UNIVERSITY OF CAPE COAST

INDIGENOUS KNOWLEDGE AND OCEAN MANAGEMENT PRACTICES IN AXIM, GHANA

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BY

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DECLARATION

Candidate's Declaration

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

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

Name: .....

Supervisor's Declaration

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

Supervisor's Signature.....…… Date.....

Name: .....

ABSTRACT

The issue of effective ocean management practices has assumed a centre stage of national debate in such contemporary times because of its impact on coastal communities and the nation as a whole. Indigenous Knowledge in ocean management has played the role of ensuring the usage of useful practices in managing the oceans. This study explores the forms of ocean-related-Indigenous Knowledge and the patterns of ocean- related-Indigenous Knowledge transfer in the Western Region of Ghana, its relevance in managing the ocean effectively and the seemingly impediments to the promotion of ocean related IK in coastal communities in modern times. By the use of qualitative approach, a total number of 17 focus group discussions and 7 key-informant interviews were conducted. The study employed the Diffusion of Innovation theory by Everett Rogers and Woodley's Ecological Knowledge theory and used thematic analysis and phenomenological analytic strategy as the analytic techniques. Among other findings, the participants revealed that ocean-related indigenous knowledge like observance of no-fishing holidays, serving of food to the gods in the sea for bumper harvest, and customary laws against the harvest of specific fishes in the sea in Axim helped in preserving the sea and its environs sometime past. However, the non-application of indigenous knowledge in recent times has led to the deterioration of the sea surroundings and its resources in Axim. The findings also revealed that there was a huge gap between the knowledge on ocean related IK and practice as a result of the heavy presence of religion and modernization. The paper argues that indigenous knowledge has a way of enhancing the deployment of useful practices in managing the oceans; nonetheless, pragmatic measures like the formation of intergenerational learning programs or clubs and the encouragement of apprenticeship between younger and older members of the community need to be considered to ensure IK's continuous application and enforcement among natives in the coastal communities and its successful transfer to the youthful generation.

KEYWORDS

Indigenous Knowledge,

Ocean Management Practices,

Knowledge Transfer.

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DEDICATION

To;

My mother, who teaches me,

My brother, Isaac Kofi Obeng, who has been a backbone and pillar

Dr J.W Ansah and Dr G.Y. Oduro, who guide me in this journey,

My sibings, who inspire and motivate me.

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LIST OF ABBREVIATIONS AND ACRONYMS

IK	Indigenouns Knowledge
UN	United Nations
UNCD	United Nations Conference on Desertification
UNCLOS	United Nations' Convention on Law of the Sea

CHAPTER ONE

INTRODUCTION

Background to the Study

There is no gainsaying the fact that the oceans play an integral role in the survival of humans. The oceans all over the world are a major source of protein for majority of the world's population (Wright 2019; FAO 2019; Paradinas et al., 2016). Additionally, the ocean links nations and cities globally, fostering trade and economic activity for the 38% of the world's population that lives within 100 kilometers away from the ocean. (Pawan, et al 2016; MOFAD 2015).

This notwithstanding, it is considerably important to note that Africa's fishing potentials and other ocean related activities remain untapped and poorly managed (Lopez, 2016). More than 90% of Africa's imports and exports are carried out by sea, with 38 of the 54 states in the continent being coastal (Lopez, 2016; Pawan et al., 2016).

Ghana, just like many other nations in Africa has relied mainly on the oceans for the provision of jobs, medicine and food. Over US$ 1 billion is generated as revenue from the sector each year with about 4.5 percent contribution to Gross Domestic Product (GDP) of the nation (MOFAD, 2015; Adjei & Sika-Bright, 2019; Eshun et al, 2019). The importance of the blue economy to Ghana or any other nation that is endowed with the resource cannot be underestimated (Amarh, 2019).

The oceans' ability to better the lots of coastal communities and the nation as a whole remains a mirage without resorting to effective ocean management practices (Amarh, 2019; Eshun et al, 2019; Amlalo, 2008). The

issue of ocean management practices has therefore assumed a centre stage of national debate in such contemporary times because of its impact on coastal communities and the nation as a whole.

These ocean management practices, as defined by Katona et al (2017) are the systematic processes for the continuous improvement of management policies and practices toward defined goals by learning from outcomes of previous policies and practices (cited in Winther, Dai, Douvere, Fernandes, Halpin, Hoel, Juinio-Meñez, Li, Morrissey, Rist, Scarano, Trice, Unger, & Whitehouse, 2020). Ocean management practices therefore have a strong connection with policy frameworks and finds expression in global and national policy frameworks (Ban et al 2020; Johannes, Freeman, & Hamilton 2000). It is against this backdrop that there have been recent calls for global and national policy frameworks to govern and manage these oceans (Singh, 2017; Lisa, Noella, Fairbanks, Silver, Gruby, Dubik, Basurto, 2016; Reppetto, 2005). These institutional frameworks are institutions established by Law of the Sea Convention (LOSC), United Nations Open-ended Informal Consultative Process on Oceans (the Consultative Process), Oceans and Coastal Areas Network (UN-Oceans), Post -UNCED Developments Guiding the Institutional Framework (Singh 2017; Tarmizi 2010) and national policies like the Fisheries Act of 2002, Act 625 (Amuzu et al.,2016).

In view of such recent calls for better ocean governance, Amarfio (2021) points out that there is the urgent need for an all-encompassing general policy on ocean governance that will augment the efforts of the already existing Fisheries Management Act 625 in Ghana by clearly defining the role

of IK in such management process. It is within this context that the role of IK in management practices gains impetus.

Researchers of various dispositions have therefore argued the place of indigenous knowledge in fisheries and ocean management by clearly defining IK as the embodiment of knowledge that is distinctive to a particular culture and has been passed down from generation to generation usually by oral tradition or by word of mouth. It is learned through the beliefs, culture and rites, customs and traditions of a particular group of people (Ban et al, 2017; Abukha 2015; Drew 2005; Berkes et al 2000; Paul 1998). Paul (1998) contends that the idea of traditional knowledge or IK brings out the image of respectful learning from Elders. According to him, the elders of every community are indeed the knowledge keepers and are amongst the most respected persons in every society. Beaufort Sea Partnership (2021) posits that this type of knowledge continues to grow and evolve over time. They continue to argue that the continuous and evolving nature of IK over time ensures that current knowledge is incorporated into the existing body of IK. It is instructive to note that this type of knowledge lies in the bosom of local institutions that can play vital role in the management of the oceans or natural resources by defining practices, assigning tasks and guiding interactions of people on issues related to resour ce-use (Ban et al, 2017; Abukha 2015; Drew 2005; Berkes et al 2000; Paul 1998).

Eckert et al., (2018) identify that despite having regional and location-specific characteristics, indigenous governance ideas are universal. For instance, many Indigenous peoples have customary maritime tenures, under which individuals, families, or communities are in charge of maintaining

certain areas or resources (Pawan et al., 2016). Although specific implementation varies, the role of IK in management practices can therefore never be side-lined (Johannes 1978, Colding and Folke 2001, Cinner and Aswani 2007).

The benefits of integrating indigenous knowledge in ocean management practices in Ghana are therefore far-reaching. Alexander et al (2019) are of the opinion that taking into consideration diverse knowledge systems like IK in the management of the oceans improves our understanding of socio-ecological interdependencies, can lead to innovation, and contribute to the identification of desirable pathways for the future. He further intimates that it expands the evidence-base, increases legitimacy, and builds trust in decision making and environmental management. Incorporating IK in ocean management, according to Alexander et al. (2019), will give a human face to such a management approach, as it will make the communities feel part and parcel of such systems (Appeaning Addo & Appeaning Addo, 2016).

What then is the reality in the case of Axim? Axim is assumed to be one of the oldest fishing towns in the area with enormous preservation ethics in the town's IK particularly, cosmological beliefs, totems and taboos and drawing from the town's IK will help in safeguarding the fast deteriorating nature of the ocean(Adom, 2016).

The growing relevance of IK makes it exceedingly exigent for a new chapter in ocean management research to explore its significant role in ocean management practices in Axim.

Statement of the Problem

Researchers in marine resources management have argued that the role of indigenous knowledge in management practices is always been considered inferior to scientific knowledge. However, studies on the role of indigenous knowledge in natural resources do exist. The case of countries within East Africa demonstrates this daunting reality (Semesi, 1998; de la Torre-Castro and Lindström, 2010). Information on how IK could be used vis-à-vis the scientific knowledge in managing these resources is lacking and not sufficient in scope (Berkes, 2012; Folkes 2016). It then becomes indicative of the fact that most of the ocean management planning in the region has not been wider and all-encompassing thereby downplaying the relevance of IK in ocean management (Semesi, 1998; Shilabukha, 2015; UNESCO, 2015; Tobisson, 2014).

In view of the above proposition, Addo & Addo (2016) brought into perspective the need to combine indigenous knowledge and empirical research. However, the focus of such research was on how IK could help in mitigating the problem of soil erosion.

Thornton & Scheer (2012) in terms of the objective of their study sought to investigate the historical contexts to indigenous knowledge and contemporary baseline information whereas Jabali et al.(2020) sought to find out how IK could be used as stewardship techniques to improve conservation planning and Hens (2019) research's objective sought to investigate the methods and techniques to the preservation of IK in relation to marine resources and Boafo et al.(2016) also examined the experiences of rural folks regarding the value of IK to ecosystem management. What is therefore lacking

in the studies cited so far is that, in terms of objectives, the studies' objectives focused generally on establishing the relevance of IK without specific recourse to the nature and forms of IK, the patterns of IK transfer and the impediments to the promotion of IK as a management tool in ocean management. However, studies by Abane (2015) and Adjei & Sika-Bright (2019) which were both situated in the Western Region sought to identify through community engagement, factors that have either constrained or facilitated the management of artisanal marine fish resources and the role traditional beliefs play in sea fishing respectively.

Key among the findings of subsequent studies by Utombo (2020) and Boafo et al (2016) is that the centralistic approach of managing marine ecosystem has really failed to protect marine ecosystems. Within the context of methodological contributions, their research relied on semi-structured questionnaires, field observations and interviews to probe into the indigene's knowledge and perception about indigenous knowledge in managing marine resources. While acknowledging the value of employing this methodology for its broader reach in engaging research participants, it is notable that a methodological gap emerges concerning the depth and detailed information regarding the experiences and perceptions of individuals in terms of their understanding of Indigenous Knowledge (IK), the forms of IK, the patterns of IK transfer overtime and the impediments to IK promotion. There is therefore the increasing need to resort to key informant interviews, field observations, focus group discussions and creative pictures in order to fill the research gap of depth in responses in terms of methodology as portrayed in the aforementioned studies.

It is worth noting that studies by Yahaya (2012); Drew (2005); Hens (2019); Fuseini & Mahama (2016) that based their research on the role of IK in managing natural resources and the role of IK in managing marine resources respectively were too broad in nature and scope. Their studies were not exclusively centred on the role of IK in ocean management specifically; thereby making IK's role in Ocean management in these studies very scanty and assimilated into the information of other areas and fields. This therefore casts a gloom on the detailed nature of the information on IK and ocean management practices needed for rich academic discourse to advance.

Taking into cognizance some of these aforementioned studies, it becomes clear that issues about the role of IK in resource management have been highlighted. Nonetheless, it is imperatively instructive to note that works specifically talking about the usage of IK in ocean governance and management in Ghana are rare and often insufficient in scope and depth to critically assess the forms of IK, the patterns of IK transfer and how IK has improved the quality of ocean management and governance in mitigating the management in Ghana today.

The way and manner the aforementioned studies were carried out in terms of the study focus, objectives and methodology is only symptomatic of the fact that attention could still be given to the role of IK in ocean management practices but with particular attention to the forms, nature and patterns of IK in ocean management practices in Ghana so as to paint a clear picture on the need to incorporate them into national policies (Alexander et al., 2019; Addo and Addo; 2016).

Axim is considered to be one of the oldest fishing towns in the area with enormous preservation ethics in the town's IK particularly, cosmological beliefs, totems and taboos and drawing from the town's IK will help in safeguarding the fast deteriorating nature of the ocean in this region(Adom, 2016). This study therefore seeks to explore the role of IK in ocean management in Axim by paying particular attention to the forms and patterns of indigenous knowledge transfer.

General Objective

To explore the patterns of IK diffusion and its role in impacting ocean management practices and governance in Ghana.

Specific Objectives

1. To identify the nature and forms of indigenous knowledge in coastal communities regarding ocean management.
2. To interrogate the patterns of indigenous knowledge transfer in Axim.
3. To assess how indigenous knowledge has improved ocean management practices in Axim.
4. To explore the impediments to the promotion of indigenous knowledge in ocean management and governance in Axim.

Research Questions

1. What are the forms and nature of indigenous knowledge regarding ocean management?
2. What are the patterns of indigenous knowledge transfer in Axim?
3. How has indigenous knowledge improved ocean management practices in Axim?

4. What are the impediments to the promotion of indigenous knowledge in ocean management and governance in Axim?

Significance of the Study

The findings of this study will help policy makers in appreciating the forms and nature of indigenous knowledge, the patterns of indigenous knowledge transfer in coastal communities and how the incorporation of such indigenous knowledge can help govern the oceans effectively and boost ocean resources.

The study will empower local communities by recognizing and documenting their indigenous knowledge related to ocean management practices. This acknowledgment can enhance their sense of agency and pride in preserving traditional practices. This will also make substantial contributions to the strengthening of fisheries management policies and laws. The findings of this study will go a long way to help policy makers to come out with robust and a more resilient frameworks which will see to the incorporation of indigenous knowledge in ocean management just as espoused by the 1982 United Nations Convention on the Law of the Sea (UNCLOS), which provides the basic global framework for ocean governance. This study will also breed empathy on the part of the local community members to feel that they are part of parcel of the management process of the ocean.

Within the circus of academia, the findings of this research will contribute substantially by adding to existing body of knowledge in relevant subfields of Sociology like Sociology of the Blue Economy and Political Sociology, Marine Sociology and Rural Sociology.

Organization of the Study

This thesis is presented in five chapters. The first chapter takes into consideration the introduction of the study. After a presentation of the introduction to the study, I reviewed literature on concepts, theories and empirical works. The methodology that is employed in this study is the third thing to consider. The methodology was broken down into sub-topics like the research philosophy, research approach, research design, population, sampling technique and sampling size and data gathering instruments. The next part is the data analysis section. The fifth chapter provides the summary, conclusion and recommendations, implications for further studies and the limitations.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter discusses concepts related to indigenous knowledge and ocean management practices (i.e, definition of knowledge, understanding knowledge transfer and the concept of indigenous knowledge). This chapter also reviews relevant literature on the historical contexts to indigenous knowledge and the brewing tensions between knowledge and western science within the global, continental and regional perspective. The chapter also discusses the theoretical perspectives (i.e. Diffusion of Innovation theory and Woodley's Ecological Knowledge Theory). It further reviewed literature on knowledge transfer and the formal recognition of indigenous knowledge across the globe. The first subsection begins with the conceptual review of the study.

Conceptual Review

Historical Background to Indigenous Knowledge

Historically, the form and application of indigenous knowledges that predate colonialism have been hampered by the cultural assumption that these knowledges are simple and unsophisticated. By treating indigenous cultural traditions and territory as public scientific property, Western practitioners seriously endangered their integrity. Archaeologists carried out damaging and unethical research methods. The harm included the stealing of cultural property, the imposing of nationalist ideology, the disruption of traditional practices, the harming of local ecosystems, the misrepresenting of indigenous culture and property in museums, and overall disregard for it (Bruchac, 2014).

Smith (2012) has argued that the legitimacy of indigenous knowledges was mostly unknown to scientists in the early days of archaeology, and there were few fruitful intellectual exchanges between indigenous and European knowledge-bearers. Indigenous peoples were typically considered as objects rather than as collaborators. When compared to imperialist ideals and larger organized religious groups, indigenous beliefs and customs were seen as religious superstitions. Indigenous peoples were politically disempowered and endured hostile environments across North and South America, Australia, and New Zealand, making it challenging for traditional groups to preserve coherence (Smith 2012). Among the Maori, colonization directly interfered with the authority of traditional leaders and traditional knowledge, stripping away Maori control of their land and destiny (Bruchac 2014).

Bruchac (2014) maintains that traditions passed down from one generation to the next and from one society to another are the foundation of all human knowledge. In this sense, scientific approaches to resource management could be seen as a collection of customs that grew out of the unique social interactions and power dynamics that formed in the context of contemporary European academies. In those institutions, the scientific method, valued for its purported neutrality, was developed as a research methodology.

However, the data is cataloged and categorized in ways that are somewhat removed from actual experience and sensory perception (Apffel-Marglin 2011; Smith 2012). Scientific organizational and thought processes are based on disciplinary divisions that divide the natural world and human creations into separate categories that do not correspond to their geographical origins (for example, the usage of Latin names for flora and animals). In

contrast, indigenous knowledges are naturally holistic and integrative because they are based on sensory awareness and human experience of the intricate interactions between many animals in various environments (Apffel-Marglin 2011; Augustine 1997; Smith 2012). According to Bruchac (2014), indigenous knowledge is not entirely unscientific, and the terms "science" and "tradition" do not always have to be mutually exclusive in order for humans to understand and engage with the natural world.

In conclusion, it is imperative to note from the argument so far that indigenous consultation was not routine in the management of natural resources in western societies until it gathered much debates in the 1970s.

Understanding the concept of indigenous knowledge

The difference between "traditional knowledge" and "indigenous knowledge," which have been employed interchangeably or differently depending on the context by the United Nations and United Nations' Conference on Desertification, is also unclear. It is important to state that although there have been initiatives to define the connections between some of the terminologies, none has gained widespread approval, and terminological difficulties persist (Thathong, 2014). The idea of indigenous knowledge has been referred to differently by writers and scholars of various dispositions based on how they used the term in their works or research. Berkes 2000, Colding 2012 as cited in Donda and Manyungwa-Pasani (2018) argue that some scholars have referred to the whole idea of indigenous knowledge as traditional ecological knowledge, traditional environmental knowledge and traditional technical knowledge whereas others refer to it as simply local knowledge or informal knowledge. Adom (2016) justifies this term, 'informal

knowledge' by arguing that it is informal because it is learned outside of formal institutions, by personal experience or experimentation, and informal observations of cultural and artistic activities. This argument is consistent with that made by Wilder, O'meara, Monti, and Nabhan (2016), who claim that indigenous knowledge is informal because it is passed orally from elders to young people who are extremely conscientious and respectful. These elders are knowledgeable about the people's cultural heritage. Additionally, IK is regarded as traditional because it is passed down from one generation to the next and is unique to a certain group of people or ethnic culture within a cultural framework (Battiste, 2002). Donda and Manyungwa-Pasani (2018) are of the view IK finds expression in the culture of the people and evolves gradually through interactions from one generation to the other.

Indigenous knowledge is more accurately described by Kandal, Swart, Yacoub, and Gerkema (2021) as the well-developed, long-standing customs and practices of a particular regional, indigenous, or local populations. They go on to claim that IK also includes the teachings, knowledge, and wisdom of specific groups. This information has frequently been passed down verbally from one generation to the next. Folklore, legends, stories, songs, rituals, and even laws are used to express the majority of indigenous knowledge. Different methods are frequently used to express other types of traditional knowledge.

In other vein, IK is said to have deep spiritual connections with the oceans and its resources (Utombo, 2010; Kandal, Swart, Yacoub, & Gerkema,2021). Utombo (2010) points out that local people and their communities form an integral part in environmental management, preservation and protection because of their in-depth knowledge in traditional practices. He continues to

argue that there is the increasing need for states and countries to recognize, support their identity, culture and interests in order to ensure sustainable development of this natural resource (ocean)

Berkes (2000) as quoted by many references defines IK as the embodiment of knowledge that is distinctive to a particular culture and has been passed down from generation to generation usually by oral tradition or by word of mouth. It is learned through the beliefs, culture and rites, customs and traditions of a particular group of people (Abukha, 2015). Berkes (2000) definition of IK is also in tangent with the definition of the International Council for Science, 2002 as they note that IK can be defined as a collective body of knowledge, know-how, practices, and representations that peoples with long histories of environmental interaction have generated and maintained.

According to Drew (2005), IK is an important concept that is symbolic of knowledge acquired from engaging in a variety of activities, such as gathering medicinal plants, preparing for spiritual rites, hunting and gathering, or maintaining a family economy. Nakata et al, (2005) is of the view that It typically consists ethnic narratives, music, folklore, proverbs, cultural norms, religious beliefs, rituals, local laws, dialects, and agricultural activities…. To sum up the definitions, Mulatap et al., (2020) introduced a broad essence of IK as *a living body of knowledge, practices, skills and innovations […] passed down through generations continuously and in locally meaningful contexts by [indigenous peoples and local communities] who act as creators, developers, preservers, guardians, and custodians.*

It is instructively imperative to note that there exist IK attached to various fields like Agriculture, health and medicine, hunting and gathering and environmental management. However, the current contestations within the literature have been that there is no definite and internationally recognized and accepted definition of IK in international law. Indigenous knowledge is more than just a way of comprehending how things are than it is a form of knowledge that can be contained or quantified in the same way as western scientific disciplines. IK is based on a wide range of values and concepts that can differ from community to community. The most prevalent principles are connectedness to one another and the environment, accountability, respect, and reciprocity (Ross et al., 2021). The dynamic nature of people and their cultures makes it practically impossible to have a definite definition of IK that is representative of all local communities and cultures (Utombo, 2010).

To address such complexities existing in getting a definite definition, researchers within ocean research have argued that there is the need for a general agreement among researchers to describe indigenous knowledge as (i) place specific or culture specific, (ii) belongs to specific group of people who have close connection with nature, (iii) and has a sharp contrast with 'western' or 'modern' scientific knowledge (Studley 1998 as cited in Utombo, 2010).

In conclusion, it becomes clear that IK is a place-based knowledge which informs local peoples' day-to-day decision-making about their immediate environment and encompasses language, resource use and management…, social interactions, cultural practices, and spirituality.

Defining the Concept of Ocean Management Practices

Ocean management practices refer to the various strategies and policies that aim to ensure the sustainable use and protection of marine ecosystems and resources. These practices can include regulations and laws, fisheries management plans, marine protected areas, ecosystem-based management approaches, and stakeholder engagement and participation (Fletcher et al., 2019; UNESCO, 2021). Unlike policies, which are often broad and general guidelines, ocean management practices are specific and practical measures that are designed to address specific issues and challenges faced by the ocean. Some examples of ocean management practices include marine protected areas, sustainable fishing practices, and ecosystem-based management (United Nations, 2017).

The United Nations has identified sustainable ocean management practices as crucial for achieving the sustainable development goals, particularly those related to poverty reduction, food security, and climate change mitigation and adaptation (United Nations, 2017). The implementation of effective ocean management practices requires the collaboration of stakeholders, including government agencies, civil society organizations, private sector actors, and local communities (Fletcher et al., 2019).

Marine protected areas (MPAs) are one of the most effective ocean management practices that have been implemented in recent years. MPAs are designated areas in the ocean where human activities such as fishing and mining are restricted or prohibited to protect marine biodiversity and ecosystem services. MPAs help to conserve and restore critical habitats, protect endangered species, and enhance the resilience of ecosystems to

climate change. MPAs also provide socio-economic benefits, such as supporting sustainable fisheries, tourism, and recreation (Fletcher et al., 2019; UNESCO, 2021).

Sustainable fishing practices are another important ocean management practice that aims to maintain healthy fish populations and promote sustainable seafood production. Sustainable fishing practices include measures such as setting fishing quotas, reducing bycatch, and using gear that minimizes damage to the seabed and marine life. These practices ensure that fish stocks are not overexploited and that the fishing industry remains economically viable and socially responsible (Fletcher et al., 2019).

Another ocean management practice identified by Kandal et al., (2021) is the ecosystem-based management. It is a holistic approach to ocean management that recognizes the interconnectedness of marine ecosystems and their relationship with human activities. by Kandal et al., (2021) argues that ecosystem-based management takes into account the multiple uses of the ocean, such as fisheries, shipping, energy production, and recreation, and aims to balance these uses with the conservation and restoration of marine ecosystems. This approach is essential for addressing complex and interconnected issues such as climate change, ocean acidification, and marine pollution.

In conclusion, ocean management practices are essential for the sustainable use and conservation of our oceans. Effective ocean management practices such as marine protected areas, sustainable fishing practices, and ecosystem-based management are critical for ensuring the health and resilience of our oceans and the livelihoods and well-being of the people who

depend on them. It is essential that policymakers, stakeholders, and communities work together to implement and support these practices and to continue to innovate and improve them in the face of evolving challenges and opportunities.

Formal Recognition of Indigenous Knowledge across the World

It has been argued in the literature that indigenous knowledge was recognized by the Convention on Biological Diversity (CBD) in 1992 as a valuable traditional knowledge system which will be useful in protecting species, ecosystems and other marine resources.

With this convention in view, a number of international organizations and governments all over the world have come out with projects and guidelines which are related to the knowledge systems of indigenous people (Utombo, 2010)

Utombo (2010) notes that the use of indigenous knowledge in the development process resulted from a series of events. For instance, the 1992 United Nations Conference on Environment and Development (UNCED) aimed at recognizing and strengthening the role of indigenous people and their communities, the 1992 United Nations Conventions on Biodiversity (UNCBD) aimed at conserving the earth's biological diversity, and the ILO Convention 169 of 1989 aimed at protecting indigenous peoples and their cultures and languages from vanishing with special actions by the Government authority (Capistrano 2010). More recently, the United Nation’s 2019 Permanent Forum on Indigenous Issues also established a pressing need to recognize value and preserve indigenous people’s knowledge.

Taking into cognizance the sequential events leading to the recognition of IK, it becomes evident that IK has only gained momentum and relevance in international circles not long ago. Issues surrounding the recognition of indigenous knowledge especially in ocean management are rife all over the world (Capistrano 2010).

Understanding knowledge transfer

The generation of knowledge and the dissemination of knowledge are two aspects of knowledge that Hanusch, Maußner, and Rahmeyer (2009) introduce. With the advent of information and communication technology (ICT), which not only encourages the spread of knowledge but also enforces its creation indirectly (Hanusch, Maußner, & Rahmeyer, 2009) as well as serving as a marker of created knowledge, the connections between the facets are much more clearly expressed.

Knowledge transfer and diffusion is characterized in the classic works by Rivera-Batiz and Romer (1991) as cited in Ansah (2020) as either a direct transfer in the sense of a transfer of human capital or as a more indirect transfer associated with the diffusion of new technologies and of intermediate and capital goods. Indeed, knowledge dispersion occurs when information is shared between members of social systems that do not straddle the same national geographical boundaries through specific pathways.

Indigenous knowledge (IK) encompasses the accumulated insights, skills, and practices passed down through generations within specific cultural contexts. In Africa, where diverse ethnic groups coexist, understanding the generation and transfer of indigenous knowledge is crucial for appreciating the rich tapestry of traditions that underpin societal resilience and sustainability

(Sraku-Lartey, 2014). The generation of indigenous knowledge in Africa is a dynamic process deeply intertwined with the environment, community, and spirituality. Indigenous knowledge is often produced through observation, trial and error, and a profound connection to nature. In Ghana, for instance, traditional agricultural practices, herbal medicine, and craftsmanship contribute to the vast repository of indigenous knowledge (Hanusch, Maußner, & Rahmeyer, 2009).

Rivera-Batiz and Romer (1991) as cited in Ansah (2020) note that the transfer of indigenous knowledge is influenced by various factors, including cultural practices, oral traditions, and social structures. In Ghana, the extended family system plays a pivotal role in transmitting knowledge from elders to younger generations. Additionally, rituals, storytelling, and apprenticeship programs contribute to the effective transfer of indigenous knowledge.

Sraku-Lartey (2014) contends that In Ghana, as in many African societies, orality is a dominant mode of communication. Elders impart knowledge through storytelling, using myths, proverbs, and folktales to convey essential life lessons. This oral tradition is a powerful tool for transferring indigenous knowledge, fostering a sense of identity and community.

Agyemang, Ngulube, & Dube (2019) are of the view that apprenticeship is a cornerstone of indigenous knowledge transfer in Ghana. Craftsmen, healers, and agriculturalists pass on their expertise to the younger generation through hands-on training. This experiential learning approach ensures the practical application of knowledge and the preservation of traditional skill. Rituals and ceremonies play a significant role in indigenous

knowledge transfer in Ghana. Initiation ceremonies, rites of passage, and community celebrations serve as platforms for sharing knowledge related to spirituality, healing practices, and sustainable resource management.

Despite the resilience of indigenous knowledge transfer mechanisms, Boadu (2022) notes that there are challenges such as globalization, modernization, and the diminishing influence of traditional institutions. However, there are also opportunities for revitalization through community-led initiatives, the integration of indigenous knowledge into formal education, and the recognition of its value in sustainable development.

Understanding indigenous knowledge transfer in Africa, particularly in Ghana, requires a nuanced appreciation of cultural, social, and environmental contexts. By acknowledging the diverse methods of knowledge generation and transmission, societies can harness the strengths of indigenous knowledge for sustainable development. As we navigate the complexities of the modern world, preserving and respecting indigenous knowledge becomes imperative for maintaining the unique cultural heritage that defines Africa (Boadu, 2022).

Knowledge transfer just like indigenous knowledge transfer is challenging to assess, both practically and theoretically, according to Krugman (1991) as cited in Ansah (2020). In order to quantify and track information flows, they must be invisible and leave no paper trail. Hanusch, Maußner, and Rahmeyer (2009) believe that the dissemination process itself can be thought of as an epidemic or as a hierarchical phenomenon, providing further insights in a somewhat metaphorical way. The first presupposes that knowledge diffusion spreads evenly across space from a certain source. Instead, the latter

views agglomeration phenomena as enhancing the process of information diffusion. Knowledge first spreads from the source to agglomerated areas, then, with some lag time, to the periphery of the economy.

As a result, the development and dissemination of knowledge are not only dependent on context or problem-based, but also have a time and space dimension.

Theoretical Review

This study will particularly draw from the knowledge diffusion theory by Everett Roger and Woodley's Ecological Knowledge Theory.

Diffusion of Innovation Theory

As succinctly expressed by Green et al. (2009) that for many centuries, the theory of diffusion has served as a reliable source for the production of knowledge in terms of ideas generation, concepts, and measures. Green et al. strengthen the case by pointing out that diffusion theory has evolved into a collection of ideas from various social sciences concerned with the spread of knowledge among populations or a group of people over time. These ideas include the transfer of knowledge, experiences from the application of technology, and experiences from the use of new technologies. The evolution of diffusion theory marks the emergence of various theoretical explanations for social behaviour and has been applied in various sub disciplines of practice in communications, Public Health, History, Economics, Political Science, marketing, and education (Green et al.,2009; Medlin, 2001; Parisot, 1995, Dooley, 1999; Stuart, 2000).

The theoretical foundation of this study stems from Everett Roger's diffusion of innovation theory. The theory provides an in-depth explanation to the dynamics, contexts and processes within which an idea, information or knowledge gains grounds and acceptance through a group of people or population. The Diffusion of Innovation theory has prevailed over the changing phase of time and has proven to be a relevant tool to understand the underlying mechanisms for an idea or knowledge to catch on, regardless of its cultural or societal system (Atkin et al., 2015). Rogers (1995) therefore define diffusion as the process in which an innovation (idea, values, knowledge, and information) is communicated through certain channels overtime among the members of a social system. From the very definition, it becomes crystal clear the definition is primarily made up of four components; innovation, communication channels, time and social system.

"An idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers, 1995, p. 11) is how Rogers (1995) described innovation. The innovation-decision process can be defined as the "process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to either adopt or reject, to implementation of the new idea, and to confirmation of this decision" (Rogers, 1995, p. 20 as cited in Dooley & Murmphrey, 2000).

Rogers' notes that there are categories of those who adopt these ideas, values, and knowledge and they include; the innovators (those who are quick to take up new ideas and knowledge). The second in this category are the early adopters (those who represent the respected members of the society like

opinion leaders and are more integrated in the system willing to embrace change). They are followed by the early majority (those who rarely perform leadership roles but adopt new knowledge before the average person). The fourth in this category are the ones described as the late majority (those who are cautious about change and have a questioning attitude to the innovation and will only adopt the innovation after many people have tried it). The last group are referred to as the laggards (those who are bound by tradition and are very conservative)

Evolution of Knowledge

Knowledge and its definition have been widely discussed in the literature in terms of its philosophical and theoretical contexts. The term "knowledge" refers to a wide range of interconnected elements, including, mentioning a few, experiences, rituals, worldviews, social and family institutions, languages, and the customary use of lands and natural resources. (Mustonen, 2020). Additionally, knowledge has been described as a "intangible" resource that can be produced, altered, and exploited by a variety of actors (Purwaningrum, Beckhanov and Sepulveda, 2009). According to Hayek (1945), knowledge only exists as the scattered fragments of inadequate and usually contradictory knowledge that each distinct person possesses. Knowledge never exists in a concentrated or integrated form (Mustonen, 2020).

Polanyi (1967) as cited in Ansah (2020) has argued that contextually, knowledge has evolved and manifested in two categories; implicit and explicit knowledge. Explicit knowledge can be carried out using formal and methodical language in books, archives, databases, and libraries, according to

Polanyi (1967) as cited in Ansah (2020), making it simple to understand. Contrarily, tacit (implicit) knowledge is more intimately linked to the individual because it is based on instinct, values, and opinions that have been formed through experiences (Lahti & Beyerlein, 2000). Implicit knowledge, according to Polanyi, cannot be instantly recorded through time and space and must be transmitted by personal touch via face-to-face conversation. As a result, knowledge can be conveyed as well as created, used, and modified. In fact, the setting in which information is produced determines the mechanism of transmission (Urmetzer, Schlaile, Bogner, Mueller, and Pyka, 2018). Ansah (2020) therefore notes that language parity, as well as the fundamental knowledge, adaptability, and inventiveness of the players in the recipient region, are key factors in the effectiveness of knowledge transmission from one region to another.

These characteristics are also emphasized by Nonaka and Takeuchi (1995), who claim that tacit knowledge depends on acquired knowledge, beliefs, emotions, and personal talents and is contextually and individually specific. According to Zack (1999), tacit knowledge is the foundation for a specific culture's or communities' long-term competitive advantages because it is challenging to formalize and consequently challenging to replicate. A well-known model created by Nonaka and Takeuchi is based on the contrast between explicit and tacit knowledge, and it is widely discussed in the literature. A well-known model created by Nonaka and Takeuchi is based on the contrast between explicit and tacit knowledge, and it is discussed in the chapter that follows. The differentiation is seen in table 1

Table 1: Explicit and tacit knowledge (Thomas et al., 2005, p. 13)

Explicit Knowledge (Objective)	*Tacit Knowledge (Subjective)*
Knowledge of rationality (mind)	Knowledge of experience (body)
Sequential knowledge (there and then)	Simultaneous knowledge (here and now)
Digital knowledge (theory)	Analogue knowledge (practice)

All knowledge, according to Polanyi (1966), is made up of explicit and implicit components. Many more recent publications, according to Lahti and Beyerlein (2000), disregard this claim and view knowledge as either explicit or tacit. They present a continuum of knowledge that has been extensively addressed in the literature.

According to the continuum theory, knowledge is considered explicit when it tends to fall more on the explicit end of the continuum's scale, meaning there is a lot of explicit information and little tacit knowledge present. Contrarily, knowledge is said to as tacit when it tends to lean more toward the latter end of the continuum, implying a low level of explicit knowledge and a high level of tacit knowledge (Lahti & Beyerlein, 2000)

In conclusion, it is exigent to note that knowledge may also be transported in addition to being generated, used, and altered. According to Urmetzer, Schlaile, Bogner, Mueller, and Pyka (2018), referenced in Ansah (2020), the context in which knowledge is formed determines the mechanism of transmission and usage.

Theoretical Assumptions of Diffusion of Innovation

According to Rogers', the grounds or rate at which knowledge will be adopted hinges on five assumptions; 1) relative advantage, 2) compatibility, 3)

complexity, 4) trialability, and 5) observability. He argues that Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes (Rogers, 1995; Robinson, 2009). For this to come into fruition, many change agencies use incentives to increase the rate of adoption. The main function of an incentive is to increase the degree of relative advantage a new idea has over the existing one.

The second attribute, compatibility depends on how well the innovation fits the requirements, values, and experiences of potential adopters (Rogers, 1995, p. 224). According to Rogers (1995, p. 242), the third feature, complexity, describes the innovation's simplicity and usability to others or adopters. More sophisticated innovations have a slower adoption rate. The fourth factor, trialability (sometimes referred to as divisibility), "measures the extent to which an invention may be tried with a basis that already exists before a hasty effort is made to implement the innovationInnovations that can be tested on an installment plan are typically accepted faster than non-divisible innovations (Rogers, 1995, p. 243). The final characteristic, observability, "is the degree to which the results of an innovation are visible to others" (Rogers, 1995, p. 244).

The theory of DOI and its applicability to knowledge transfer finds expression in the reality that knowledge should be understood as socially constructed which can be adopted for varying reasons within volatile diffusion arenas.

Criticisms to the Theory of Diffusion of Innovation

The theory of DOI, despite its numerous strengths has received widespread condemnation from many researchers of various dispositions.

Lyytinen and Damsgaard (2001) posit that the theory's strong stance on the fact that people will adopt a particular knowledge based on rationality is not always true but also unrealistic. They are of the view that a particular population's decision to adopt a particular idea, value or knowledge is sometimes obligatory because that is the only option the adopters of such idea have at that material moment. DOI has been criticised to be pro-innovation bias, the implication that an innovation should be diffused and adopted by all respective people where the act of innovating is considered positive and the act of rejecting an innovation is considered negative, individual- blame bias(blaming the individuals who do not adopt the innovation for their lack of response rather than the development agency) and the problem of equality(ignoring the negative impacts of the theory are not considered in terms of unemployment, migration of rural people and equitable distribution of incomes) .

Another critique of the diffusion of innovation theory is its emphasis on the attributes of the innovation itself, rather than the social processes that influence its adoption. Critics argue that the theory tends to focus on the technical aspects of innovation, such as its relative advantage, compatibility, and complexity, while overlooking the social factors that may facilitate or hinder its adoption. For instance, scholars such as Callon (1986) have argued that the theory's emphasis on the attributes of innovation tends to ignore the social processes that can lead to the rejection or acceptance of an innovation.

Critics also argue that the diffusion of innovation theory overlooks the role of power in the diffusion process. The theory fails to account for the power dynamics that exist between different social actors and how these dynamics

can influence the adoption of innovations. Burt (1987) argues that the theory's emphasis on social networks tends to overlook the power differentials that exist between different actors in a social system, which can influence the flow of information and the adoption of innovations.

Amidst the diverse criticisms to the diffusion of innovation theory, it is important to note that the theory has been applied in various fields by researchers of various dispositions (Ansah, 2020; Mylan, 2015; Kaminski 2011; Valente, 2005; & Chang, 2010) including the fields of sociology, technology, health, and agriculture. In sociology, researchers have used the theory to study the adoption of new cultural practices and identify the factors that affect the rate of adoption (Coskun, 2021; Kalu, 2019; Conjo et al. 2011). In technology, scholars (see; Sobti, 2019: Mallat et al. 2005) have used the theory to identify the factors that influence the rate of adoption of new technologies such as mobile payment systems. In health, the theory has been used to understand the adoption of new health technologies and behaviors such as telemedicine, vaccination, and healthy diets (Valente 2010; Green et al. 2009). In agriculture, the theory has been used to study the adoption of new agricultural technologies and practices such as precision agriculture (Ansah 2020; Shikuku, et al. 2019; Isalm et al. 2018). Overall, the diffusion of innovation theory remains an important tool for understanding the spread of innovations and designing effective strategies for their adoption.

Riddled with deficiencies such as being individual-blame bias, internal consistencies, problem of equality and pro-innovation bias, this theory has however become relevant and has the propensity of making scholars (Ansah 2020, Mylan 2015, Kaminski 2011, Valente, 2005, & Chang, 2010) and

development agents to make sense of the adoption of innovation (ideas and values) such as indigenous knowledge which hitherto were not considered in mainstream ocean management. The theory goes a long way to also help in understanding the underlying processes and patterns regarding such indigenous knowledge's usage in the management of oceans within the Ghanaian Context.

Relevance of the Theory to the Study

The theory of DOI becomes relevant within the context that the theory has implications on the degree of adoption of IK and how its adoption can inform the deployment of useful practices for ocean management.

Putting the arguments in the theory into perspective, it is important to note that the theory is applicable to the first objective of the study which is helping to have deeper insights into the forms of ocean related indigenous knowledge existing in the communities of Axim. In the context of the forms of ocean-related indigenous knowledge, the theory helps in better appreciating and understanding the transformative process and variations of the forms of ocean related indigenous knowledge in the community of Axim overtime. In terms of exploring the forms of existing ocean related indigenous knowledge in the community of Axim, the diffusion of innovation theory better helps in understanding how ideas and practices related to the ocean are formed and developed within indigenous communities. By examining the different stages of transformation that ocean-related indigenous knowledge has undergone, including the variations or changes, adoption, and dissemination, we can better understand how traditional knowledge is passed down from one generation to the next, and how it evolves over time.

The diffusion of innovation theory can be applied to the patterns of ocean-related indigenous knowledge transfer by examining how this knowledge is disseminated, the variations and changes this knowledge has gone through overtime and how it has been adopted within indigenous communities and beyond. According to the diffusion of innovation theory, the decision process consists of five stages: knowledge, persuasion, decision, implementation, and confirmation. By analyzing how this process unfolds within indigenous communities with regards to ocean-related indigenous knowledge, we can better understand the factors that influence the adoption of a particular IK and practices related to the ocean. Also, Opinion leaders are individuals within a community who have a strong influence on others and can help spread ideas and practices. By identifying the opinion leaders within a community and their attitudes towards ocean-related indigenous knowledge, we can better understand how this knowledge is disseminated and adopted.

Regarding the forms of IK and the relevance of IK, the relevance of the theory to the research is being justified as it points out what well respected members of the community (early adopters) like the chief and elders, chief priests and priestesses, chief fisherman and other traditional leaders whose opinions hold sway in the community can do to see to the acceptance and adoption of IK as management practice with regards to the management of the oceans. This becomes important because those who do not hold any leadership positions (early majority) like fishermen, youth groups, fish processors will also decide to adopt and adhere to this IK based on what they see the respected members and opinion leaders of the community do. Thus, their decision to either adopt or reject IK will be largely dependent on the

leaders' stance on IK. This is as a result of the fact that the leaders wield a lot of influence and power in the community. Within the frontiers of the theory, the adherence of the chiefs and elders of the community, the chief fishermen, chief priestesses, etc to the forms of IK and the importance they attach to IK will even go a long way to inform the decision of those who are cautious(late majority) about the incorporation of IK into policies like some community members, Ministry of Fisheries and Aquaculture Development and the Ministry of Lands and Natural Resources to decide to adopt IK since it has been generally accepted by a chunk of the population. This will have a trickling effect on children because they learn by observation and would only adhere to such IK only after a lot of people had tried it.

Woodley's Ecological Knowledge Theory

The work also draws from Woodley's Ecological Knowledge theory. Woodley's Ecological Knowledge Theory presents a comprehensive framework for understanding the intricate relationships between human societies and their natural environments. According to Woodley, a scholar renowned for his work in environmental anthropology, this theory delves into the ways in which different cultures accumulate, transmit, and apply knowledge concerning their ecological surroundings (Woodley, 2015). This theory offers a holistic perspective, acknowledging the interconnectedness of diverse forms of knowledge within a given cultural context.

Dr. David Woodley, an esteemed environmental anthropologist, stands as the primary proponent of the Ecological Knowledge Theory. Woodley's extensive research emphasizes the significance of indigenous knowledge and its role in sustainable resource management and community

resilience (Woodley, 2013). His work has become pivotal in reshaping academic discourse, highlighting the importance of integrating traditional ecological knowledge into broader environmental studies.

Woodley's Ecological Knowledge Theory has historical antecedents deeply rooted in the emergence of environmental anthropology during the late 20th century. This theoretical framework evolved as a response to the recognition that conventional environmental studies often overlooked the profound insights embedded in local and indigenous knowledge systems. Scholars like Roy Rappaport and Julian Steward, with their emphasis on cultural ecology and ecological anthropology, laid the groundwork for Woodley's more nuanced approach (Rappaport, 1971; Steward, 1955).

Woodley's Ecological Knowledge Theory has found application across diverse geographical and cultural contexts. For instance, in the Arctic region, indigenous communities have long relied on their ecological knowledge to navigate and adapt to changing environmental conditions (Huntington, 2011). In the rainforests of South America, indigenous tribes have utilized their ecological knowledge to maintain sustainable agricultural practices (Posey, 1999). Moreover, the theory has been applied in assessing the impact of climate change on traditional resource management systems in various parts of the world (Berkes, 2018).

Woodley's Ecological Knowledge Theory extends beyond academia, influencing policy frameworks and conservation initiatives. By recognizing the value of indigenous knowledge, it advocates for the inclusion of local communities in decision-making processes related to environmental management and biodiversity conservation (Berkes, 2018). This application

ensures a more holistic and culturally sensitive approach to addressing ecological challenges.

In conclusion, Woodley's Ecological Knowledge Theory represents a significant advancement in our understanding of human-environment interactions. Rooted in the historical context of environmental anthropology, it has been applied across various regions to emphasize the importance of indigenous knowledge in shaping sustainable practices. As societies grapple with complex environmental issues, this theory provides a valuable framework for integrating diverse forms of knowledge to foster more inclusive and effective environmental stewardship.

Assumptions of Woodley's Ecological Knowledge Theory

One of the foundational assumptions in Woodley's theory is the recognition of indigenous knowledge as a valuable source of ecological wisdom. It contends that local and traditional knowledge systems are not only valid but are crucial for understanding and addressing environmental challenges (Woodley, 2013). This assumption challenges the tendency within mainstream environmental studies to overlook or undervalue the insights embedded in indigenous knowledge.

Woodley's Ecological Knowledge Theory also assumes a holistic perspective on knowledge, emphasizing the integration of diverse sources. It contends that ecological understanding goes beyond scientific paradigms and includes cultural, spiritual, and experiential knowledge (Woodley, 2015). This holistic integration is essential for a comprehensive understanding of human-environment interactions, reflecting the multifaceted nature of ecological dynamics.

The theory also hinges on the assumption that ecological knowledge is dynamic and adaptive. It acknowledges that indigenous knowledge evolves in response to changing environmental conditions, technological advancements, and socio-cultural shifts (Woodley, 2013). This assumption challenges static views of traditional knowledge, emphasizing the resilience and adaptability inherent in indigenous ecological wisdom

Woodley's theory assumes a community-centric approach, highlighting the collective nature of knowledge creation and transmission. It posits that ecological knowledge is often embedded within communities and transmitted through social networks, emphasizing the role of elders and communal rituals in knowledge preservation (Woodley, 2015). This community-centric perspective challenges individualistic views of knowledge acquisition prevalent in certain academic discourses.

In conclusion, Woodley's Ecological Knowledge Theory is underpinned by key assumptions that challenge traditional views of ecological understanding. By recognizing the value of indigenous knowledge, advocating for a holistic integration of diverse sources, and embracing the dynamic nature of knowledge systems, the theory provides a nuanced perspective on the complex relationships between humans and their environments.`

An underlying assumption in Woodley's theory is that ecological knowledge should be applied in the pursuit of sustainable practices. It contends that integrating indigenous knowledge into environmental management strategies can contribute to more effective and culturally sensitive conservation efforts (Woodley, 2013). This assumption underscores the practical implications of

embracing diverse knowledge systems for addressing contemporary ecological challenges.

Criticisms to Woodley's Ecological Knowledge Theory

While Woodley's Ecological Knowledge Theory has made significant contributions to environmental anthropology, it is not without its critics. One notable critique centers on the potential oversimplification and homogenization of indigenous knowledge within Woodley's theory. Critics argue that by categorizing diverse knowledge systems under a broad umbrella, the theory may inadvertently undermine the rich variability existing among different cultural groups (Smith, 2018). The risk lies in overlooking the unique intricacies and context-specific nuances embedded in each community's ecological understanding.

Another critique focuses on the theory's limited emphasis on power dynamics within the transmission and application of ecological knowledge. Scholars argue that Woodley's framework might not adequately address the power imbalances that influence whose knowledge is prioritized and legitimized in decision-making processes (Berkes, 2018). Overlooking power dynamics can potentially perpetuate inequalities in the recognition and utilization of different knowledge sources.

Critics also contend that Woodley's Ecological Knowledge Theory may, at times, portray a somewhat static view of indigenous knowledge evolution. The theory's emphasis on resilience and adaptability might not fully capture the dynamic, contested, and sometimes conflicted nature of how indigenous knowledge systems change over time (Davis & Ruddle, 2019). This limitation raises questions about the theory's ability to effectively address the

complexities of knowledge transformation within evolving socio-cultural contexts.

Some critics argue that Woodley's theory might underestimate the influence of external factors on indigenous knowledge systems. External forces such as globalization, climate change, and political interventions can significantly shape and impact local knowledge (Reyes-García et al., 2016). Neglecting these external influences in the theory may limit its applicability to situations where indigenous communities face profound changes in their environments and social structures.

In conclusion, while Woodley's Ecological Knowledge Theory has provided a valuable framework for understanding human-environment interactions, it is not immune to criticisms. Addressing these critiques becomes integral to refining the theory and ensuring its relevance in the ever-evolving field of environmental anthropology.

Relevance to the Study

Woodley's theory aligns seamlessly with the first objective of the research – understanding the forms and nature of ocean-related indigenous knowledge in Axim. It posits that ecological knowledge encompasses a broad spectrum, not confined to scientific paradigms alone (Woodley, 2015). In the context of Axim, indigenous knowledge might include traditional fishing techniques, maritime folklore, and the use of celestial navigation—highlighting the holistic nature of the ecological wisdom embedded within the local culture. This theoretical perspective emphasizes the dynamic and adaptive nature of indigenous knowledge, acknowledging that practices evolve over time in response to changing environmental conditions (Woodley, 2013).

In the context of Axim, this might manifest in the adaptation of traditional fishing methods to address alterations in fish migration patterns or the incorporation of new environmental indicators into navigation practices.

Woodley's theory also sheds light on the last objective—unraveling the impediments to the promotion of ocean-related indigenous knowledge. The assumption within the theory that ecological knowledge is often undervalued or overlooked in mainstream environmental studies directly speaks to the challenges faced by indigenous practices in Axim (Woodley, 2015).

This theory underscores the need to challenge static views of traditional knowledge and to recognize the resilience and adaptability inherent in indigenous ecological wisdom (Woodley, 2013). In the Axim context, this might involve addressing external pressures such as overfishing, climate change, or regulatory frameworks that might threaten or disregard traditional ocean management practices.

Empirical Review

Situating Indigenous Knowledge in the Management of Natural Resources

James D. Wolfensohn, World Bank President in Ewane and Adjagbe (2018) asserted that *"Indigenous knowledge is an integral part of the culture and history of a local community. We need to learn from local communities to enrich the management and development process."*

Taking into cognizance the aforementioned narrative, Ewane and Adjagbe argue that indigenous Knowledge is used as the idea of 'local ownership' in the management process, and as a 'cultural capital' used for resisting wholesale imposition of natural resource management ideas. They further

intimate that top-down approach to the management of resources and development as a whole that relies on modern science, technology and expert knowledge held outside a community for the community's natural resource management is epistemologically flawed. Local communities' perspectives on development and resource management have been greatly impacted by indigenous cultural traditions and the sense of place, and this makes it relevant for local communities' management and development values to be invoked in the quest for finding a lasting solution to the seeming mismanagement of natural resources in local communities.

IK is in sharp contrast with the Western knowledge system generated by universities, research institutions and private firms. It forms the foundational grounds for local-level decision making in natural-resource management, agriculture, food preparation, education, health care and a host of other activities in rural communities (Warren, 1991 as cited in Ewane and Adjagbe, 2018). Indigenous information systems are considered to be dynamic and are continually influenced by internal creativity and experimentation as well as by contact with external systems (Flavier, 1995)

Kok (2005) argues that in general, knowledge systems serve as the prisms through which people interpret and provide meaning to their surroundings. Younger people are exposed to personal experiences and wisdom through the transmission of these beliefs and perceptions, which originate in a particular community or culture. These knowledge systems are a reflection of the residents of a community's dynamic way of life. Indigenous people gain an understanding of their relationship to their natural environment through knowledge systems like indigenous knowledge, and they learn how to arrange

their knowledge of cultural beliefs and history to improve their lives (Ewane and Adjagbe, 2018, Bray & Els, 2007).

Gorjestani (2004) is of the view that IK is an integral element of the social capital of the poor and rural dwellers and forms a chunk of their main asset in their quest to achieve control of their own lives. It forms the base of the knowledge system of any community and involves the skills, insights and experiences of people applied to maintain or improve their livelihoods (World Bank, 2004). In view of these reasons, the immense contribution of indigenous knowledge to locally managed, sustainable and less-expensive survival strategies should be promoted in the management of natural resources.

Conclusively, it is apparently instructive to state that the inclusion of indigenous knowledge in management practice stems from the idea that Western knowledge dominated scientific path for underdevelopment and inadequate management in terms of the management of natural resources in non-Western societies and has failed to deliver on its capability of delivering these communities and their natural resources from the issue of mismanagement. Ewane and Adjagbe (2018) therefore argue that there is the need for local participation in natural resource management to help avoid such abyss. However, the persistence of an indigenous knowledge system itself can also be a reflection of its capacity in holistically resisting modernity. Its forcibility as a part of a covert response to the destabilizing flux of modernity is noted by Fanon (1963) as cited in Ewane and Adjagbe (2018). Therefore, its inclusion in natural resource management practices forges a bodily disposition that makes up management practices. The appeal to indigenous knowledge in this regard is seen through the capacity to renew itself as one of

the forces for achieving good management practices among local people in terms of natural resources management.

Forms and Nature of Indigenous Knowledge

Indigenous knowledge (IK) represents a wealth of wisdom and practices developed over generations, deeply embedded in diverse cultural contexts worldwide. Globally, indigenous knowledge takes various forms, reflecting the immense diversity among indigenous communities. It encompasses ecological wisdom, traditional healing practices, and sustainable resource management systems. Indigenous knowledge, often oral in nature and embedded in totems and artefacts, is a dynamic and evolving set of insights, adapting to changing environmental and social contexts (Dove, 2019; Huntington, 2018).

In the African context, indigenous knowledge is deeply intertwined with the continent's rich cultural tapestry. It manifests in agricultural practices, traditional medicine, and communal decision-making processes. Elders play a crucial role in the transmission of this knowledge through storytelling and experiential learning, fostering a strong sense of community and identity (Berkes, 2018; Ampofo, 2019).

Zooming into Ghana, indigenous knowledge takes on a unique character shaped by the country's diverse ethnic groups. Traditional agricultural techniques, craftsmanship, and spiritual practices contribute to a holistic knowledge system. The extended family system is a cornerstone for knowledge transmission, fostering intergenerational learning through apprenticeships and communal rituals (Mensah & Odame, 2017; Nyampong, 2020).

Within the Western region of Ghana, indigenous knowledge is further nuanced by the specific cultural practices and environmental challenges. Fishing communities, for instance, possess unique knowledge about marine ecosystems and sustainable fishing practices. This local wisdom is passed down through generations, ensuring the preservation of traditional livelihoods and ecological balance (Gyampoh et al., 2018; Frempong, 2019)

Comparatively, the nature of indigenous knowledge globally, in Africa, and within Ghana demonstrates both commonalities and distinctions. The reliance on oral traditions, totems and artefacts, the pivotal role of elders, and the integration of spirituality are shared features. However, the specific content and application of indigenous knowledge vary significantly, shaped by the unique cultural and environmental contexts of each region (Dove, 2019; Nyampong, 2020).

In conclusion, indigenous knowledge is a mosaic of insights, practices, and wisdom that enriches communities across the globe. Understanding its forms and nature requires a nuanced analysis that considers both the common threads and distinctive features within diverse cultural contexts. As we delve into the local perspectives, such as in Ghana's Western region, we witness the intricate interplay between indigenous knowledge and the environment, shaping sustainable practices and preserving cultural heritage.

Patterns of Indigenous Knowledge Transfer and Maintenance across the World

Research reveals evidence that indigenous tribes consider education as learning for life experience, which is not confined to formal schooling or a

predefined curriculum (Kanstrup-Jensen, 2006). Indigenous peoples ensure that each individual is ready to fully integrate into their community through a life-long learning approach based on learning by doing (Preston 1975, 1982 in Ohmagari and Berkes, 1997) through observations, actions, and interactions with both adults and environment (UNESCO, 2009). Indigenous knowledge is not reliant on reading books or taking courses, as it is a "live process to be absorbed and comprehended" (Battiste, 2002), according to Köhler-Rollefson (1996). Indigenous wisdom is passed down from one generation to the other generation. The same community is in charge of passing on knowledge and values to the person, together with the family, which includes parents, grandparents, and older siblings. Sometimes this occurs by word-of-mouth, such as when stories are told, myths are narrated (van der Ploeg, 1989, in Sillitoe, 1998), metaphors are used (Marika et al., 2009), or songs are sung (Battiste, 2002). This explains why maintaining indigenous languages is also essential for ensuring the survival of indigenous knowledge, which is sometimes passed down through customs taught through hands-on practice and real-world examples like rites and ceremonies or symbols and artwork (Sillitoe, 1998). (Battiste, 2002).

Hence, experiential learning is crucial for the transfer of indigenous knowledge and helps indigenous peoples become more adaptable through time (Bates, 2009). According to Maurial (2002), oral and experiential traditions are ways for indigenous peoples to promote interactions not only between humans but also between humans and nature, maintaining indigenous well-being in the process. However, it is crucial to note that knowledge transfer is not a homogenous process and that it is influenced by factors like age, gender,

experience, political power, and occupation. These factors may produce different knowledge systems within the same community and may also have an impact on how much and what kind of indigenous knowledge an individual possesses (Briggs, 2005; Grenier, 1998; Scones and Thompson, 1994, in Sillitoe, 1998).

The Relevance of Indigenous Knowledge in Management Practices

It is a truism that the relevance of IK can never be undermined in every developmental agenda of a country**.** The benefits of IK are therefore enormous and applicable to all aspects of human endeavours. Materer et al. (2002) points out that IK bestows a moral obligation on its applicators and thus helps in creating 'moral economy'. Adom (2016) intimates that indigenous knowledge is a huge source of wealth because it enables governmental organizations to save enormous sums of money by reducing the noxious effects of moral decadence, which deplete the environment's priceless biodiversity resources, which are essential to existence. Kandal et al. (2021) state that indigenous knowledge finds its relevance and importance in the mere fact that it is practical, relatable and simple to use by local people. Indigenous/ traditional knowledge expresses a people's worldview in unambiguous terms and offers guidance for their existence and survival on a social, spiritual, economic, and political level. According to Materer et al. (2002), it explains how cultural qualities evolved as a result of people's attempts to adapt to their local surroundings. In situations where the people were unable to solve specific issues, indigenous wisdom came in helpful as a chance for them to learn more about the human condition. The main importance of indigenous knowledge is the building and nurturing of peoples' capabilities to understand their

surroundings and the world in a very simplistic and more relatable manner (Kandal et al.,2021).

Kandal et al. (2021) further point out that the mere fact that societies have lived for generations since antiquity is a simple reason why indigenous knowledge cannot be undermined in all life endeavours. Indigenous knowledge takes into consideration simple but applied economics, politics, education, religion, sciences and technologies of indigenous societies. Although this knowledge is usually considered to be very basic, it nonetheless provides a strong foundation for the development of the modern society.

There are three stages at which indigenous knowledge may be useful for the process of sustainable development, according to the World Bank (1998). Local communities are the first level, where knowledge is kept by those who live and work there; the second level is made up of various development agents, such as governments, funders, local authorities, and private sector initiatives. When dealing with the neighborhood, these agents respect, cherish, and acknowledge indigenous knowledge. Third, because indigenous knowledge is included in global knowledge, it has worth and relevance in and of itself in this context. But before implementing information into their strategies, they must comprehend it and critically assess its applicability to the goals they have in mind. Indigenous knowledge can therefore be preserved, passed on, or altered and accepted elsewhere.

Ajani et al. (2013) note that IK systems can be very beneficial not only to conservationists but also planners and the society as a whole. They are of the view that the cost-effective nature of IK, its participatory nature as well as sustainable values makes it an all-important tool to be used to preserve natural

resources in every community. In the same vein, Battisto (2002) also advances the argument by asserting that indigenous knowledge promotes a high level of communal spirit among community members thereby making local folks to easily relate with such means of preserving the oceans as a natural resource. In order to sustain conservation programs, Ajani et al. (2013) add to the discussion by arguing that the participatory nature of indigenous knowledge systems promotes the highest level of local involvement. Every compact community appreciates the food made in their own pots and would undoubtedly support its implementation fully. In advancing the argument, Adom (2016) expatiates the cost-effectiveness of IK to western scientific knowledge. The central idea in his argument is that hiring scientific experts on how the oceans should be best managed comes at a greater cost as compared to just adopting the local knowledge of the people. According to him, IK is easily tapped from the local people and comes with no or less monetary charges as compared to western scientific knowledge. He gives an example of how native farmers can quickly assess the fertility of their soil by observing the proportion of clay to sand, moisture levels, the amount of decomposed matter, and other factors that would often require scientific experts to conduct months-long, expensive tests.

Conclusively, Kandal et al. (2021) expatiate that indigenous knowledge is significant because it is based on a comprehensive understanding of how humans and nature interact. They point out that the notion of sustainability in this context offers a solution to the environmental issues our modern world is currently confronting. It is important to highlight that indigenous knowledge is a crucial instrument for indigenous peoples'

sustainability, survival, and ability to save the environment. The preservation of the oceans can be made more meaningful, effective, and efficient by acknowledging and promoting local traditions and knowledge.

Kandal et al. (2021) identify two reasons which justify the very importance of indigenous knowledge; first, indigenous knowledge contributes to local empowerment and development. It has its own way of increasing the self-sufficiency of societies. Introducing IK in ocean management practices therefore gives it legitimacy and credibility in the eyes of both indigenous people and scientists thereby boosting cultural pride and motivation to draw from indigenous people's ingenuity to solve their local problems. Secondly, indigenous people have the potential of providing valuable information about the local terrain and climate and how best they could manage its resources locally. It should be noted that for many centuries, indigenous people have taken care of the environment and the area around them, frequently without doing any harm to the local ecologies (Matowanyika, 1994 as referenced in Kandal et al., 2021). Many people believe that developing alternative methods of resource management can be based on the powerful foundation provided by indigenous knowledge. They add that indigenous knowledge systems and technologies have historically been seen as economically accessible, socially acceptable, and sustainable, as well as posing little risk to rural settlers and, most importantly, helping to preserve natural resources. According to Warren (1993), using indigenous knowledge "ensures that the end user of specific management practice is involved in developing technologies appropriate to their needs."

Murphee (1991) argues that indigenous knowledge is an embodiment of knowledge which is representative of a way of life which has evolved with the local people of which the local people have familiarized themselves with over the years. He further identifies fives ways through which indigenous knowledge is specifically adapted to local conditions and requirements. These include; restraint in resource exploitation, diversified production systems, flexibility, respect for nature, social responsibility.

Indigenous knowledge is an essential part of cultural heritage and identity. It reflects the history, traditions, and values of a particular community and provides a sense of continuity and connection to the past. Indigenous knowledge systems are often transmitted orally, through stories, songs, and rituals and they are intimately linked to the cultural practices of a community. By preserving indigenous knowledge, we can ensure that cultural heritage and identity are preserved for future generations (Smith, 2012).

In conclusion, indigenous knowledge is a vital resource for addressing environmental and social challenges, preserving cultural heritage, and ensuring the well-being of communities around the world. As we face an increasingly complex and uncertain future, the insights and experiences of indigenous knowledge holders can provide valuable guidance and direction.

Ocean Management Policies and their role in Ocean Management

The ocean is a critical ecosystem that covers about 71% of the Earth's surface and plays an essential role in regulating the climate, supporting livelihoods, and providing food and resources. However, human activities such as pollution, overfishing, and climate change have resulted in the degradation of the ocean's health and sustainability. To address these

challenges, various ocean management practices have been implemented across the globe.

Europe has implemented various ocean management practices, including the Marine Strategy Framework Directive (MSFD), the Common Fisheries Policy (CFP), and the Maritime Spatial Planning (MSP) framework. The MSFD provides a framework for protecting the marine environment by setting clear objectives and targets for improving the state of the marine environment in Europe (European Commission, 2014). The CFP aims to ensure the sustainable use of fisheries resources, by setting quotas and limits on fishing activities (European Commission, 2014). Finally, the MSP framework provides a comprehensive approach to managing marine activities by integrating environmental, social, and economic considerations into decision-making processes (European Commission, 2014).

In Africa, the African Union's Agenda 2063 framework emphasizes the sustainable use of marine resources through the African Integrated Maritime Strategy (AIMS) and the African Blue Economy Strategy (ABES). The AIMS aims to promote maritime security, governance, and sustainable development in Africa, while the ABES focuses on harnessing the potential of the blue economy to create jobs, promote economic growth, and reduce poverty (African Union Commission, 2018). Additionally, some African countries have implemented marine protected areas (MPAs) to protect biodiversity and ecosystem services in their coastal areas, such as the South African Marine Protected Areas (Kaplan-Hallam et al., 2016).

Ghana has implemented various ocean management practices, including the Ghana National Ocean and Fisheries Policy, the Fisheries Act, and the Marine

Fisheries Management Plan. The National Ocean and Fisheries Policy aim to ensure sustainable management of the country's marine resources and ecosystems, while the Fisheries Act regulates fishing activities by setting quotas and licensing requirements (Government of Ghana, 2014). Finally, the Marine Fisheries Management Plan aims to promote sustainable fisheries management by improving monitoring, surveillance, and enforcement of fishing regulations (MFAD, 2015).

In conclusion, ocean management practices have been implemented across the globe to address the challenges facing the ocean's health and sustainability. Europe has implemented the MSFD, CFP, and MSP frameworks, while Africa has implemented the AIMS, ABES, and MPAs, and Ghana has implemented the National Ocean and Fisheries Policy, Fisheries Act, and Marine Fisheries Management Plan. These practices aim to promote sustainable use and management of ocean resources, protect marine biodiversity, and reduce the impacts of human activities on the ocean's health and sustainability.

Ocean Management Policies in the Context of Ghana

Ghana is a West African country that has a coastline of over 550 kilometers and relies heavily on the ocean for economic development and livelihoods. However, the ocean faces various challenges such as overfishing, pollution, and climate change, which have resulted in the depletion of marine resources and degradation of the marine ecosystem. To address these challenges, Ghana has implemented various ocean management policies.

Ghana has implemented various ocean management practices, including the Ghana National Ocean and Fisheries Policy, the Fisheries Act of 2002, Act

265, and the Marine Fisheries Management Plan. The Ghana National Ocean and Fisheries Policy (NOFP) were developed in 2014, with the aim of promoting sustainable management of the country's marine resources and ecosystems (Government of Ghana, 2014). The policy provides a comprehensive approach to ocean management by integrating environmental, social, and economic considerations into decision-making processes. The policy sets out several objectives and strategies, such as promoting sustainable fishing practices, reducing pollution, and protecting biodiversity.

The Fisheries Act was enacted in 2002 to regulate fishing activities in Ghana. The act provides a legal framework for sustainable fisheries management, by setting quotas and licensing requirements, and establishing penalties for illegal fishing activities (Government of Ghana, 2004). The act also provides for the establishment of fisheries management committees, which are responsible for advising the government on fisheries management issues.

The Marine Fisheries Management Plan (MFMP) was developed in 2015, with the aim of promoting sustainable fisheries management by improving monitoring, surveillance, and enforcement of fishing regulations (MFAD, 2015). The MFMP sets out several strategies, such as strengthening fisheries monitoring systems, increasing the number of fisheries patrols, and enhancing the capacity of enforcement agencies. The plan also provides for the establishment of closed seasons, which restrict fishing activities during specific periods of the year, to allow for the recovery of fish stocks.

In addition to these policies, Ghana has also implemented various conservation measures such as marine protected areas (MPAs) and closed

areas. The MPAs aim to protect biodiversity and ecosystem services in Ghana's coastal areas, by restricting or prohibiting certain activities such as fishing and oil exploration (Azu et al., 2018). The closed areas, on the other hand, are areas where fishing activities are prohibited, to allow for the recovery of fish stocks and the restoration of degraded habitats.

Despite the fact that Ghana's ocean management policies have chalked some successes, it is however plagued by a number of weaknesses. One of the weaknesses of Ghana's ocean management policies is the lack of effective implementation and enforcement of regulations. Despite the existence of several policies and regulations, illegal fishing activities such as the use of dynamite and light fishing continue to occur in Ghana's waters (Osei-Tutu et al., 2021). The lack of effective enforcement of regulations undermines the efforts to promote sustainable fisheries management and protect marine biodiversity.

Another weakness of Ghana's ocean management policies is the limited resources allocated to ocean management. Ghana's ocean management policies require significant resources for effective implementation and enforcement. However, limited funding and human resources constrain the capacity of the government to implement and enforce regulations effectively (Kwame, 2019). The lack of adequate resources undermines the efforts to promote sustainable management of Ghana's marine ecosystem.

In conclusion, Ghana has implemented various ocean management policies such as the National Ocean and Fisheries Policy, Fisheries Act, and Marine Fisheries Management Plan, to promote sustainable management of the country's marine resources and ecosystems. These policies aim to address

the challenges facing the ocean in Ghana, such as overfishing, pollution, and climate change, and protect biodiversity and ecosystem services. Additionally, conservation measures such as marine protected areas and closed areas have been implemented to protect marine biodiversity and ecosystem services. It is also worth noting that Ghana's ocean management policies have strengths such as the Ghana National Ocean and Fisheries Policy, Fisheries Act, and Marine Fisheries Management Plan, which promote sustainable management of the marine ecosystem. However, the lack of effective implementation and enforcement of regulations and limited resources allocated to ocean management are weaknesses of Ghana's ocean management policies. To overcome these weaknesses, there is a need for increased resources and effective enforcement of regulations to ensure the sustainable management of Ghana's marine ecosystem (Kwame, 2019).

Comparative Review of Ocean Related IK in Africa, Europe and Asia

Indigenous knowledge is an essential part of many communities worldwide, including those living along the coastlines of Africa, Europe, and Asia. The ocean, being an important resource for these communities, has shaped their cultures, traditions, and way of life.

In Europe, indigenous knowledge related to the ocean is deeply rooted in folklore and mythology. For example, the Norse mythology of Scandinavia tells stories of sea monsters, sea witches, and other creatures that inhabit the ocean. The indigenous peoples of the British Isles, such as the Celts and the Picts, also have a rich tradition of seafaring and ocean-related folklore. For example, the Scottish Selkie legend tells the story of seals that can shed their skin to become humans and back again (Bilbao et al., 2021). In recent times,

there has been a growing recognition of the value of indigenous knowledge, and efforts have been made to document and preserve it. For example, in the Basque region of Spain, fishermen have been working with researchers to document their traditional knowledge of the ocean and its resources (Bilbao et al., 2021). In Norway, the Norwegian Institute of Marine Research has established a program to document indigenous knowledge related to marine ecosystems (Hovelsrud et al., 2019).

In Asia, the ocean has played a significant role in the history and culture of coastal communities for centuries. Indigenous knowledge related to the ocean in Asia varies greatly depending on the region. In Japan, for example, the Ama divers have a long history of harvesting pearls and other sea creatures while practicing their own rituals and beliefs. In Southeast Asia, indigenous communities have developed complex fishing techniques that rely on lunar cycles, tidal patterns, and other natural phenomena (Bodin and Crona, 2009). The Bajau people, also known as sea nomads, have a unique relationship with the ocean and have developed incredible breath-holding abilities that enable them to dive deeper and for longer periods than most people. In Japan, traditional ecological knowledge related to the ocean has been documented in a variety of sources, including poetry, art, and scientific studies (Tsuruta et al., 2019).

In Africa, the ocean plays a significant role in the livelihoods of coastal communities. The indigenous knowledge of these communities is diverse and unique, with variations depending on the specific regions (DEA, 2014). For example, in East Africa, the Mijikenda people have traditional fishing practices that involve the use of specific nets and traps. They also use different

types of wood for boat building, with each wood type having a specific meaning and purpose (DEA, 2014). In West Africa, the Yoruba people have an elaborate system of divination, using cowrie shells and other objects to predict weather patterns, fishing yields, and other events related to the ocean (LOC, 2021).

Despite the differences in culture, traditions, and practices, the ocean-related indigenous knowledge of Africa, Europe, and Asia share some commonalities. For example, many of these communities have a deep respect for the ocean and recognize its power and importance (LOC, 2021). They also have a rich tradition of storytelling, with myths, legends, and folklore that help explain the mysteries of the ocean. Additionally, many of these communities have developed sustainable fishing practices that allow them to maintain their way of life while preserving the ocean's resources (DEA, 2014).

In conclusion, the ocean-related indigenous knowledge of Africa, Europe, and Asia is diverse, unique, and deeply rooted in the culture and traditions of coastal communities. While there are some commonalities between these regions, each has developed its own practices, beliefs, and customs related to the ocean. Understanding and respecting this indigenous knowledge is essential for preserving the ocean's resources and maintaining the way of life of these communities.

Traditional Rules and Reguations in Ocean Management in Ghana

In the coastal regions of Ghana, traditional rules and regulations have played a vital role in shaping and sustaining ocean management practices. Embedded in the cultural fabric of communities, these norms provide a unique perspective on the relationship between local populations and the marine

environment. Understanding these traditional rules is crucial for appreciating the holistic and community-driven approach to ocean management in Ghana (Asare-Kyei et al., 2015; Frempong, 2018)

One significant aspect of traditional rules in Ghana revolves around community-based resource allocation. Fishing communities often adhere to customary laws that dictate the equitable distribution of fishing grounds among different groups. These rules, shaped by centuries of experience, ensure that ocean resources are utilized sustainably, preventing over-exploitation and fostering a sense of collective responsibility among community members (Frempong, 2018; Gyampoh et al., 2018).

Traditional rules also govern the timing of fishing activities through seasonal fishing moratoriums. During specific periods, communities implement temporary bans on fishing to allow fish stocks to replenish and reproduce. This temporal regulation aligns with traditional ecological knowledge, recognizing the importance of maintaining a balance between extraction and regeneration for long-term sustainability (Asare-Kyei et al., 2015; Gyampoh et al., 2018).

Traditional rules further extend to defining maritime boundaries and resolving conflicts within fishing communities. Elders and community leaders often act as mediators, employing customary laws to settle disputes over fishing territories or resource utilization. This decentralized governance approach fosters a sense of ownership and collective stewardship, ensuring that conflicts are resolved in ways that align with the community's cultural values (Asare-Kyei et al., 2015; Frempong, 2018).

Cultural rituals form an integral part of traditional rules in ocean management, signifying a spiritual connection between communities and the sea. Ceremonies and rituals are performed to seek the protection of marine deities and ensure a bountiful harvest. This intertwining of cultural practices with ocean management underscores the holistic approach that recognizes the ocean not merely as a resource but as a sacred entity deserving of respect and reverence (Gyampoh et al., 2018; Frempong, 2018).

Interestingly, traditional rules and regulations in Ghana exhibit a degree of adaptability to changing environmental conditions. Elders and community leaders often engage in a dynamic process of updating rules to address emerging challenges such as climate change and pollution. This flexibility showcases the responsiveness of traditional governance systems, ensuring their continued relevance in the face of evolving oceanic contexts (Asare-Kyei et al., 2015; Frempong, 2018)

In conclusion, the traditional rules and regulations governing ocean management in Ghana offer a human-centric and culturally rooted approach. Through community-based resource allocation, seasonal fishing moratoriums, conflict resolution mechanisms, cultural rituals, and adaptability to changing environments, these norms reflect a profound connection between communities and the ocean. Recognizing and respecting these traditional rules is paramount for promoting sustainable ocean management practices in Ghana.

Ocean related indigenous knowledge among the different ethnic groups in Ghana

In the context of Ghana, which is located in the West Coast of Africa, there exists a rich diversity of indigenous knowledge related to the ocean and its resources among the different ethnic groups.

The Fante people, who are predominantly located in the coastal regions of Ghana, have a rich cultural heritage related to the ocean. The Fante people have developed unique fishing techniques, such as the use of wooden canoes and nets, which have been passed down from generation to generation. They also have a deep understanding of the ocean currents and weather patterns, which they use to predict fishing conditions. Additionally, the Fante people have developed traditional medicines from ocean resources, such as seaweed, which are used to treat various ailments (Asante-Darko, 2014).

The Ga people, who are also located along the coast of Ghana, have developed unique knowledge related to ocean currents and tides. They have developed an intricate understanding of the ocean's behavior, which they use to navigate their fishing vessels and predict fishing conditions. Additionally, the Ga people have developed traditional knowledge related to the use of ocean resources for medicinal purposes, such as the use of crabs and other marine organisms to treat various ailments (Asante-Darko, 2014).

The Ewe people, who are located in the eastern part of Ghana, also have unique knowledge related to the ocean. The Ewe people have developed traditional fishing methods, such as the use of traps and gill nets, which have been passed down from generation to generation. They also have a deep understanding of the ocean's ecosystem, including the different species of fish

and their behavior, which they use to enhance their fishing techniques. Additionally, the Ewe people have developed traditional medicines from ocean resources, such as sea snails, which are used to treat various ailments (Gonu, 2019).

The Nzema people, who are located in the western part of Ghana, have developed unique knowledge related to ocean resources. The Nzema people have developed traditional fishing methods, such as the use of nets and traps, which have been passed down from generation to generation. They also have developed an intricate understanding of the ocean currents, which they use to predict the best times for fishing. Additionally, the Nzema people have developed traditional medicines from ocean resources, such as seaweed and other marine organisms, which are used to treat various ailments (Gonu, 2019).

In conclusion, the indigenous knowledge related to the ocean in Ghana is rich and diverse. The different ethnic groups have developed unique knowledge related to fishing techniques, ocean currents, and traditional medicines from ocean resources. This knowledge has been passed down from generation to generation and is a significant part of their cultural heritage. It is important to recognize and preserve this knowledge for future generations to come.

Intergenerational Knowledge Gaps between the aged and the youth in contemporary times

Elderly people are the guardians of indigenous knowledge, making them the most important source of transmission, along with women, as was already established (Dweba and Mearns, 2011). The metaphor of the

Yambirrpa used by the Yolngu, an indigenous group from northeast Arnhem Land in the Northern Territory of Australia, can be used to understand the role of elders in the transfer of knowledge. The Yambirrpai is a literal fish trap consisting of a group of rocks arranged in a circle, where the fish are trapped during high tide through a network of tiny holes. In the Yambirrpaare, which is a metaphor, the rocks stand in for the elders, and the fish for the children and grandkids, who are protected by the elders who join together to lead them into the community's foundations of learning (Marika et al., 2009). Effective educational programs, like the Alaska Rural Systemic Initiative, encourage students' continued connections with indigenous elders through a variety of channels. For instance, in culturally responsive schools, elders play a key role in instructional planning, curriculum design, and program implementation. In cultural camps, seniors are also in charge of carrying out knowledge transmission-related activities (Barnhardt, 2008; Barnhardt and Kawagley, 2005).

Yet, research on indigenous knowledge transfer have shown a rising generational difference between older and younger generations, which frequently manifests in the latter generation's aversion to acquiring traditional techniques, despite the value placed on elders. Posey (1990) noted the significant impact of the "industrialized world" on younger generations as the primary reason for this resistance as early as the early 1990s. Similar to this, Ohmagari and Berkes (1997) highlight how social changes brought about by sedentarization, formal education, and the advent of television have brought changes also in the value system of younger generations who do not attribute the same value to indigenous knowledge as their parents or grandparents in

their study of knowledge transfer among women of the OmushkegoCree group in Canada. It's also interesting to note that Rocheleau (1991) observed a variation in the rate of knowledge loss between young men and young women when conducting research in Kenya. Women's knowledge gaps between generations were less pronounced than men's.

This rising trend, which the same indigenous peoples have acknowledged in international conferences, demonstrates how, despite the more active participation of indigenous peoples, indigenous knowledge and societies continue to be given a lesser rank. Likewise, the ongoing stigma associated with anything that is "indigenous" continues to shape how younger generations view traditional knowledge and, as a result, choose whether or not to acquire it. For instance, younger generations have stopped learning about and consuming traditional vegetables among the Xhosa people in the Eastern Cape Province of South Africa because of the association between those foods and poverty and primitivism. This is because they do not want to be seen as belonging to a lower social class or being generally backward. Native kids have made these kinds of decisions that have resulted in the loss of significant resources, like traditional vegetables in this example, which are a crucial source of sustenance, especially in underdeveloped rural regions (Dweba and Mearns, 2011). Younger generations suffer serious repercussions from the loss of indigenous knowledge, as noted by Ford et al., 2010, cited in Nakashima et al., 2012), as it lowers their social capital and may affect their capacity to respond to ecological and socioeconomic difficulties.

As was indicated in the instance of indigenous women's knowledge, formal education has been one of the key contributors to the breakdown of ties

between the young and old generations, which has had severe ramifications for the transfer of indigenous knowledge (UNESCO, 2009; Dweba and Mearns, 2011; Rocheleau, 1991). For instance, Wongbusarakum (2009) highlights how formal schooling has become "a primary instrument of cultural modification and [the] primary source of knowledge about the outside world" in his research in the Adang Archipelago with the Urak Lawoi group, which has detrimental effects on the preservation of indigenous knowledge in younger generations.

Indigenous People and Their Spiritual Relationship with the Sea

Indigenous people view the sea as a source of life and a gift from the creator of the universe that teaches, supports and nourishes indigenous people. There is no gainsaying the fact that indigenous people all around the world vary greatly in terms of their culture and customs. There is one common thing among all; they revere the sea as a god and parent. For some indigenous people, they consider the sea as the core of their culture, the source of their identity as a people and one that connects them with their past (home of their ancestors), with their present (as provider of their material needs), and with the future (as the legacy they hold in trust for their children and grandchildren). In this regard, the indigenousness smacks of a sense of belonging to a particular place. UN World Water Development Report (2022) also argues that the value indigenous people place on the sea goes beyond its role in supporting life and other related life-sustaining functions and include spiritual well-being, sound mental health, happiness and emotional balance. For example, water has aesthetic values which contribute significantly to mental health.

It is important to note that most of life happiness and satisfaction depend to a great extent on the sea: the sea can appeal to people to spiritual

reasons, or through its picturesque attractiveness, because of it over all importance for wildlife or recreation, among others. UN World Water Development Report (2022) is also of the view that the sea plays an integral role across faith-based traditions and customs globally since it symbolizes elements which are very diverse as life, renewal and reconciliation and purity. In some instances, water is viewed as a gift for human beings to care for. The connection between the sea and a particular place is often strong in many indigenous cultures. The fate of humans and the sea are therefore inseparably linked (UN World Water Development Report, 2022).

One of the key ways in which indigenous peoples in Africa interact with the sea is through fishing and other forms of marine resource use. Indigenous communities have developed sophisticated techniques for managing marine resources sustainably, based on their traditional knowledge and practices. For example, the Bagyeli people in Cameroon use traditional knowledge to manage their fishing activities, including knowledge about the breeding seasons of fish and the use of specific fishing gears for different types of fish (Assembe-Mvondo, 2015). Similarly, the Vezo people in Madagascar have developed a unique system of marine tenure, in which fishing rights are based on ancestral claims to specific areas of the sea (Gomes, 2017).

Warren (1993) observes that spiritual and material worlds are interwoven in one complex web, with all living things having a sacred meaning. This is the living sense of connectedness that connects indigenous people and the sea has disappeared among city dwellers. Among indigenous people, there is the widespread idea that the sea cannot be owned, it cannot

belong to someone even when left unused, uncared, uninhabited. Indigenous people have a collective ownership of the sea. According to the indigenous people, human beings cannot be more than trustees of the land with a collective responsibility to preserve it.

The United Nations Permanent Forum on Indigenous Issues argues that Indigenous Peoples have an exceptional relationship with the environment, with historical links to stewarding the ocean territories that go beyond millennia. This principle of stewardship is embedded in placed-based knowledge and language systems that emanate from age-old observation and close interaction with nature. These principles upon which indigenous knowledge are hinged stem from a philosophy that considers the natural world as sacred, and humanity as part of it. In reality, this underlying philosophy ensures that Indigenous Peoples live in balance with the environment and has played an integral role in the collective management of the sea.

However, it shoud be noted that indigenous peoples' relationship with the sea in Ghana and Africa at large is not always positive. Many indigenous communities around the continent are facing the impacts of climate change, pollution, and overfishing, which are threatening their cultural and economic survival. For example, the Maasai people in Tanzania are experiencing the loss of water sources due to drought, which is making it difficult for them to sustain their livestock and traditional way of life (Kijazi & Mpanda, 2018). Similarly, the coastal communities of Sierra Leone are facing the impacts of rising sea levels and erosion, which are threatening their homes, farmlands, and fishing grounds (Hundeyin et al., 2018).

In conclusion, indigenous peoples' relationship with the sea in Africa is complex and multifaceted, encompassing ecological, cultural, spiritual, and economic dimensions. Indigenous knowledge and practices have much to offer in terms of sustainable marine resource management, cultural preservation, and resilience in the face of environmental change. However, the challenges that many indigenous communities face also highlight the need for greater recognition of their rights, knowledge, and perspectives in decision-making around marine resource use and conservation.

What are the Current Debates Concerning Indigenous Knowledge?

Mistry (2009) is of the view that IK was largely ignored in the fields of development and conservation in previous years, however, IK is currently going through a revamp and its integration into natural resource management is seen as one that cannot be side-lined. Having said thisIt is significant to note that there are numerous unresolved questions regarding how IK is documented and how it is applied in other local contexts. There are disagreements on the extent to which and to whom indigenous knowledge is valuable outside of the context in which it was created (Briggs 2005; Mistry 2014). Despite the fact that it is commonly acknowledged that there are numerous lessons to be learned from indigenous knowledge systems, there is no protection for indigenous knowledge under international law, making it open to mistreatment and disavowal. Mendez (2014) is of the view that although there are still questions and contentious arguments about IK's practicality, despite the fact that it is becoming more widely accepted as a feasible alternative strategy for improving environmental sustainability in both academic settings and policy formation fora, there are misconceptions regarding the divisions between

regional indigenous knowledge and western'scientific' knowledge; this is an attitude issue.

Additionally, there are the practical issues that arise when attempting to transfer ideas and concepts from one culture to another and when seeking to reconcile two very different worldviews (Johnson 1992, p. 10). Indigenous environmental knowledge is being lost in communities all around the world as a result of the persistent bias toward "modern western knowledge" as the only practical knowledge system. There is therefore an urgent need to utilize this knowledge in developing mechanisms for protecting the earth's biological diversity.

The fundamentals of indigenous and western ecological understanding are similar. Both ultimately stem from rationally generating order from chaos as a survival mechanism (Agrawal, 2002) and are based on empirical observations of the environment. Despite the fact that certain of IK's religious and cultural beliefs on the environment may not make sense to western science, they are nonetheless crucial to comprehending and protecting the environment (Johnson 2018).

Very common in the literature, western science and indigenous have been considered as two different sides which run competitively contrary to each other and characterized by a divide which is inevitably emanating from the epistemological foundations of the two knowledge systems. Mohan and Stoke (2000) argue that both western science and indigenous knowledge as two different knowledge systems may be treated as individually separate and distinct knowledge systems thereby preventing dialogue and learning between these two bodies of knowledge systems. There is no gainsaying the fact that

some scholars have argued that this divide may be false or not as it has been propagated (see, for example, Briggs, 2005, Bell, 1979; Chambers, 1979; Bebbington, 1993; Briggs *et al.*, 1999; Leach and Fairhead, 2000), nonetheless, this notion of competition and difference in indigenous knowledge and western science continuous inevitably.

It is a widely accepted fact that western science is considered as a knowledge system which is open, follows systematic procedures, ensures objectivism, and relies mostly on being a detached centre of rationality and intelligence, whereas IK is seen to be closed, primitive, emotional, no intellectual appeal, and parochial. Consequently, Briggs (2005) and Mwende (2011) argue that whereas Western Knowledge is viewed within the lenses of modernity, indigenous knowledge on the other hand is considered as being part of a leftover, traditional and backward looking of which this view is reinforced by the concentration of work on indigenous knowledge on people in low and middle income countries.

Escobar (1995) as cited in Briggs (2005) there argues that it is not out of place for people to erroneously imagine that development can only happen from the application of Western Knowledge and that IK itself has little or nothing to offer in terms of development and the preservation of natural resources. The aforementioned view is succinctly expressed by Escobar (1995; 13) that "development has relied exclusively on one knowledge system, namely, the modern Western one. The dominance of this knowledge system has dictated the marginalization and disqualification of non-Western knowledge systems". in the same vein, Ellen and Harris (2000) as cited in Briggs (2005) further opine that the term Indigenous knowledge almost

connotes ‘ a US versus THEM’ scenario between these two systems of knowledge. this binary division has been emphasized strongly in some of the empirical literature, perhaps at a blind sight. A classic example to illustrate this reality is in the work of Kundiri et al., (1997) as he describes local farmers as having “very subjective methods of identifying and describing the different soils”. The usage of the word subject therefore connotes a non-rigorous meaning of IK.

It is important to note that Western knowledge has retained its robustness and reliability in resource management and development of its perceived ‘substance’ (Leach and Mearns, 1996, Briggs, 2005) something that indigenous knowledge is lacking. Comparatively, Dewalt (1994) argues that Western Knowledge has been somehow detached and decontextualized from its socio-cultural, political and physical environments. According to the literature, Western Science is much socially constructed as IK, and it is therefore ironic that although the charge is mostly made that IK is culturally and place-specific to be transferable and universal and therefore to be of much value in a broader sense, such doubts are rarely made about Western Knowledge although it results in ensuring development in the developing countries in the last years have been questionable. Ordinarily, even where both knowledge system seemingly start operating within the same community, there appears to be a dispute about their relationship. Ortiz (1999) as cited in Briggs (2005), for example, intimates that little is known about the interaction between such knowledge systems among farmers, which is suggestive of the fact that the two knowledge systems operate independently of each other, or

perhaps there is no interest or little interest shown in how they may be complementing or competing against each other.

Some scholars (Briggs, 2005, Davies, 1994; Kalland, 2000) have also argued that IK has a comparative advantage over Western Science within the context of poor communities. this is because, the information available is tested in the context of survival and hence is not just true or false in some unsentimental way (as asserted by western science), but is rather about effectively providing the means of survival, a conclusion which is more meaningful in the context of everyday existence. IK therefore becomes something which is very much driven by pragmatic, practical and everyday demands of life. This therefore is suggestive of the fact that Western Science need to be receptive and embracing to explore and recognize the validity of alternative explanations and to acknowledge the importance of indigenous knowledge (Briggs, 2005).

In conclusion, it is important to note that although there are clear attractions and meaningful dialogues between IK and Western Knowledge, in reality, there remains tensions which are unresolved (Briggs, 2005). Fascinatingly, Briggs (2005) further argue that once official views and community norms and values are integrated, conflict and rivalry emanating from traditional and modern natural resources conservation methods will reduce to their barest minimum if not completely eradicated.

Threats to the Promotion of Indigenous Knowledge

The promotion or existence of indigenous knowledge comes with many threats and challenges. Kandal et al., (2021) identify six challenges faced by indigenous knowledge's usage which include IK as; easily

overlooked, endangered species, not well managed, limited access to IK, unwillingness to share IK and the fact that IK may not always be accurate.

IK is readily disregarded. Indigenous methods aren't always amazing. They can easily go unnoticed despite their efficiency. A system of straight, cement-lined canals, as opposed to an indigenous irrigation system constructed of bamboo pipes and mud canals, is more aesthetically pleasing. However, the neighborhood system can supply the fields with water in a reliable manner. In the long run, it may even be more effective at conserving water than cement canals. IK is frequently disregarded by outsiders because it appears "messy" and is obscure.

Again, it is worth noting that IK is usually considered as an endangered species. *"When a knowledgeable person dies, a whole library disappears"*

This old English adage is very true for indigenous people since it mostly undocumented and is passed down orally from one generation to the other generation. Grenier (1998) as cited in Kandal et al. (2021) has therefore argued that IK is stored in the memories of people and expressed in songs, folklore, stories proverbs, myths, dances, cultural values, beliefs, community laws, rituals, local language and taxonomy, animal breeds equipment, materials, plant species, and agricultural practices. IK is communicated by word of mouth through specific example and culture. Indigenous Knowledge systems globally, especially in the developing countries of Africa, Asia and Latin America are gradually becoming extinct. They are threatened by modernization, urbanization and globalization.

The gradual extinction of indigenous knowledge is as a result of little recording of IK. IK is usually handed down by word of mouth rather than in documented form. This makes it susceptible to a fast change especially when people are displaced or killed as a result of war or famine, or when. The values and lifestyle of the younger generation are different from that of their forefathers. Through Experience, it has become known that some IK is fall out naturally through the modification of some tools and techniques. Also, factors like rural urban migration and population changes have further exacerbated this loss, posing a threat to the continuous survival of IK. As younger generations acquire different values and lifestyles as a result of exposure to global and national influences, traditional communication networks gradually breakdown, which signifies that Elders are dying without passing their knowledge on to children. Furthermore, Rice, Haynes, Royce, & Thompson (2016) argue that local capacity limitations and the way global content is pushed also has led to the gradual extinction of IK in contemporary times. The forces driving international or simply non-local material are far more powerful than those pushing local content, which is particularly popular in the country's rural parts.

This is shown in advertising, television programming, the proliferation of international brands, in classrooms using imported curricula and exams, in the use of foreign languages in schools and universities, and in the low status of local languages on the Internet, as well as in research, the dissemination of trustworthy scientific information, and in the over-reliance on foreign technical assistance.

IK's poor management is cited as another concern by Kandal et al. (2021). Information makers and keepers typically play quite diverse roles in society. According to the European Commission on Preservation and Access, neither those who generated the materials (IK) nor those who retained them had any influence over their development. Despite the fact that IK is increasingly vital for planning and managing sustainable resources and projects, librarians and information professionals have not been in charge of managing IK in the majority of the world. Acquiring, organizing, and maintaining recorded and codified knowledge—much of which is produced by research laboratories, research stations, and universities—has been the foundation of the prevailing information management paradigm. IK, which is not formally codified and only exists in local people's ideas, has limited room in such a model. IK is poorly administered, making it exceedingly challenging to employ it in development initiatives. Another issue at play here is whether or not to employ the western paradigm to keep IK. Rice, Haynes, Royce, & Thompson (2016) state that the collection of indigenous information has therefore been considered as tedious, demanding in terms of time and costly. For example, as a result of improper management, most of the indigenous knowledge gathered by colonial officers and early missionaries cannot be found in most archival institutions.

Dewalt (1994) has also argued that Limited access to Indigenous Knowledge has been one of the challenges facing indigenous knowledge

Getting access to indigenous knowledge or information is very limited because it it is not well organized in terms of being indexed and abstracted (Kandal et al., 2021, UNESCO 1982). This partly explains why IK is underutilized in

development projects. Dewalt (1994) further opines that the lack of marketing strategies has also accounted for the low levels of the use of IK.

Contrary to the view of Dewalt (1994), Kalland (2000) points out that IK is not promoted in contemporary times because of the Unwillingness of the local people to share IK.

It is common practice that some of the indigenous people are not willing to share their IK. However, it is important to note that Some IK is generic and can be freely accessed in many communities, both by members and foreigners. Ordinary members of the community are also generally excited to share their knowledge. However, herbalists and traditional healers are not so willing to share their knowledge, and the ability to access supernatural sources of information to cure diseases as well as to solve social, political and economic problems.

Another challenge facing IK as noted by Kalland (2000) is the fact that IK may not always be accurate. Just like other knowledge systems, IK has its weaknesses and limitations. IK may not be right and appropriate all the time. It may be dangerous to accept all traditional knowledge as good practice or as sustainable practice. Indigenous peoples have at times mismanaged resources.

For example, according to Kalland (2000) as cited in Kandal et al., (2021), nomadic hunters and gatherers who are not tied to any specific resource base may not have a conservation ethic.

CHAPTER THREE

RESEARCH METHODOLOGY

Introduction

This chapter brings to the fore the main research approaches used in the production of knowledge. This was closely followed by the research philosophy and the research approach. The research design of the research follow-suit as well as a description of the main activities that were deployed during the research including the identification and selection of the research participants, the methods and instruments used in collecting the data and the modes of data analysis that were used in the study.

This chapter also provides the ethical considerations that were adhered to and followed in the course of the research in order to ensure the safety of the researcher, the research participants and the communities understudy at large.

Research Philosophy

This research was philosophically rooted in the interpretive paradigm of knowledge production. Interpretive philosophy is a philosophical approach to research that emphasizes the importance of understanding and interpreting the subjective meanings people attribute to their experiences, actions, and the social world. Interpretivism therefore was helpful in giving the participants the opportunity to freely express themselves on issues pertaining to the meanings and interpretations attached to the forms of IK, the patterns of IK transfer and the very impediments to the promotion of IK in ocean management practices. This helped in generating meanings from their interpretations and experiences of the forms of IK and the patterns of IK transfer thereby teasing out their relevance in ocean management practices. This line of argument is in tangent

with the argument of Creswell and Poth (2018) as they opined that reality is not something 'out there' which a researcher can explain or describe but rather, reality and knowledge are created and replicated through communication, interaction and practice.

Research Approach

In an attempt to put the basic tenets of the interpretivist philosophical paradigm into proper context with regard to this research, I leaned towards the qualitative approach. This helped to describe the phenomenon (IK) understudy by using narratives, stories to present a picture of the people's experiences, conditions and thought processes about IK and ocean management practices.

Research Design and Justification

Specifically, the study was exploratory. With the use of exploratory design, I explored the native's interpretations of IK, the forms and nature of indigenous knowledge regarding ocean management, the patterns of IK transfer and the impediments to the promotion of IK in ocean management and governance. The exploratory design is the best for this study because the nature of knowledge, its forms and diffusion within a particular region are difficult to measure in theoretical terms. Krugman (1991) as cited in Ansah (2020) justifies this by arguing that knowledge flows are "invisible; they leave no paper trail by which they may be measured and tracked". More so to this point is the fact the expressions and interpretations of the indigenes in terms of the nature of IK and the patterns of IK diffusion and transfer are usually not items that could be quantified easily (Ansah 2020).

Taking cognizance of the view that no such study, in terms of methods, scope and research participants has been done, it therefore created a solid

foundation through which other research works could be done, especially quantitative research. The participants in this exploratory study were therefore engaged to narrate their experiences, perceptions and daily-encounters with the usage of IK, the forms of IK, the relevance of IK and their views on the impediments to the promotion of IK in ocean management as members of a coastal community.

This study engaged participants with the view of exploring the detailed nature of how the research participants comprehend, feel and think about the incorporation of IK in ocean management and also their understanding of the very impediments to IK in ocean management. Babbie (2010) contends that exploratory research has the aim of influencing the researcher: to develop methods to be used in future research, to satisfy the researcher's curiosity and to test the feasibility of a more extensive study. In view of this study, the motivation was the researcher's curiosity to explore the forms of IK, the relevance of IK and the patterns of IK transfer in the western region (Axim) of Ghana through empirical research. It is against this backdrop that exploratory research design was deemed appropriate to achieve the purpose of the study and to draw meaningful conclusions from the study.

Study Area

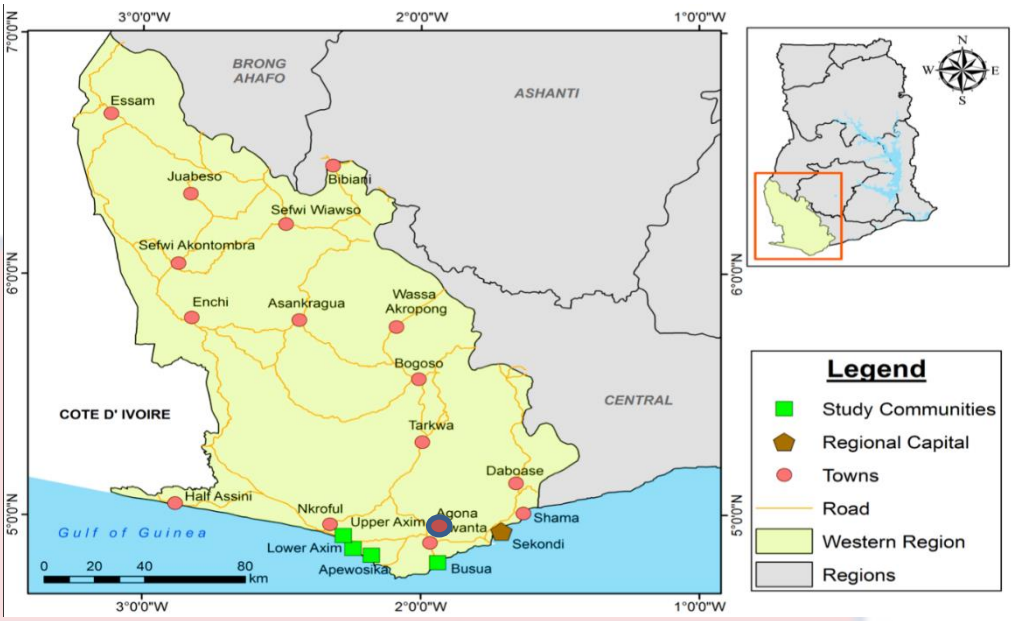

Figure 1: Map of the Western Coast of Ghana Showing the study areas.
Source: Cartography Unit, UCC (2016)

The study was conducted in Axim in the western region of Ghana. The Nzema East Municipality, which covers 2,194 square kilometers (9.8% of the total area of the Western Region), has Axim as its capital. According to GSS (2014), Axim has a population of 25,446, which is made up of the three settlements that were chosen for this study and 11,855 men and 13,391 women. The oldest fort in Sub-Saharan Africa, Fort San Antonio, is located in Axim (quoted in Ghana West Coast Magazine, 2010). One may observe libation being poured to Nana Bralua, an Upper Town deity who resides in the huge softwood tree that grows between the sea and the football field in front of Fort San Antonio, if they want a look into Axim's traditional religious activities. An island serves as the deity of Lower Town. (Cited in Ghana West Coast Magazine, 2010) These represent their vibrant tradition and culture. Socio-culturally; the district has five paramouncies with chiefs who are part of the Manle Traditional Council.

The Kundum Festival is celebrated in four paramouncies between August and October with the exception of Gwira traditional council which celebrates the Odwira (Yam festival). Christianity is the predominant religion; and co- existing with Islam and Traditional beliefs. In terms of infrastructure, the District has some good tarred roads, community centres and a modest hospital. The predominant means of transport are buses, taxis, motorcycles and tricycles. Specifically, the study will consider three communities in Axim, namely; Apewosika, Lower Axim and Upper Axim which were all considered as part of Axim in the 2010 Ghana Population and Housing Census. There is no gainsaying the fact that these communities are rural in nature, however, such communities have been exposed to Western Culture indicated by the number of churches, Lorries, mosques, commercial bank, rural banks, the dominant usage of mobile phones and the presence of radios.

Mangrove vegetation along the river estuary at Axim. Source: ITTO Pre-project (2007).

The first study area in Axim for this research was Apewosika. The indigenes of Apewosika are believed to have traced their ancestry from Elmina and Dutch Komenda in the Central Region of Ghana (Adjei and Sika-

Bright, 2019) and first settled at Akyenim now named Anto-Apewosika in the Western Region. According to the people of Apewosika, the land on which they live now was given to their ancestors by the chief of Axim and people of Axim who incessantly worried them with paying taxes. Apewosika shares boundaries with Domunli to the east, Anto-Apewosika to the west and Dr. Beamish School to the north. The community is dominated by Fanti speaking people. However, it is important to note that there are a few Nzemas in the community who are from Lower and Upper Axim as noted by Friends of the Nation (2010). The entire community is into fishing related activities and has been largely considered as a fishing community (Friends of the Nation, 2010). The men in Apewosika are the fishers and the women are the fish processors. Till date, the people hold their norms and customs in high esteem and therefore consider fishing on Tuesdays as a Taboo in the community. The readily available market centres for their smoked fish are Agbobloshi e(Accra), Obuasi and Kumasi.

The ocean view in Apewosika, Axim. Source: fieldwork (2022)

The next community is Lower Axim. The community is located in the lower part of Axim. It is an ethnically mixed community which include Gas, Nzemas and Simpas (those from Winneba). Friends of the Nation (2010) point out that there are more Nzemas in the area than any other ethnic group. It is termed as the real commercial hub of the Nzema East District where all kinds of business activities take place. Adjei and Sika-Bright (2019) note that majority of the indigenes in this community are into fishing and its related activities for livelihood with only a few women who are into petty trading. In this community, Tuesdays are considered as sacred days for the gods where the fisher folks do not go fishing. The fish in this area are sold at Bogoso, Agona, Kumasi and some parts of Sefwi Wiawso and Sefwi-Bekwai.

The last study area was Upper Axim. It is a blooming and large community in the Nzema East District. The community shares boundaries with Lower Axim to the East and Amanfukuma to the West. The people in this area are Nzemas and speak the Evalue Language. Just like the other communities, the people in Upper Axim are into fishing and its related activities. As a common trait among these communities, the men go fishing while the women process the fish and sell. Nonetheless, it is worth mentioning that there are a handful of farmers in the community of upper Axim.

Justification of the Study Area

Three conditions justify the selection of Axim for this study. First, Axim is noted as one of the major fish producing areas in the Nzema East Municipality. From the total municipal population of 52,672, a total of 29,829 constituting 56.9% live in Axim. This reinforces the overwhelming socio-economic influence of the town on the entire municipality with the presence of

the water bodies serving as a pull factor. Studies have also shown that fishing activities in the oceans are still based on traditional techniques. Secondly, the communities in focus; Apewosika, Lower Axim and Upper Axim show that they all portray what the Sociologist, Emile Durkheim (Ritzer, 2008) terms Mechanical Solidarity in that they all engage in similar socio-economic activities and lifestyles. Therefore, the selection of these communities was purposively done because they are traditional fishing communities who are most likely to have knowledge about the prevailing indigenous knowledge in the communities so far as the management of the ocean is concerned.

Finally, they were also purposively selected because it is assumed to be one of the oldest fishing towns in the area with enormous preservation ethics in the town's IK particularly, cosmological beliefs, totems and taboos (Adom, 2016) and it was best for such a study to be conducted in the area to enhance the richness of data to be collected.

Target Population

The target population was the members of the community who live in Axim. The accessible population was fishermen, fishmongers, who have depended on the oceans to eke a living and are indigenous people of the communities. Opinion leaders (chief and elders, chief priests and priestesses,), youth groups, children and community members who do not engage directly in fishing and its related activities but are indigenous people of the communities also formed part of the accessible population.

Sources of Data

In this research, I made use of only primary data. The primary data was obtained during the process of my field interviews and focus group

discussions. The accessible population for the primary data was the Opinion leaders (Chief fishermen, chief and elders, chief priests and priestesses,), youth groups, fishermen, fishmongers, and children. The opinion leaders forming as a source of primary data for this study were interviewed based on the forms and nature of IK, the meanings and interpretations attached to these forms of IK existing in the selected communities and how the existing ocean management practices have been informed by such IK. The children were asked on their daily encounters and experiences with IK and the importance they attach to such knowledge through photo-voice. Data concerning the diverse ways IK has been transferred among fishermen and fishmongers was collected from the fishermen and the fishmongers. This helped in getting the first hand information about the issues under study.

Sampling and Sampling Techniques

The purposive and convenience sampling techniques were used to select the target participants. Purposive was used in selecting the target participants because they are in the best position as indigenes of the community to provide deeper insights into the forms and nature of indigenous knowledge in Axim and how relevant such knowledge is in the management of the oceans in contemporary times. Again, the target participants were selected purposively so as to serve as a primary source of information for the research pertaining to the views, meanings attached to indigenous knowledge in the communities and the relevance of such indigenous knowledge.

In an attempt to further select specific participants, the study relied on the criterion purposive sampling to select the opinion leaders like the chief and elders, chief priests and priestesses, chief fishermen who are indigenes of the

community. They were selected because they are natives of Axim and also with leaders of their calibre; it was assumed that they had knowledge about the subject matter of indigenous knowledge in the community pertaining to managing the oceans effectively. By extension, the opinion leaders were also purposively selected because they are seen as opinion leaders whose views and opinions about the history of the norms, values and traditions in the community hold sway and are regarded with much reverence. The male and female community and youth groups were also selected using the criterion purposive sampling. They were selected because they are indigenes of the community who have lived in Axim over a decade and have acclimatized themselves with the prevailing norms, values and taboos regarding the preservation of the oceans. Also, since they have long periods of engagement with the ocean as indigenes of the communities, they have developed techniques that are dynamic in the relationship with the mangroves, fisheries and corals as well as coral reefs and would be the best people to vividly narrate how they have preserved such a resource in the community. Besides, it is also instructive to note that this category of people were selected because they may had daily encounters and experiences of the usage of indigenous knowledge in preserving the oceans which helped in unravelling the patterns of indigenous knowledge transfer in the chosen communities and also help in appreciating their views and expressions first-hand as to why indigenous knowledge as a management practice for effective ocean management is being accepted or rejected in the area .

The purposive sampling technique was relied upon to select the fishermen in the selected communities. Given the cultural significance of

fishermen in Axim, purposive sampling aligns with the research's goal of capturing the authentic perspectives deeply rooted in the local context. Fishermen in these communities- Apewosika, Lower Axim, and Upper Axim play a central role in shaping and preserving indigenous ocean management practices, making them key participants to provide nuanced insights into the cultural dynamics intertwined with ocean-related-indogenous knowledge (Patton, 2015).

Finally, children were conveniently sampled and interviewed. According to the Convention of Child Rights, a child is a person below the age of 18(United Nations, 1989). The Children who were selected for this study were within the ages of 12-17.This technique was chosen because the entire population of children in the communities was practically impossible to reach and therefore was advisable to resort to convenience sampling.

It is worth noting to state that 17 Focus Group Discussions and 8 in-depth interviews were held in the community of Axim. In all, a total of 168 participants participated in this study. The focus group discussions considered groups such as fishermen, fishmongers, male community members, female community members, youth groups, and children within the communities of Axim- Apewosika, Upper Axim and Lower Axim. The in-depth interviews were conducted among Chiefs of Lower Axim and Upper Axim, Chief fisherman for Lower and Upper Axim, Youth leader of Axim, and Chief Priest and Priestess for both Upper and Lower Axim respectively. Considering the number of participants engaged for both Focus group discussions and In-depth Interviews, it is important to state that total of 168 participated in the study in general. Out of the 168 participants, 30 were females and 138 were males. Of

the 168 participants, 100 participants were engaged in Upper Axim with about 41 participants engaged in Lower Axim. The rest of the participants which is 27 were engaged within the community of Apewosika in Axim. The disparity with regards to the number of people engaged in each community was determined by the availability of the participants in that particular community and their willingness or unwillingness to participate in the study.

The age distribution among the adults who participated in the study ranged from 28 -52 years with a mean age of 39 years. The age of children engaged in the research also ranged from 12- 17 years with the mean age of 14 years. Most of the participants stated they were adherents to the tenets of Christianity with only 5 people who were Muslims. The main ethnicity of the participants was Akan. All these characteristics are as a result of the fact that Axim is predominantly an Akan community with the heavy presence of Christianity influencing the lifestyles of the natives (GSS, 2014).

Most of the participants had no formal education except for 15 participants who had attained some level of formal education.

Data Collection Instruments

For all the identified individuals, groups and institutions who were used as research participants for the purpose of this study, information about the forms and nature, patterns of IK transfer and impediments to the promotion of IK in the effective management of the oceans were elicited from the research participants with the help of Focus Group Discussions (FGD), in-depth interviews, observational guides and creative pictures (photo-voicing).

In-depth Interviews(IDIs)

In-depth interviews were conducted with the opinion leaders (Chief Priests, chief fishermen, chiefs, youth leader) by using open ended interview questions and following a topical semi- structured interview guide**.** The interview guides were used to draw information from the opinion leaders like the chief and elders, chief priests and priestesses, chief fisherman, youth leader in the community. They were asked questions about the forms and nature of IK vis-à-vis ocean management and the very meanings attached to these IK as identified. They were also interrogated on the very relevance of IK in their perspective and how IK could improve ocean management practices in the region. The interviews were conducted from the 19th June 2022 – 14th August, 2022. Each interview lasted for 45 minutes to an hour. In all 8 IDIs were conducted which included- the chief fisherman for Upper Axim and Lower Axim, Chief Priest/ess for Lower and Upper Axim, Youth Leader of Axim, Chief of Upper Axim, Chief of Lower Axim, and Chief fisherman for Apewosika.

These IDIs were conducted within the respective workplaces of the individuals as at when permitted for the convenience and availability of participants and they were recorded with the consent of the research participants using an audio recorder and field notes as back up. Before the FGD will be administered, paricipants were debriefed thoroughly on the research purpose, procedures, and potential benefits. Participants were given the opportunity to ask questions and express any concerns. Emphasis was placed on the voluntary nature of participation, assuring participants that they could withdraw at any point without facing any repercussions. This was

reiterated multiple times to underscore the importance of their autonomy in the decision-making process.

Focus Group Discussions (FGDs)

The focus group discussion was used to solicit data from the fishermen, fishmongers and the indigenous community members including youth groups, male and female community members. They were asked questions about the forms and nature of IK vis-à-vis ocean management and the very meanings attached to these IK as identified. They were also interrogated on the very relevance of IK in their perspective, the patterns of ocean-related indigenous knowledge transfer and how IK could improve ocean management practices in the region. Each Focus Group discussion lasted for about one hour, 45 minutes. The FGDs were conducted from the 19th June 2022 – 14th August, 2022.

The Focus Group Discussions were used to draw information from the indigenous community youth groups, fishermen, fish processors and community members (males and females). The composition of the FGDs was structured based on the gender of the participants (Males and Females). This was done so as to give room for each gender to be expressive and not to be intimidated by the presence of the other. However, the FGD for the children was mixed. This was done to reveal the dynamism in thoughts concerning the issue of ocean related indigenous knowledge in Axim. In all 17 FGDs were conducted involving about 160 participants. Each group consisted of about 7-9 members. The FGDs became helpful as they helped me to quickly and conveniently garner data from many participants simultaneously. They were asked to provide experiences and daily encounters through which IK has

proven to be relevant in ocean management in terms of the patterns of IK transfer in the region and the identifiable impediments to the promotion of IK in ocean management.

These Focus Group Discussions were conducted within the respective workplaces of the individuals as at when permitted for the convenience and availability of participants and they were recorded with the consent of the research participants using an audio recorder and field notes as back up. Before the FGD will be administered, paricipants were debriefed thoroughly on the research purpose, procedures, and potential benefits. Participants were given the opportunity to ask questions and express any concerns. Emphasis was placed on the voluntary nature of participation, assuring participants that they could withdraw at any point without facing any repercussions. This was reiterated multiple times to underscore the importance of their autonomy in the decision-making process.

Creative Pictures (Photo-Voice)

Creative pictures (Photo-voice) were used to elicit information from the selected children pertaining to the matter under research. The use of photo-voice became necessary as Oduro (2018) has argued that it help children and students to deviate from tasks that deviate from the usual written text in schools, and paints the perception where children may believe that they can be very honest through photography – or at least, not exaggerate their narratives to say what researchers would love to hear. Photo-voice can therefore constitute a less intrusive way of accessing experiences that the researcher cannot see. The children were asked to pictorially represent how the oceans will look like with the usage of IK in Ocean management and the vice-versa. I

provided the children with drawing books, crayons, pencils and sharpeners so as to have an accurate portrayal of their thoughts about ocean related indigenous knowledge in the community of Axim. Such pictures helped in comprehending how IK is socially and culturally constructed in the minds of these children thereby helping to unravel the meanings these children placed on activities, rituals, norms and values that are locally in existence in the form of IK to preserve, manage and govern the oceans.

Observational Guide

Lastly, observational guide was developed in view of the detailed nature of data needed to answer the research questions. This study observed some inscriptions on canoes which were imbedded in the Indigenous knowledge of the communities and also observed the ocean management practices and how each practice has been informed by IK. I also observed artefacts, and totems in the communities which were imbedded in their culture in relation to their understanding of IK. The observational guide was therefore developed based on literature and the research objectives. These covered questions bothering on forms of existing indigenous knowledge, their mode of diffusion and transfer overtime, and their relevance in managing the oceans. It is instructive to note that the observation in this regard was carried out in a non-participant fashion as I observed the phenomenon of interest during the field work activities. However, it should be noted that some form of interaction took place as I sought to know the meanings behind the phenomenon being observed.

The interview guides and focus group discussion were developed based on the study objectives, with the goal of keeping the interview both

comprehensive and focused. The interview guide was divided into two sections; section A and section B. Section A comprised the demographical data of the participants and section B comprised the interview questions which guided me to ascertain the nature, patterns of indigenous knowledge diffusion and its relevance in ocean management in Axim.

Data Collection Procedure

IDIs and Focus Group Discussions

In-depth interviews and FGDs were conducted for chief, chief priests, chief fishermen, fishermen, fishmongers, children, non-fishing community members youth groups and youth leader from July to the month of August. Upon arriving in Axim and keeping my luggage in a guest house, I quickly took a tour of the communities involved to familiarize myself with the place so as to facilitate my movement in the community in the subsequent days. I had a key informant in the person of the youth leader who I contacted upon my arrival in Lower Axim. Through the youth leader, I was introduced to some gatekeepers in the community like the chief and elders, chief priest, chief fishermen who were debriefed about my mission in the community. After we had exchanged pleasantries with the gatekeepers of the community of Axim, I proceeded with the data collection in the next day- early in the morning around 7:30 am. This time was more appropriate in getting the fishermen because it was a time they use in sitting by the seaside to play cards and drafts as they observed the closed fishing season.

It should be noted that participation in this study was response-driven and willingness. In getting to my participants like the fishermen, the youth leader helped in mobilizing groups of fishermen by the seaside of which I

engaged them about my research and whether they would want to participate. Majority of them willingly participated and some decided to opt out with the complain that the government banned them from fishing in that month as punishment. Others bemoaned that previous research about the community in relation to the sea yielded no results so they do not see the need to engage in this one. However, I should be quick to state that the majority of people who expressed interest were very receptive and gave rich responses. For the children, within the ages of 10-17 years, permission was sought from their parents who were around to buy fish by the seashore. Through informal conversations (such as whether they were natives of Axim, compliment on their swimming skills and their relationship with the sea), I introduced the topic to them in a subtle manner. This technique helped me to get their full attention regarding the subject matter. I then proceeded to engage them in the actual interview. How will you describe the sea in terms of what it is used for, what is in it and its colour? How have you been taught locally to take care of this ocean? These are a few but some of the questions I asked my potential participants regarding the children.

In all this, building rapport was very important in seeing to it that I had successful interviews with the participants. This approach was very instrumental in the successful recruitment of potential participants and their willingness to participate in the research work especially for those I engaged in the focus group discussions. In building rapport, I engaged in friendly conversations with my potential participants. These conversations were related to swimming, playing of cards and drafts. For instance, I engaged some youth I met by the seaside in friendly conversations and ended up playing cards with

them. Doing this helped me immensely in building a friendly bond and familiarity with them. This gave me the opportunity to introduce my research topic to them and ask of their opinion concerning the subject matter. For non-fishing male community members in the community of Axim, I ended up playing drafts with them in a local spot called "*Class One D or Friends' Kitchen*". After playing drafts with them, I then introduced my research topic to them and they became very receptive towards me and were willing to participate in the research topic. Approaching them while in casual wear and slippers made them identify with me as one of their own and found it easy discussing their beliefs, perception and knowledge about the sea and their relationship with it. After this session, they further referred me to other people who they thought had in-depth knowledge about the subject who could be of help. Through these referrals, I contacted and engaged those who were willing to participate in the research.

Interviewees who were interested in the study were debriefed about the research topic and its purpose and asked whether they were willing to participate. The nature of the consent was sought from the potential participants of the research verbally and it was recorded on the tape recorder. For the participants who were below the ages of 18(children), the consent was sought from their parents and I proceeded to interview them so far as their parents consented to it on their behalf. The participants were made aware of their rights as research participants. They were assured that this research was not going to bring any harm to them physically and emotionally. Their right to recuse themselves from the study when they feel uncomfortable was also

emphasized. I made it known that they are at liberty to state whether they want to be recorded on my tape recorder.

It is important to note that participants were assured of anonymity and confidentiality. I ensured this by making sure that the potential participants only gave their pseudo names and not their real names. They were given names and codes other than their real names. Also, to ensure confidentiality, I made sure their responses from the research were not passed on to a third party who was not directly involved in the research.

All the interviews were conducted in Twi with the exception of the youth leader who interspersed English with the Twi Language. Most of the interviewees were conversant in the Twi language and it was therefore easy to probe and get their responses on the subject matter. Most of the interviews lasted for 45-55 minutes. The interviews were conducted in the homes of the research participants, their workplaces and also by the seashore. The responses to the interview questions were tape recorded so as to help me in the transcription stage.

I approached all the participants with an interview guide which had a list of questions that I was interested in asking concerning the subject matter. The questions in my interview guide which were asked were developed carefully based on my study objectives. The purpose was to elicit detailed information from my participants concerning the existing ocean related indigenous knowledge in the community of Axim and how it has helped in managing the sea within community. The first few minutes of the interview saw to it that I followed the interview questions but as the interview progressed, there were pressing issues that came up and needed to be probed

further in relation to the subject matter. As I progressed in the interviewed, I improved on my probing skills which helped in keeping the conversation going and made it appear spontaneous. This gave room for the issues about the management practices in the community in relation to the sea to be explored further and better appreciated and understood.

A number of the interviewees were receptive and willing to participate in the study except for some few potential participants who were angry and hurled insults at me and my supervisor thinking that I am a government official who will come and listen to their responses and use their words against them in the form of implementing the closed fishing season policy.

Creative Pictures/ Photo-voice

To find out how important indigenous knowledge about the ocean is to kids in Axim, Ghana, a unique and interactive approach called photo-voice was used. With the use of this creative method, the kids were to be given the opportunity to express through visuals how they felt about the importance of indigenous knowledge in ocean management.

A 45-minute photo-voice session was held with each of the nine participants, who represented the communities of Apewosika, Lower Axim, and Upper Axim. Forms for informed consent were prepared with children in mind, using wording that was easy to understand. Parents or guardians were given the opportunity to read the informed consent papers, which contained information on the photo-voice sessions, possible advantages, and the voluntary nature of their child's involvement.

To build rapport and put the kids at ease, the photo-voice sessions started with an introduction and an icebreaker (how many of you can swim and enjoy drawing?). This action was essential to creating a relaxed and accepting atmosphere for artistic expression.

Pencils, crayons, and drawing books were provided for every child to help them express their artistic ideas. The students were able to visually convey their awareness of the significance of indigenous knowledge in ocean management since the materials were thoughtfully chosen to allow for a variety of creative answers.

To encourage the children to depict particular components of indigenous knowledge relating to the ocean that they felt were significant for ocean management techniques, I gave them guiding prompts and questions that were related to the research purpose.

The children had the chance to show the group their drawings at the conclusion of each session. Important insights into the many viewpoints and interpretations of the children's relevance of indigenous knowledge were gained during this sharing and reflection phase.

The research endeavored to capture the distinct viewpoints of the children in Axim by employing the photo-voice methodology, and to imaginatively investigate the relevance of indigenous knowledge in ocean management practices. Throughout the research project, ethical and respectful participation was guaranteed by the informed consent procedure, which was created with the understanding of the children in mind.

Observation Guide

As a researcher studying ocean management practices and indigenous knowledge in Axim, Ghana, the observation process was essential to obtaining nuanced understandings of the community's relationship with the ocean. Observing totems, artifacts, canoe inscriptions, and people's relationships with the ocean and its space were the main points of interest.

It was crucial to prepare thoroughly and become familiar with the cultural background and particulars of indigenous knowledge before approaching the field. In order to comprehend the meaning of totems, artifacts, inscriptions, and evident relationships with the ocean, this required interacting with local leaders, fishermen, and community members to know much about certain observations that I did not understand.

I started by paying attention to notable totems and objects in the communities, including carvings, sculptures, or buildings with cultural importance connected to ocean management. I also observed how people in the community interact with these items and totems by keeping track of any ceremonies, rituals, or regular activities that incorporate these aspects of the culture.

I observed how members of the community went about their everyday lives in relation to managing the ocean, including how they fished, navigated, and used traditional tools and also how they kept the ocean space clean. I was particularly interested in any rites or ceremonies connected to the ocean, such as prayers, offerings, or get-togethers with the community that highlight the cultural bond with the sea.

I made thorough field notes both during and right after the observations. I was able to record the mood, feelings, and any unexpected events that could shed more light like people coming at the seashore to engage in open defecation. I used photographs to supplement written notes in order to depict the totems, artifacts, inscriptions, and people's connections with the ocean into visual form.

Table 2: Summary of the category of research participants, their respective numbers and methods of data gathering
Table 1.1

Category	Method of data gathering	Upper Axim		Lower Axim		Apewosika		Total
		M	F	M	F	M	F	
Chief	IDI	1	0	1	0	0	0	2
Chief Priest	IDI	1	0	0	1	0	0	3
Chief Fisherman	IDI	1	0	1	0	0	0	2
fishermen	FGD	50	0	15	0	14	0	79
Youth Group	IDI	15	0	10	0	0	0	25
Konkohemaa	IDI	0	0	0	0	0	1	1
Fishmongers	FGD	0	15	0	6	0	7	28
Female Community Members	FGD	0	5	0	0	0	5	11
Male community members	FGD	12	0	7	0	0	0	19
TOTAL		80	20	34	7	14	13	168

Source: Fieldwork, 2022.

Data Processing and Analysis

The responses that were recorded from the interviews with the participants were translated and transcribed and the relevant information was drawn from it. The data was therefore organized, synthesized and patterned to decide what to report (Tesch, 2013). Thematic analysis was the main tool used for the analysis. The primary data obtained was transcribed, "sorted, organized and indexed" (Mason, 1996:7) and classified into categories. After this the transcribed data was extracted manually as relevant texts from the transcriptions were sorted and put under the themes that emerged from the responses. Themes which contained similar responses and meaning from the multiple research participants (Ayres, Kavanaugh & Knafl, 2003) were developed to aid the structural formatting and presentation of the data obtained. Themes like the forms of IK, patterns of IK transfer, indigenous knowledge' s relevance to ocean management, impediments to IK promotion, were developed along the specific issues which emerged from the participants' responses during the period of data collection. Afterwards the contents of the themes were analysed manually with theoretical perspectives and relevant empirical literature.

In addition, the phenomenological analytic strategy was used to analyse the lived experiences and the indigenes' encounters with the forms of indigenous knowledge, the patterns of indigenous knowledge transfer and the impediments to the promotion of indigenous knowledge in ocean management practices (Frechette, Bitzas, Aubry, Kilpatrick, & Lavoie-Tremblay, 2020). This same strategy was used to analyse the pictures in terms of artefacts,

drawings of children, totems and inscriptions on canoes as taken on the field by considering their relationships to the cultural setting of the place.

Ethical Considerations

This study paid particular attention to ethical issues. Permission was sought from the chief of Axim and the Chief Fisherman of the Axim fishing communities before the study was carried out. The participants were duly informed about the study and those willing to participate were engaged for the study. In the case of children, permission was sought from their parents before engaging them in this research. Issues of the participants' confidentiality, anonymity, and privacy were strictly adhered to. Confidentiality was assured in this study as the participants were assured that the data collected from them will not be used for any other purpose either than academic purpose. Anonymity was also assured as the real names of the participants were not used. Privacy as a research ethic was also assured as the participants were asked to choose places of convenience for the interviews and Focus Group Discussions to be held. There was also strict adherence to Covid-19 protocols in the course of the field activities as research participants were is given face masks and hand sanitizers to protect themselves from the virus in the course of the study.

Summary

The chapter brought to the fore my methodological approach. I detailed the various issues and principles that were followed in undertaking the research. I followed-suit with the procedures sampling, data collection procedures and how I analysed the data.

CHAPTER FOUR

FINDINGS AND DISCUSSIONS

Introduction

This chapter analyses and discusses data gathered during the study on Indigenous Knowledge and Ocean Management Practices in the Western Region of Ghana. Four major themes emerged from the data that was gathered for this study. These themes include; Knowledge on forms of ocean related Indigenous Knowledge, patterns of ocean related indigenous knowledge transfer, relevance of ocean related indigenous knowledge, and impediments to the promotion to ocean related indigenous knowledge. The work also drew from the diffusion of innovation theory as espoused by Rogers (1965) and Woodley's Ecological Knowledge theory

Socio-Demographic Characteristics of the Participants based on sex

The age range of the persons who took part in the study was 28 to 60, with a mean age of 39. Children that participated in the study ranged in age from 12 to 17 years, with a mean age of 14. Only 5 participants identified as Muslims, the majority of who claimed to follow Christian principles. The participants were primarily of Akan ethnicity. All of these traits arise from the fact that Axim is predominately an Akan village, with Christianity having a strong influence on locals' way of life (GSS, 2014).

Most of the participants had no formal education except for 15 participants who had attained some level of formal education.

The study included 168 participants in all. Thirty women and 138 men made up the 168 participants. Out of the 168 individuals, 100 took part in Upper Axim, and roughly 41 took part in Lower Axim. The 27 remaining

participants were active in the Apewosika community in Axim. The availability of participants in each village and their desire or unwillingness to participate in the study determined the disparity in the number of people involved in each community.

The forms of Ocean related Indigenous Knowledge in Axim

Participants of the research were asked on the existing forms of ocean related indigenous knowledge. This was to have an in-depth understanding of the forms of ocean related indigenous knowledge within the community of Axim. This was also to ascertain community member's level of knowledge and awareness of the ocean related indigenous knowledge as indigenes of the community. This was necessary because their knowledge on the existing IKs in the community will help in better appreciating how this IK has been transferred over time. The views of the participants varied from one participant to the other and therefore there was the need to ensure such dynamism in responses. For many fishermen, youth, community members and opinion leaders (Chief, Chief Priests, Chief fishermen) in the study area, they identified the ocean related indigenous knowledge in the community to be observance of no-fishing days (Tuesdays) and serving of food to the sea god, *BeboArizi* for bumper harvest.

Quite a number of the participants also identified the avoidance of the use of light and other harmful substances in fishing as a form of ocean related indigenous knowledge. The participants believed that these harmful substances did not only harm aquatic life and water but also irritate the gods in the sea.

On the part of the fishmongers, they identified these ocean related indigenous knowledge to be the digging of catholes along the coast to dump their human waste. Some of the responses from the participants have been sampled below:

> *The Indigenous knowledge that we have had from our forefathers which they used to protect the sea was not fishing on Tuesday. Our fathers were also not fishing with harmful chemicals like dynamite, DDT, and the use of detergents in fishing. (A 30- year- old youth in James town, Muslim, FGD, July 2022)*

A fishmonger in Amanfukuma, Lower Axim from the focus group discussion also succinctly expressed that;

> *Our forefathers used to defecate along the coast just as we do in our time. That has not changed. But what they used to do before easing themselves was that they used to dig a hole among the sands with their hands. So immediately they finish easing themselves, they cover it gently. They were also using paper bags when going to fish but these days, we go with polythene bags, sachet water and bottles of soft drinks and we dump them in the sea as we fish (A 39 -y-ear old fishmonger, Christian, FGD. July 2022)*

The above assertions from the fishmongers in a focus group discussion are also indicative of the fact that IK as a management practice for local communities in terms of managing the sea was visible in the lifestyles and attitudes of people of old towards the sea. They purposefully avoided the use

of polythene bags, sachets and plastic bottles whiles fishing just as a conscious effort to keep the oceans and its surroundings clean.

The chief priest of Lower Axim also expressed his view on serving of food to the sea god as a form of IK in the following way;

> *We had seasons for fishing. Before the season begins, such as the Bakatue of the people of Elmina. After a month the fish moves to our portion of the sea. We as traditional priests perform traditions on the island to protect this sea and the community. eto) is being prepared and a cow is also slaughtered. The eto) and the blood of the cow are sprinkled on the canoes and the gods of the sea. This sacrifice is to tell the gods that it is a new year, and this is their food so they should provide fish for the inhabitants of the land. The community have a procession to the outskirts of the town (Chief Priest, Lower Axim, and IDI. July 2022)*

The responses from the participants and the narratives so far concerning the forms and nature of IK is indicative of the fact that IK is deeply woven into the cultural fabric of the people and have deep spiritual connotations like the reverence of the sea as a god and the serving of food to the gods in the sea. This is also expressive of the reality that indigenous people do not see this as just an ordinary knowledge but it is also their way of going to their creator in prayer and supplications. It is imperatively instructive to note that the religiosity of indigenous people is made manifest in how they revere the sea. The acknowledgement of the forms and nature of the existing ocean related indigenous knowledge in the community of Axim also finds

expression in the Diffusion of Innovation theory as Rogers (1965) argues that people will adopt and continue to use a particular type of knowledge if that idea resonates with their lifestyles, their culture and tradition. For example, adherence to the no-fishing days in the community, as espoused by the Diffusion of the innovation theory will be largely dependent on how such taboo resonates with their contemporary lifestyles and belief system.

As established in the literature, Ocean related IK finds expression in the long-standing traditions and practices of local communities and involves the knowledge, wisdom and teachings of particular communities concerning the management and preservation of resources (Kandal, Swart, Yacoub, & Gerkema, 2021). The responses of participants regarding the sea as deity revealed the deep spiritual connections local people have with the oceans and its resources. The findings corroborate the findings of many other scholars as they argue that indigenous people have deep spiritual connections with the sea. (See, Utombo 2010; Kandal, Swart, Yacoub, & Gerkema, 2021).

Responses from the participants indicate that this indigenous knowledge used in managing the sea has their ancestors as the source. It became clear that IK is not modern creation but rather something that has been in existence in the community of Axim for many years (Utombo, 2010). This was common in the narratives of all the participants as they identified their ancestors to be the source of all the forms of IK that were identified in this study.

> *The knowledge of no-fishing days and avoiding the usage of harmful substances in fishing that we have used to manage the sea belongs to all of us and came from our ancestors. Our*

parents taught us and we are also teaching our children (A - 40- year- old fisherman, Lower Axim, FGD, July 2022.)

The above narrative corroborates the argument of Berkes (2012) as he noted that IK is collectively owned by people of a particular culture and passed down from one generation to the other generation by word of mouth or through oral tradition.

The Ocean as a Deity

Another issue that came up strongly in the narratives was the strong belief in the Sea as God with many smaller gods. Viewing the sea as god was identified as another form of IK in the community of Axim. Majority of the participants in the focus group discussions and in-depth interviews corroborated the assertions that the sea was viewed as a god with many smaller gods within the sea who protect the community and also sees to it that the community have enough fish to feed themselves and also to sell in order to make money for themselves. However, other participants were of the view that the sea is not a god in itself but were rather created by God for the benefit of mankind. A fisherman in a focus group discussion in Apewosika noted that there is a god on an island in the sea known as *BeboArizi.* According to him, this god was responsible for giving fishermen and the community bumper catch anytime they go to the sea to fish. This was succinctly expressed by the fisherman in the following words;

There is a powerful god in the sea known as BeboaArizi. The lighthouse that you can see from this distance on the island is the home of this powerful God. Anytime we make the

necessary sacrifices to him, he sees to it that we get plenty fishes (Fisherman, FGD, Apewosika, July 2022)

The Chief Priest of Upper Axim also noted that the whale was also considered as a smaller god in the sea and for that matter was not supposed to be caught by fishermen. According to him, the whale helped in calling other fishes into the sea and also capsizes the boats of fishermen who have been cursed by other people. The participants noted that because the sea is a god, it detests all kinds of dirt and rubbish thrown in it. According to a male participant from a focus group discussion in Upper Axim, the sea is said to detest dirt as a god because the sea washes ashore all dead bodies that have been drowned in the sea. The reverence for the sea as a god was also made manifest in how the Chief Priest, Chief and elders and other opinion leaders in the community prepare food to be served to the gods in the sea. The knowledge and fear that the sea is a god and that it has some spirits like *mamawata* in it prevented people from desecrating the sea and also restrained them from throwing rubbish into the sea. There is the fear that people who desecrated the sea will be punished by the gods in the sea with a fatal illness. A female community member recounted her experience about the deity of the sea in the following way:

The sea you see there is not just an ordinary water, the sea is a god with likes and dislikes. I remember when we were young; we went to the seashore early in the morning so that we can dump rubbish in the sea without anyone seeing us. Early that morning, we saw someone clothed in white dancing on the sea. The closer we got, the wider the distance

between us. We started running to save our lives (A 38- year -old community member, Upper Axim, FGD, August 2022).

A child from Upper Axim in a focus group discussion also stated that they have been told the sea is a god with a lot of spirits dwelling in it. According to this child, they are been allowed to swim to certain designated areas in the sea but they have been cautioned not to have sexual intercourse in the sea as they are swimming because this will irritate the gods in the sea and the gods could strike them dead instantly. This was common in the narratives of the children. This was expressed as;

My mother has told me that there is a spirit in the sea whose upper part is a human being and the lower is a fish. This spirit is called maamewata. She said I could be punished if I do something bad in the sea that the spirit doesn't like. An example is having sexual intercourse in the sea while swimming (A 14- year -old Pupil in Upper Axim, FGD, August 2022)

Another child also expressed that;

We know that some big fishes in the sea like shark and the whale are all gods in the water (14- year -old Pupil in Lower Axim, FGD, August 2022)

From the participants' narratives so far, not only does the reverence for the sea as a god restrains natives from desecrating the sea with dirt but they also reposed a greater trust and belief in the healing power of the sea water because it is assumed to have come from the gods. The Chief Priest of Upper Axim noted that the sea water has the power to heal all kinds of diseases and

health conditions among which include, barrenness, sexual weakness, eczema, rheumatism, waist pains, chicken pox, skin rashes, and nausea. A Fishmonger who is also married to a fisherman corroborated this in a focus group discussion with fishmongers;

> *Our belief is that this sea water is very good in curing a lot of diseases. Taking a little of this sea water can even make you very strong in bed and cure all waist pains. Respectfully, your manhood will be very strong. My husband and every fisherman can attest to this (A 43 -year- old woman, Lower Axim, FGD, July 2022)*

Another participant in the focus group discussion for children also noted that;

> *The sea water is able to heal us of sickness. When you fetch the sea water, you just have to boil it on fire for some time and then pour it in a bucket. After inhaling the flavour from the boiled water, you will begin to sweat and that will heal you(A -16 -year- old pupil, Upper Axim, FGD, July 2022).*

It is important to note that the belief in the water as a deity is not a new phenomenon in the literature (See, Adjei &Sika-Bright, 2019; Turaki, 2000; Ntiamoah-Baidu, 1995; Sarfo-Mensah & Oduro, 2007). It therefore comes as no surprise that most of the ethnic groups in Ghana have beliefs which are reflective of water bodies as deities because rivers and seas symbolize the gods of local people in a community (Adjei &Sika-Bright, 2019; Sarfo-Mensah & Oduro, 2007). The reverence and fear of the sea as a god is also confirmed within the literature that some ethnic groups in Ghana worship and serve these water bodies in their communities as these water bodies protect

them from harm and all forms of danger (Adjei &Sika-Bright, 2019; Turaki, 2000; Ntiamoah-Baidu, 1995; Sarfo-Mensah & Oduro, 2007). Ohemeng Boakye (1980), cited by Adjei & Sika-Bright (2019) noted that some people even regard the sea and water bodies as a source of life and fertility- where barren women could go and bath in it for cleansing with the hope of becoming fertile and the gift of a child. It is also a reality that in most African traditional homes, prayers are made directly or indirectly to the gods and spirits in the water for guidance and protection. The findings of this study regarding the fear of the sea as a god can therefore be situated within the context of the existing literature since these particular findings corroborate those of other researchers.

Summary

From the narratives of the participants, there is no gainsaying the reality that they had knowledge on the existing forms of ocean related IK in the community of Axim. They identified these to be observance of no-fishing holidays (Tuesdays), serving of food to the sea god, digging of catholes along the seashore to dump human waste and engaging in communal activities around the sea. Through the narratives, it became clear that ocean related IK is not a modern creation but could be traced to antiquity

Patterns of ocean related Indigenous Knowledge Transfer in Axim

Prétat and Thomas (2009) have argued that the key knowledge of every people and community has to be shared, disseminated and used within the whole community so it can become an asset whereby its practice could be strengthened. Prétat and Thomas (2009) intimate that knowledge transfer

means to convey and to diffuse knowledge among different people or within people of the same community.

The participants of the research expressed their knowledge on the patterns of indigenous knowledge transfer in the selected communities. This became necessary to have an in-depth understanding of how IK has been transferred from one generation to the other till date in the community of Axim. Such questions helped in appreciating how they were first introduced to IK, the process through which they were introduced to it, the mechanism through which IK was transferred to them and the changes that have occurred in the transfer of this IK to them.

How Community Members are introduced to IK

Concerning how community members were introduced to the IK, most of the participants revealed that they were introduced to IK by their parents and older siblings. A fisherman from the focus group discussion has this to say about how he was introduced to ocean related IK;

> *As for me, it was my father who first introduced me to these customs and traditions which are used in preserving the sea. As a little boy, I used to follow him to sea as just as we are on the sea, I will be watching what he does and also do same (A -40 -year- old fisherman, Upper Axim, FGD, July 2023).*

Another fisherman in Upper Axim in a focus group discussion also intimated that:

> *Whiles fishing, I remember my father once told me that the sea is a god and for that matter it should be treated with respect. That we*

should not do things that will be harmful to the sea. (A- 39- year-old fisherman, Upper Axim, FGD, and July 2022).

However, the community members noted that apart from they been introduced to IK by their parents and older siblings, elders in the community also played a critical role in introducing them to ocean related IK. A female community member in a focus group discussion asserted:

When I was growing up, I once sat in a pan at the seashore and an elder told me not to do that because I was blocking the harvest of the fishermen and since then I have not sat in a pan at the seashore (a -39 -year- old female community member, Lower Axim, FGD, July 2022)

Nonetheless, The Chief Priest of Upper Axim however noted that as a Chief Priest, one is being intentionally taught all these ocean related practices and rites before you even become a Chief Priest. He stated:

The position of the Chief Priest is not for small children. As a Chief Priest, you have to know the customs and traditions in relation to the sea. So, you are made to learn from the elders and your predecessor before you become a Chief Priest (Chief Priest, IDI, Upper Axim, and July 2022)

Processes through which Community Members are introduced to IK

Regarding the processes through which community members are introduced to ocean related IK in Axim, it became evident that fishermen were introduced to this IK through teaching, coercion and subtle persuasion. Dominant among the narratives of the fishmongers, it became clear that subtle

means of persuasion was the major means through which this ocean related IK were learnt.

Regarding the use of persuasion as a process of being introduced to ocean related IK, a child in Apewosika intimated that:

> *My mother told me that if I do not dump refuse in the sea, the spirits in the sea will bless me but if I become stubborn and keep on dumping refuse in the sea, the gods will punish me. When she said that, I was afraid. (13- year -old -boy, Apewosika, FGD, July 2022)*

A fishmonger in a focus group discussion stated that:

> *My mother taught me how to process fish and also taught me that there were laws against the catching of some particular fishes so I was also not buying such fishes from fishermen. She was also giving me money so learning these things from her as we were working was interesting. she wasn't giving me money when I refuse to listen to her teachings. (A -45- year- old fishmonger, Upper Axim, FGD, July 2022).*

The Diffusion of Innovation theory as Roggers (1966) could therefore be used to explain the above findings that when well respected members of the community (early adopters) like the chief and elders, chief priests and priestesses, chief fisherman and other traditional leaders whose opinions hold sway in the community accept and use this type of knowledge, it becomes easy for their children or younger ones to follow-suit. Within the lenses of this theory, it becomes important to note that the fishmonger learnt these

customary laws and traditions in safeguarding the sea because she saw her mother and other elders in the community who are well respected doing same. Another fisherman recounted how he learnt ocean related IK by stating that:

> *In those days, all we knew was fishing and nothing else. We had to learn these traditional practices and customary laws from our fathers to protect the sea because this was the only thing that brought us money (A -36 -year -old fisherman, Lower Axim).*

It is also important to note that the Chief Priests played a cardinal role in seeing to it that these ocean related indigenous knowledge are being transferred from one generation to the other. According to the research participants, the position of the Chief Priest is one that invokes reverence and fear and for that matter if the chief priest speaks as an oracle of the gods that fishermen are not to engage in unhealthy fishing practices, the fishermen had no choice but to obey. This was encapsulated in the words of the Chief Fisherman of Upper Axim in the following words:

> *in the olden days, the Chief Priest had a lot of influence in seeing to it that people followed and learnt these ocean related indigenous knowledge like observance of Tuesdays fishing holidays and the avoidance of open defecation by the seashore. When the Chief Priests says it is a directive from the gods, fishermen and other people had no choice but to follow because the position of the Chief Priest was not only respected but also feared (Chief Fisherman, 56yrs, IDI, Upper Axim)*

Another fisherman intimated the role of the Chief Priest in these ocean related IK in Axim in the following words;

> *As the Chief Priest performs rites to appease the gods on behalf of fishermen who broke the customary laws of catching some specific specie of fishes that are not supposed to be harvested, the rest of us learn through such rites that it is a taboo to harvest such species (Fisherman, 39yrs, Lower Axim, FGD, July 2022)*

Mechanisms of Ocean-related Indigenoous Knowledge Transfer

In terms of the mechanisms through which these ocean related IK were transferred to them, there were varied responses among the participants interviewed. Whereas the fishermen noted face-to-face social relation like observation as the main mechanism through which this ocean related IK were transferred to them, the male and female community members, children and the fishmongers identified oral tradition and folktales as the mechanisms through which these ocean- related IK were transferred to them in the community.

A fisherman explained that:

> While at sea, my father never used DDT and "omo" in fishing. *I always observed and practiced what was been done both on shore and offshore as I grew up (A -47 -year- old fisherman, Upper Axim).*

The aforementioned narrative of learning through observation corroborates the findings of Prétat and Thomas (2009) as they argued that acquiring indigenous knowledge by observation could be likened to that of a master-

apprentice relationship. They noted that the apprentice can acquire knowledge without the use of language. In this context of the narrative, language is replaced by observing and imitating the master and later practicing what has been seen.

A child in the focus group discussion also noted that

> *We were told that we are not supposed to go to the sea on Tuesdays because one went there on Tuesday and he was beaten by the god on the island. The god is called BeboArizi (14 -year- old child, Lower Axim)*

Oral Tradition as a mechanism of ocean related IK transfer also featured in strongly in the narratives of the research participants. A 16-year-old in the community of Lower Axim stated that:

> *My mother told me a story that there was a man who went on fishing on Tuesday and he was beaten by the god, BeboArizi (16 -year- old Child, FGD, Lower Axim, July 2022)*

It has been made evident in the narratives of the participants that this ocean related indigenous knowledge was learnt through face-to-face social relations. The link between face-to-face social relations and other mechanisms of IK transfer has been widely outlined in the literature (See, Perrin and Roland, 2007; Salis and Williams, 2008; Si, 2020; Grenoble, 2016). In line with the narratives on the mechanism for the transfer of IK, Perrin and Roland (2007) have argued that face-to-face social relation like observation and oral traditions have a strong way of ensuring the transfer of IK. The findings of this research regarding Face-to-face social relations like observations and oral

traditions corroborate the findings of (Perrin and Roland, 2007; Salis and Williams, 2008); as they argue that when individuals physically close to each other engage in mutual exchange of stories and information, it helps in building a pool of knowledge base for posterity.

The findings of Oral tradition and observations in my research are also explained in the works of Perrin and Roland (2007) as they opine that Oral traditions and observations as mechanisms for the transfer of IK allow the exchange of community member's IK throughout the community. Exchanging knowledge by means of face-to-face social relations is expected to be more effective compared to other means of l It is deeply imbedded in its bearers which often do not know that they possess it (Perrin and Roland, 2008); physical contact and verbal interactions are important requisites for the transfer of knowledge among individuals (Ambrosini and Bowman, 2001). In management practices where face-to-face social relations are visibly traceable as part of the mechanism for the transfer of IK, such management practices become more effective among the local people (Perrin and Roland, 2008).

The narratives from the participants are also suggestive of the fact that IK is practical (Nonaka, 1991; Sternberg, 1994), thus, it describes a process and context-specific as it is acquired in situations where it is used. Therefore, it is better acquired through personal experience and learning by doing in practical situations involving face-to-face interactions such as coaching, observations, oral traditions, networking and the like (Rebernik and Širec, 2007).

Knowledge Gap Between the young and Aged in the Community

In terms of differences in what the aged population know about these ocean related indigenous knowledge vis-à-vis what the youth know, It is important to note that the participants especially among the aged population revealed that in terms of the transfer of this IK among members of the community, that there is no difference between what they know as older generation and what the youth of today know about ocean related indigenous knowledge in the community of Axim. However, all the participants especially the aged fishermen, fish processors, chief and traditional priests agreed that when it comes to the depth and intensity of what they knew about ocean related IK in their time, there is definitely a slight difference because of social change. A fisherman expressed that:

> *I don't think that there is much difference between what we (older generation) know and what the younger generation also know about this customs and traditions to preserve the sea. The only problem is that there is a slight difference in our knowledge because of the presence of church, televisions and modern lifestyles. For example, the church people will say that observing customary rites related to the sea is ungodly (A- 52 -year- old fisherman in Upper Axim, FGD, July 2022)*

A youth in the focus group in discussion also noted:

> *We know we are not to go fishing on Tuesday and that a woman menstruating is not supposed to go closer to the sea. The truth is that these things do not really have much effect*

on our lives in these current times (A -32 -year- old youth, Lower Axim, FGD, July 2022)

The narratives from the participants in terms of the differences in knowledge between the aged population and the younger population clearly depicts that there is no inter-generational knowledge gap between what the younger generation know in this current dispensation and what the older generation knew in their time. However, it should be stated that the narratives make it clear there are contemporary barriers to the intergenerational transfer of indigenous knowledge- it being religion, modern lifestyles and televisions.

Common among the narratives of the chiefs, chief priests, and chief fishermen was the fact that the traditional authority of Axim plays a very strong role in seeing to it that ocean related indigenous knowledge is being preserved in the community of Axim. According to their narratives, they do this by seeing to it that they offer food to the gods of the sea, sees to it that no one goes fishing on Tuesday and also makes sure that customary laws against the catching of certain species of fish were strictly adhered to by the fishermen. This was succinctly expressed by the chief priest of upper Axim in the following words:

We play a very important role as traditional authority in seeing to it that people follow these customs and traditions in preserving the sea (Chief of Upper Axim).

The role of the traditional authority in the promotion and preservation of ocean related indigenous knowledge has been emphasized in the literature. Bruchac (2014) argues that indigenous knowledge is promoted and preserved by gatekeepers and opinion leaders (e.g., tribal leaders, ritual practioners, chiefs and elders, chief priests) who have vested of oral traditions are often

carefully trained to link parts of traditional narratives to specific events and locales, and cultural coherence by regular repetition in the community. It is therefore agreeable to argue that a failure in the role of these gatekeepers in preserving IK is a gradual extinction of ocean related IK. The above narrative also finds expression in the diffusion of innovation theory as it espouses that younger generations are likely to use a particular type of knowledge only when they see the well-respected in the community using that particular knowledge (Rogers, 1965).

However, some fishermen had a contrary opinion to the role of the traditional authority in promoting the adherence to ocean related indigenous knowledge in the area. The firm stance of some fishermen was expressed as follows:

> *The leaders and chiefs have a role to play but they only think of themselves. When was even the last time that they sacrificed a cow to the god of the sea? They even allow people to go fishing on Tuesdays and bring them some of the fish (A 30 -year- old fisherman, Upper Axim)*

This was also supported by a 40 -year- old fisherman:

> *the leaders are a bit relaxed in enforcing the strict observance of these customary rites as compared to what other leaders used to do in the oden days (Fisherman, 40 years, Lower Axim, FGD, July 2022)*

A fishmonger in Apewosika also added that

> *These days, fishermen even go fishing on Tuesdays, when they return, they (fishermen) just have to give a portion of*

their harvest to the Chief Fisherman (Fishmonger, 35- year - old, Apewosika, FGD, July 2022)

The Chief Fisherman of Upper Axim also explained that

These days, because of the closed fishing season which is being implemented, we sometimes allow the fishermen to go fishing on Tuesdays. When they come, they bring a portion here to me which we sell at the coldstore you have seen there. The profit is being used to take care of some challenges facing the fishermen (Chief Fisherman, FGD, Upper Axim, July 2022)

The narrative above from a section of the fishermen is only symptomatic of the reality that the traditional leaders and opinion leaders who are the gatekeepers of ocean related indigenous knowledge in Axim do not see to it that IK is being adhered to and practiced regarding the management of the oceans in contemporary times. This has a concomitant effect on how fishermen blatantly disregard and flout the ban on Tuesday fishing in the community of Axim.

Summary

It is imperative to note that there are existing patterns of ocean related IK in the community of Axim which were expressed in the form of how community members are introduced to ocean related IK, the processes through which they were introduced to ocean related IK, the mechanisms through which IK was transferred to them as natives and the existing changes that have occurred in the transfer of IK. Members of the community are introduced to IK by parents, older siblings and elders in the community. Teaching, subtle

coercion and persuasion were identified by the research participants as the process through which ocean related IK was transferred in the community of Axim of which subtle means of persuasion was the dominant process of ocean related IK transfer in the community.

The mechanisms through which ocean related IK was transferred in the community of Axim were identified to be face-to-face social relations like observation and oral tradition. However, face-to-face observation was identified as the major mechanism through which IK was transferred in the community amidst other mechanisms of knowledge transfer because it presented a more personal means of acquiring knowledge. It was also evident that there is no intergeneration knowledge gap between the knowledge of the aged population on ocean related IK and the knowledge of the younger generation on ocean related IK. However, it should be noted that there are contemporary barriers to intergenerational transfer of IK in the form of religion, modern lifestyles and the media-both print media and electronic.

Relevance of Ocean Related Indigenous Knowledge to ocean management in Axim

Kandal et al., (2021) expatiate that the importance of indigenous knowledge is sustainability based on the holistic understanding of the relationship between human beings and nature. They note that the idea of sustainability in this context proffers solution to the environmental problems facing our present world. It is apparently instructive to note that indigenous knowledge is significant tool of the indigenous peoples towards environmental conservation, survival and sustainability which is less expensive (Nyadzi, 2021).

Taking cognizance of the above arguments, participants of the research were asked on their knowledge on the relevance of IK in the community of Axim. Almost all the participants in the research agreed that IK is a useful means in preserving the oceans to meet present needs of community members and also to meet the needs of posterity. Common among the narratives of the Chief Priest, chief, fisherman, and the fishmongers was the fact that ocean related IK in Axim helps in boosting bumper harvest, fear of the gods to keep the oceans from pollution, preservation of fish species, reliance on IK for weather forecasting to predict good fishing seasons and the deployment of environmentally friendly fishing practices in managing the ocean in Axim.

Regarding how ocean related indigenous knowledge contributes to the boosting of bumper harvest, a fisherman noted that strict adherence to the customary laws and traditional practices related to fishing and the ocean always brought about increment in the fish stock in the sea. The chief priest also noted that anytime, they adhered to these IK in managing the sea and its resources, their harvest of fish was always massive and therefore should be continued unabated. A chief priest asserted that:

> *So, the traditions were good. This man has grown and can attest to the fact that the fishes were caught in abundance anytime we adhered to our own knowledge of managing the sea and people even sold fish on credit... The tradition of observing Tuesday fishing holiday helped a lot, improved the business of everyone because through that we had fish always. Even salt vendors had a good market in those days (Chief Priest, Upper Axim, IDI, July 2022).*

Fisherman also added,

> *my friends here will agree with me that those days that people were not using harmful substances like DDT, Omo and gari in fishing, fishermen used to get a lot of fishes anytime they go fishing (Fisherman, 36 years, Upper Axim, FGD, July 2022)*

From the narratives, it becomes evident that ocean related indigenous knowledge in the community of Axim has gained wide acceptance and even has trickling effect on other means of livelihoods in the community such as the mining of salt. The narrative is also reflective of the fact that IK as a useful means of managing the ocean also has a way of not only enhancing the fishing business for only fishermen but also creates a viable economic activity for fishmongers, drivers and children who may carry these fishes offshore thereby contributing to the general economy of the community and the municipality as a whole. These narratives are applicable to the diffusion of innovation theory as Rogers (1965) argued that a particular population will accept the usage of an idea or knowledge when they perfectly understand the "why" of that knowledge, i.e. understanding the reasons for the usage of that knowledge. Within the assumptions of the theory, it becomes clear that the people of Axim are using IK to manage the sea because it brings them bumper harvest and boosts their economic activities. The findings also corroborate the findings of Kandal et al., (2021) as they argue that IK's adherence like fishing holidays ensure the continuous multiplying of fish stock.

Consistent among the narratives of the fishermen, fishmongers and chief of Upper Axim was the narrative that the fear of gods alone in the olden

days used to keep people from doing things that will harm aquatic life and the general health of the ocean like fishing with harmful chemicals, throwing of rubbish into the sea and urinating into the sea. This was guided by the belief that the gods in the sea had the power to attack one with a deadly sickness, cause a misfortune to happen to the person or even strike the person dead at the instance. This fear for the gods regulated the behaviours of the natives of the community in moderation with regard to their attitude towards the sea. This belief in the gods was further reaffirmed when the natives of the community served the gods with food. This was expressed in the words of the chief of Upper Axim as he explained that:

> *In the olden days, one could die for refusing to adhere to these customs and traditions when it comes to preserving the sea. You will be punished for that. You may be punished with sickness and when enquiry is made the answer will be because you refused to listen to the directives of the gods in the sea (Chief of Upper Axim, IDI, July 2022).*

Another fisherman in a focus group discussion also stated that

> *The sea you see there is part of us and has influenced how we live our lives here in Axim. It is not just an ordinary water body that is why when the festival of the town is about to be celebrated, sacrifices are made to the sea so we can get more fish for ourselves and the future of our children (Fisherman, 45 years, Lower Axim, FGD, July 2022)*

The above narrative corroborates the findings of Amponsem (2015) and Adjei and Sika-Bright (2019). Amponsem (2015) argues in this tangent that in

most traditional societies in Ghana and Africa, smaller gods and traditional deities are represented by water bodies – rivers, lakes and streams. It is a known reality that these places are the abodes of gods and thus, shrines are set up closer to the water bodies. Fetish priests and other traditional leaders then set rules and regulations depicting how and when to use the water (Adjei and Sika-Bright, 2019). The narratives are also consistent with the findings of Kugblenu, Mahama and Hussein (2016) as they argued that indigenous people revere the sea as a god and parent. Some indigenous people view the sea as the center of their culture, the source of their sense of identity as a group, and the link between their past (as the location of their ancestors), present (as the source of their material needs), and future (as the legacy they are entrusting to their children and grandchildren) (Alam, Chadwick, Mallick and Soussan, 2019).

Another fisherman also added that IK was relevant in the preservation of the sea and its resources in Axim because it helped with customary laws against the harvest of some specific species of fish. He reported that fishes like the whale and shark could not be harvested because they served as totems for particular families in the communities and that they were also regarded as gods who aid in calling other fishes into sea. This explained the very reason why they had funerals for such fishes like the shark and whale anytime they are found dead along the shore of the sea. Aside the whales and Sharks, there are also customary laws against the catch of fingerlings and going contrary to this will not only call for the wrath of the gods but also the chief fisherman and his subjects will deal with the fisherman who breaks this customary law. The punishment could come in seizing of the fisherman's harvest for the day and

also the payment of some fines to serve as a deterrent to other fishermen who may want to engage in the harvesting of such fingerlings. This view was succinctly expressed by a fisherman in Apewosika in the following words:

> *We had customary laws and traditions against catching some particular fishes like the whale. The customary laws and traditions were very effective in the olden days so people did not joke with that at all (a -45- year -old fisherman in Apewosika, FGD, July 2022)*

The above narrative is widely corroborated in the literature (see, Adjei and Sika-Bright, 2019; Alexander, Agyekumhene and Allman, 2017; Chadwick et al., 2019; Amponsem, 2015). Taking cognizance of the above narrative, Alexander et al.(2017) has contended that before the introduction of Western conservation methods to Africa, many communities already had established resource management systems based on complex traditions and cultural belief systems that incorporate myths, taboos, totems, and social norms against the harvest of some particular species of fish (Ostrom, 1990; Hulme and Murphree, 1999; Roe et al., 2009). These systems originated to protect and promote communal wellbeing, rather than individual interest or that of preserving wildlife and natural resources (Kideghesho, 2008) .

The chief of Upper Axim also added that;

> *the customary laws against the harvesting of some species of fish is very important. If not for these customs, we wouldn't have had fishes in the sea by now (Chief of Upper Axim, IDI, July 2022)*

The above narrative is consistent with the finding of Amponsem (2015) as he intimates that customs and traditions play a significant role in ocean management by influencing behaviours in Ghana's coastal communities towards the harvest of some specific fishes in Ghana. The diffusion of innovation theory by Rogers (1965) is also applicable to the above narratives as Rogers argues that the acceptance of these customs and traditions is because of the fact that these traditions are compatible with their value systems, beliefs and culture. It therefore becomes easy for them to relate to these customs and traditions related to the preservation of the sea.

The relevance of indigenous knowledge in preserving the oceans in Axim also featured in strongly in the participant's narratives as they reported that IK aided in the deployment of useful practices in fishing. According to the participants, these useful practices in fishing were identified to be the avoidance of the use of light in fishing, not using dynamites and other explosives in fishing and avoiding the use of DDT and other detergents like "omo" in fishing. The fishermen emphasized that the use of light in fishing affects the quality of the fish being harvested thereby becoming unwholesome for consumption. Light fishing has also been noted by the fisherman as unsafe methods which affect the longevity of the fish after being harvested. A fisherman noted that:

> *Our own traditional knowledge through our fathers taught us not to use dynamites and 'omo' in fishing because they have an effect on the fish harvested (A -39- year- old fisherman in Jamestown, Upper Axim, FGD, July 2022).*

Another fisherman added that:

We know in this community that we are not supposed to used light and dynamite in fishing because our fathers did not use these things to fish while we were growing up. These are harmful to the sea and its creatures (A -50- year- old fisherman in Lower Axim, July 2022)

Deducing from the narratives, it is evident that through IK in Axim, fishermen have been able to familiarize themselves with useful practices that do not jeopardize the oceans and its creatures for the present generation and future generation. The narratives are therefore demonstrative of the reality that the relevance of IK has been made manifest as fishermen see to it that they use the existing IK in the community to ensure sustainable fisheries management in the community.

However, it should be noted that the fishmongers unanimously admitted that through ocean related indigenous knowledge, fishermen became aware of the unsafe fishing methods that they are to eschew, nonetheless, they reported that some fishermen still resort to the usage of light, omo and DDT in fishing despite knowing of the enormous ramifications of their acts as fishermen. The participants of the research like the fishmongers therefore emphasized that the use of light in fishing and other detergents mixed with gari are alien practices that their forefathers were not used to in terms of fishing and this is taking a toll on their businesses as fish processors. Majority of the fish processors were therefore of the view that the quality of fish they used to sell in the olden days when fishermen were not resorting to the use of unapproved methods of fishing like the usage of light and detergents and dynamites improved

massively as compared to this time that fishing activities have been have been debased to the use of unlawful practices.

One of the fishmongers asserted that:

> *The fishermen are aware that they are not supposed to use light in fishing. The fishermen also know that they are not supposed to use harmful substances like DDT and omo in fishing but some of them still do and this affects the quality of fish we sell(Fishmonger, Upper Axim, FGD, 35 years, July 2022)*

Another fishmonger in the focus group discussion added that:

> *the fishes we sell could last for a year when we process them in those days that fishermen were not using harmful substances like DDT in fishing. In these days, our fishes do not last long and the fishermen know that they are not supposed to use these harmful substances in fishing but some of them still do it anyway (Fishmonger, Apewosika, 28 years, FGD, August, 2022)*

The above narratives of the fishmongers have gained wide acceptance in the literature (see, Baartman 2012; Adjei and Sika-Bright, 2019; Agyekumhene and Allman, 2017). The narrative of the fishmongers corroborates the findings of Baartman (2012) as he argues that, illegal fishing like the use of dynamites and other explosives in fishing are destroying breeding abodes of fishes and other aquatic lives in lakes, oceans, seas and the rivers and this does not only affect the fish species and other aquatic creatures

but also plants, human beings and animals that rely on such water sources to make a living.

The fishermen, in an attempt to explain why some of them still break these customary laws related to fishing, they explained that the quest to compete with Chinese Trawling vessels in Ghanaian waters, the introduction of the closed fishing season and general economic hardships compel their colleagues to resort to these unapproved ways of fishing.

A fisherman intimated that:

> *I don't use DDT and Omo mixed with gari in fishing. I know our forefathers avoided such practices to protect the sea for future generations. But those who do that as fishermen do that because of the presence of the Chinese in our water bodies. The Chinese use bigger vessels and this is the only way fishermen can compete with them to get some money for themselves and their families. The government should do something about them (fisherman, 45 years, Apewosika, FGD, and August 2022)*

Another Fisherman added that:

> *Things are very hard in Ghana now and everything is expensive. Sometimes you can buy petrol and go fishing only to return with an empty boat. So, a fisherman will resort to use unsafe fishing practices so as to get back the money used in buying petrol (29 -year -old fisherman, Upper Axim, FGD, July 2022)*

A fisherman in Lower Axim also added that:

> *The government is not helping us as fishermen in the community. These days, the government has introduced something called the closed fishing season. So, some fishermen have decided to be going on sea on Tuedays which is not supposed to be so. But if they don't do that, they and their families will starve. When they return, they just have to give some to the chief fisherman (38- year- old fisherman, Lower Axim, FGD, July 2022)*

The above narratives from the fishermen corroborate the findings of Ansah, Oduro and Wilson (2022) as they posit that political, religious, and economic circumstances culminate together to change people's encounters with the ocean and how they perceived the sacredness of these ocean related customary laws, which led to its transgressions.

It was also evident in the participants' responses that ocean related IK was relevant in tackling the issue of waste around the sea. Taking into consideration how ocean related indigenous knowledge has become relevant in tackling the issue of waste around the oceans and open-defecation along the coastal areas, majority of the participants alluded to the fact that IK has really played a significant role in tackling waste some time past. Notable among the narratives of the fishermen was the idea that through IK, they organized communal labour to sweep and clean around the water bodies that were existing in the communities. These communal activities were done twice in every month: the first and last Saturdays of the month. Another explained that in time past they used to dig catholes along the shores before they ease

themselves and then close it neatly afterwards. This had a way of keeping the shores very clean and devoid of waste and human excreta. Significant among the narratives of the fishmongers was the idea that there was also the deployment of coastal guards in the community to see to it that people did not indiscriminately dump refuse into the oceans and also to make sure that people did not engage in open defecation along the coast.

A fisherman expressed that:

> *We always organize ourselves and clean up the shores. We do this twice every month although it has not been that effective in some time now (A -39 -year -old fisherman, Apewosika, August 2022)*

Another fisherman added that:

> *One common knowledge that our fathers used to prevent open defecation along the seashore was the digging of catholes to cover their human waste (A- 35- year- old fisherman, Lower Axim, July 2022).*

From the narratives of the participants, it is evident that ocean related IK has been beneficial to the people and community of Axim in diverse ways so far as keeping the ocean space is concerned. One could also deduce from the narratives that the deployment of IK in keeping the ocean space clean in the community of Axim is one that had yielded results in some time past. These narratives also corroborate the findings in the existing literature (Blenkinsop, 2017; Chadwick et al., 2019: Kimmerer, 2013; Amponsem, 2015). Amponsem (2015) has asserted that communal activities, digging of catholes and the deployment of coastal guards were ways indigenous people protected their

water bodies. The participants narratives are also applicable to the diffusion of innovation theory as Rogers (1995) posits that a population's understanding of the importance of a particular knowledge to their survival will inform their decision to adopt the knowledge or not to adopt it. In this instance, it becomes clear that the community found IK as a solution to the waste problem along the coast hence its adoption in the management of waste along the coastal area.

Despite the fact that the participants asserted that ocean related indigenous knowledge has been helpful in tackling the issue waste in the community of Axim, I observed scenes which were contrary to their narratives of good sanitary conditions along the shore as a result of ocean related IK. I observed that people were even engaged in open defecation at a portion of the sea defense wall. They believed that the sea will wash it away anytime there are strong tidal waves. This was a common practice across all the communities in Axim. In Upper Axim, there was a portion of the seashore which was for ladies and there was also a portion of the sea defense which was demarcated for males to ease themselves. However, the observation Apewosika and Lower Axim was a bit different from the setting in Upper Axim. Whereas the seashore in Upper Axim was shared between men and women to engage in open defecation, the communities of Lower Axim and Apewosika had both women and men engaging in open defecation at the same place along the sea defense wall. It was also observed that fresh fishes were placed not far away from the waste of plastics and polythene bags along the shore.

The narratives of the fishermen also revealed that they relied on IK to predict weather changes and fishing seasons. Through indigenous knowledge, natives of the community knew the seasons which were appropriate for fishing

and the seasons which were to be considered for rest. They reported that this knowledge helped them to know when they are to experience bumper harvest in the sea anytime they go fishing. They got to know this through the movement of the stars, the direction of the wind on sea, the type of star, temperature conditions and color of the sky and rainbow to forecast the next fishing season. This line of argument became more evident in the narratives of the participants as a fisherman added that:

> *We have relied on our own knowledge in this community to determine the right time there will be fishes in the sea and the right time not to go to the sea (A- 40- year-old fisherman, Apewosika)*

Another fisherman in Lower Axim also added that:

> *Through our local knowledge in this community, we have days that we do not go fishing aside the Tuesday ban on fishing. If they had consulted us before implementing this closed fishing season, they would have known that it is not necessary because we have our own seasons that we do no fish (A- 48 -year -old fisherman)*

The above findings are consistent with the findings of Balehegn (2019) as he argues that local weather and climate forecasting is used by a lot of native communities globally as a guide in making critical decisions that aid them adapt and cope with climate change-induced extreme weather variation and when to even go fishing. In many indigenous communities in Africa, local weather and climate forecasting remains the most accessible and affordable source of weather and climate information to fishermen and the community at large (Nyadzi, 2021; Nyong et al.,2017).

It should however be noted that despite the participants' understanding of the relevance of ocean related IK in the community of Axim, quite a number of the participants noted that there are sometimes some hesitance in complying to these ocean related IK such as not fishing on Tuesdays, digging of catholes along the shore before easing themselves and the adherence to customary laws restraining the fishermen from catching specific fishes within contemporary times. A fisherman noted that the construction of sea defense wall along the seashore has been the reason for the non-compliance to the digging of catholes among the sands of the sea because there are no longer sands but rather stones. Within the context of the Diffusion of Innovation Theory, Rogers (1995) argues that a particular population will be hesitant in using a particular knowledge or idea if they feel it is no longer compatible with their value systems and lifestyles within the context of modernity and social change.

Children in Lower Axim, Upper Axim and Apewosika also demonstrated a clear understanding of the enormous relevance of ocean related indigenous knowledge in managing the ocean and its surroundings in the community of Axim. Children were asked on the relevance of ocean related IK because they are the direct recipients, practitioners and agents of transmission of such knowledge long after the elderly in the community are no more. It was therefore instructively imperative to investigate the importance they attach to this ocean related indigenous knowledge and it was portrayed through photo-voice. A participant in the focus group discussion artistically expressed his opinion about the relevance of ocean related indigenous knowledge in the following way:

Figure 2: A child's depiction of the relevance of IK.
Source: fieldwork, 2022.

The picture clearly depicts how the oceans are going to become without the usage of ocean related indigenous knowledge in managing the sea and it surroundings. From the picture, it becomes clear that for there to be a clean ocean space devoid of rubbish, open defecation, there is the need for the useful deployment of ocean related indigenous knowledge in managing the oceans and its environs. from the perspective of the child in fig 1, the use of ocean related indigenous knowledge will not only ensure a clean ocean space but will also see to it that fishes harvested for the day will not co-exist with the rubbish while they are being brought offshore for fishmongers to come and purchase. The drawing from the child's perspective also depicts that without ocean related indigenous knowledge, children will have no fear in engaging in open defecation along the shores of the ocean with the belief that nothing bad will happen to them. This does not only affect the sea and its surrounding but also contaminates the fishes that are being brought offshore.

Another child in the community of Upper Axim also portrayed his perception about the relevance of ocean related indigenous knowledge in the following drawing:

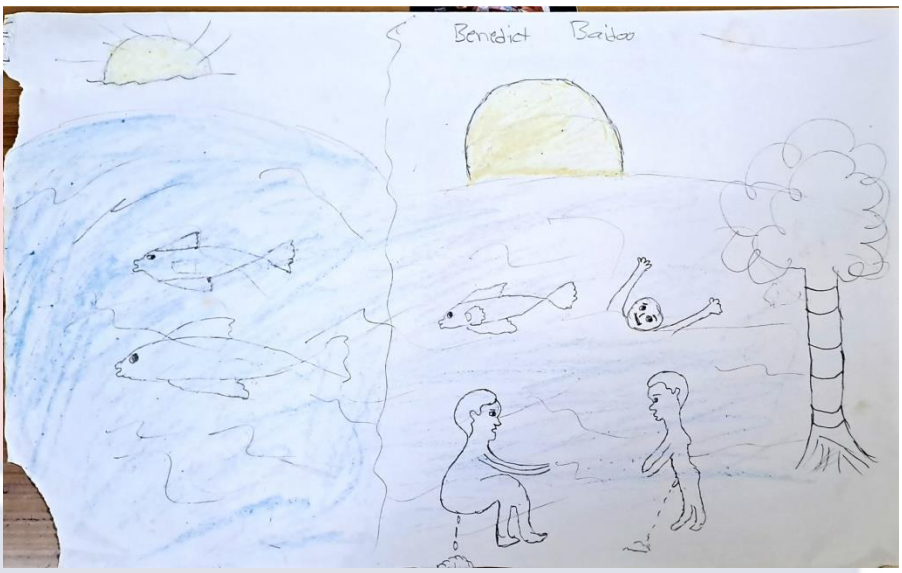

Figure 3: On the importance of IK
Source: Field work, 2022

From the perspective of this child through his drawing, indigenous knowledge has the potential of making children desist from the habit of urinating into the sea and also engaging in open defecation along the shores of the sea. The child therefore indicated how the oceans will look like without the use of indigenous knowledge like engaging in communal labour and also how the oceans will be like when they do not use indigenous knowledge in managing the ocean. Discussing his opinion of the drawing depicting a child defecating into the sea, another urinating into the sea and the other child swimming, Baidoo explained that:

> *If we use the knowledge that our parents taught us that there is a god in the sea, we will be afraid to go and defecate in the sea and we will also not go there to urinate into the sea. The*

gods will make us drown when we do that. The sea will be clean if we listen to what our parents taught. If we do not listen to them, the sea will be like the one I have drawn and the child swimming in it will get cholera (Baidoo, a 14-year-old child in Lower Axim, FGD)

From the narrative above and based on the drawing, it could be deduced that the children had a very good understanding of how indigenous knowledge could help in keeping a clean ocean space especially with the indigenous belief that the sea is a god. Such narrative is consistent with the findings of Adjei and Sika-Bright (2019) as they noted that the fear of the sea as god alone could in itself prevent people from polluting the sea since they believe that it has some spiritual connotations on their general well-being in the community. The narrative is applicable to the diffusion of innovation theory as the theory argues that people will be willing to use a particular knowledge or idea when they know its importance to their essence of living and can also related to that particular type of knowledge on the basic level without any complications in its usage.

Summary

This particular session considered findings on the relevance of ocean related IK to ocean management in the community of Axim. The participants in the research stated that ocean related IK was very useful in preserving the oceans for the present day and posterity. The participants identified the relevance of ocean related indigenous knowledge in the community of Axim by stating that adherence to IK boosts bumper harvest, keeps the ocean space and its surroundings clean from pollution, preservation of specific fish species,

aids in weather forecasting to predict good fishing seasons and helps in the deployment of environmentally friendly fishing practices in managing the sea at Axim. Photo-voice was also used to portray the relevance of ocean related IK under this section. From the narratives of the participants on the relevance of ocean related IK in ocean management, it became evident that the recognition and support to indigenous knowledge and cultures can make the preservation of the oceans more meaningful, efficient and effective.

Impediments to the Promotion of Ocean-related Indigenous Knowledge in Axim

This section explores the challenges and hindrances which impedes the advancement of ocean related indigenous within our contemporary times. The participants expressed their knowledge on the impediments to the promotion of IK within the community of Axim. The promotion of IK takes into consideration the factors that undermine the relevance of ocean related IK in Axim, the patterns of its transfer in the community and factors hindering its inclusion in national marine resource management policies.Quite a number of the fishermen, fishmongers, community members, the chiefs and chief priests who participated in the study revealed that issues about social change- high presence of religion and modernity, political influence, media impact, mainstream schooling and the perception of IK as old-fashioned formed parts of the reasons hindering the promotion of Indigenous in the community of Axim.

Significant among the narratives of most of the fishermen, chief priest, fishmongers was the idea that social change has really altered most of their culture and traditions in relations to the ocean. They reported that the heavy

presence of religion and modern lifestyles from the global west are fast eroding ocean related indigenous knowledge in the community of Axim. The participants expressed the view that community members who were bent on following the traditions and customs which depict ocean related indigenous knowledge were viewed as idolaters and ungodly by people of other religions like Christianity. They expressed that Christian religious leaders preached against the adherence to this ocean related indigenous knowledge which is not auguring well for the promotion of indigenous knowledge in the area.

The Chief Priest of Upper Axim intimated that:

> *The sacrifices we made for the gods in the sea before every fishing season should be done because now the religion of Christianity and Islam are preventing the practice. Not performing these practices annoys some of the great spirits such as the deity in the sea (Chief Priest, Upper Axim, July 2022, FGD)*

A 42-year-old fishmonger in Apewosika explained that:

> *Initially on Tuesday, no one went to the sea, and I remember witnessing that where you will either meet troubles at sea or you will get no catch but nowadays because of Christianity the elders have removed some of these traditions and now they allow fishing on Tuesday. As you can see, today is Tuesday, yet they went to catch fish. Now they can fish on Tuesday (42-year-old fishmonger, Apewosika, FGD, August 2022).*

A 39-year-old female community member in Amanfukuma (Lower Axim) also added that:

We were young then and were engaged in the activities. We would have been clothed in white cloth on this day and would have gone on the street tour with them but now we do not go. We would be in our respective houses not joining the activities because of Christianity (A 39-year-old female community member, FGD, Lower Axim).

A 49-year-old Konkohemaa also summarized the effects of social change on indigenous knowledge in this manner:

The traditions related to preserving the sea have been performed till today, but they are not practised as it used to be in those days. In those days, most people were not Christians and did not attend church, so they were more involved in the activities but today, the church has brought on the idea that these traditions are not right to be done and hence, people now do not practice these traditions and customs as they used to do (A 49-year-old Konkohemaa, Apewosika, IDI, August 2022).

A -30 -year- old fishmonger in Lower Axim also intimated that

It is very difficult for people to adhere to the traditions today. Like I said earlier I attend Action, someone else attends Methodist and another Christ Embassy. When we go to church the Pastors tell us the traditions are ungodly and idolatry hence, we should stop engaging ourselves. Now, we have been told celebrating the festival is not godly. If not, we would have been engaged in the activities that are ongoing, but we do not

because it is ungodly (30-year-old fishmonger in Lower Axim, FGD, July 2022)

A 28-year-old youth in a focus group discussion in Jamestown (Upper Axim) conclusively stated that:

One was likely to meet some bad omen when you go fishing on Tuesday hence, we were deterred from going. Just like farmers have certain days restricted that is how Tuesday is a day restricted for fishing. Today, because of church activities things have changed and we now go on fishing (Youth, Upper Axim, FGD, July 2022)

From the above narratives of the participants, it becomes clear that traits of social change through Christianity have significantly altered their cultural and social fabric in such a way that the IK related to managing the sea in the community has not been properly paid attention to. The introduction of Christianity in the narrative has created a serene environment to demystify the mystery surrounding local communities' adherence to indigenous knowledge. The narratives also are suggestive of the reality that Christianity has been a hindrance in the promotion of ocean related indigenous knowledge because it has taken away the element of fear and reverence that the local people had for the usage of indigenous knowledge in preserving the water bodies. The above findings are consistent with the findings of Luz, Guèze, Paneque-Gálvez, Pino, Macía, Orta-Martínez and Reyes-García (2015) as they argue that Changes in indigenous peoples' ways of life affect the way they manage the resources around them, including water bodies.

Among the different processes that currently affect the promotion of indigenous knowledge, cultural change has been singled out as important element (UNESCO 2008). Indigenous peoples are increasingly in contact with external actors and factors like religion-mostly Christianity, which causes a progressive adoption of new values and attitudes that in turn, might change their world view, their behaviour regarding nature and their social organisation.

On the part of the Chief Priests, Chief and Chief Fishermen, they revealed that political influence has been one of the factors impeding the promotion of ocean related indigenous knowledge in the community of Axim. The chief, chief priest and chief fishermen reported that there is a lot of political interference which is restricting natives of the community from adhering to ocean related indigenous knowledge in the community. The chief fisherman maintained that in instances where people blatantly disregard and flout the ban on Tuesday fishing, they are not able to mete out the necessary punishment to the offenders because political leaders in the area end up apologizing on behalf of the culprits. They reported that when this political interference continues for a long time, the fishermen end up seeing the traditional authority as people who do not have teeth to bite and execute punishment on offenders regarding ocean related indigenous knowledge. Community members or fishermen whose party is in power often do flout these directives since their affiliation to a political party has always saved them from facing the wrath of the chief and his subjects in the community of Axim. Political interference in the adherence to ocean related indigenous

knowledge has therefore rendered the traditional authority powerless thereby making them a white elephant.

The Chief Priest of Lower Axim explained that:

> *These days, it is even hard to punish people who do not adhere to these customs and traditions that we use in preserving the sea. When you try punishing them, their political party leaders come to their defense (Chief Priest, Lower Axim, IDI, July 2022)*

The Chief of Upper Axim also added that:

> *Those who flout these customary laws related to fishing are the ones who think that their party is in power. Such fishermen have no respect for these traditions and customs that we have used in preserving the sea all this while (Chief of Upper Axim, IDI, July 2022)*

The Chief Fisherman of Amanfukuma/ (Upper Axim) also concluded that:

> *Politicians are really meddling in our activities here. I remember some time ago a fisherman flouted the ban on Tuesday fishing here in this community. We tried giving the fisherman the necessary punishment per our tradition only for us to later realize that the canoe he was using in fishing belonged to a big man in the area (Politician). The big man came to apologize on behalf of the fisherman and we had to accept it. These fishermen know I cannot do anything to them*

when the break the law (A 68-year-old Chief Fisherman, Upper Axim, IDI, August, 2022)

The narratives of political interference as a strong hindrance to the promotion of indigenous knowledge in the community of Axim is in line with the findings of Akpalu, Eriksen, Vondolia (2018) as they intimate that a major hindrance to the adherence to ocean related indigenous knowledge is that that there are different forms of political interference. Amponsem (2015) held that fishing in the sea and its related activities are politicized, and that leaving offenders of the ban on Tuesday fishing and other fishing related customs and traditions serve as political rewards to those in political positions or with close ties to such persons. Political interferences are high therefore hindering the strict enforcement of customary laws and traditions related ocean preservation because party bigwigs are owners of fishing vessels and would also intervene on behalf of defaulters of customs just to score political points for the political party (Akpalu et al., 2018). This finds expression in the diffusion of innovation theory as Rogers (1995) argues that those who form part of the well-respected people in the society's adoption of a particular knowledge, idea or value, goes a long way to influence other people to follow-suit. Applying this theory to the finding, it could therefore be deduced that the blatant disregard for these ocean related customs is as a result of the fact that well respected members of the society like politicians who will crack a whip on offenders do not hold these customs in high esteem.

A number of the fishmongers and female community members who were engaged in this research blamed the media for the fast eroding of ocean related indigenous knowledge in the community of Axim. They reported that

the younger generation is enveloped in the web of electronic and traditional media in such a way that they have no time to even learn and observe these ocean related indigenous knowledge as practiced by the older generation. They opined that the younger generation will rather use such precious time to watch telenovelas on the television which do not portray the local knowledge of how to preserve our water bodies in the community. Through the media, the younger generation is exposed to lifestyles which are contrary to the already and known existing traditional knowledge in the area. With such constant interaction with western lifestyles through the pervasive presence of the media, the younger generation end up adopting the lifestyles in the media space and start viewing the local knowledge used in preserving the water bodies since time immemorial as primitive, archaic and backward looking.

A 37-year-old fishmonger in Apewosika narrated that:

> *In this our generation, children have no time to learn the things we are talking about. They will rather use that time to watch Kumkum Bhagya (Telenovela) on Adom TV (A 37-year-old fishmonger, Apewosika, FGD, August 2022)*

Another 34-year-old fishmonger in Lower Axim asserted that:

> *People in this our time will rather focus on their phones rather than learn traditions and customs which they see to be out-dated (A 34-year-old Fishmonger, FGD, July 2022)*

A -40 -year- old female community member in Upper Axim also noted that:

> *We try our best for the younger ones to know what to do and what not to do when they go to the seashore but these*

computer children think they are smarter than their parents who gave birth to them (A 40-year-old female community member, Upper Axim, July 2022)

It could be inferred from narratives that the media is taking a toll on how people perceive and adhere to these ocean -related indigenous knowledge and its patterns of transfer. The above findings are consistent with many findings in the available literature (Adjei and Sika-Bright, 2019; Perrin and Roland, 2007: Lekhi, 2019: Reyes-Garcia, 2015; Si, 2016). Si (2016) has argued that many factors have been identified to be the cause for the fast eroding of ocean related indigenous knowledge. Grenoble (2011) identifies some factors responsible for ocean related indigenous knowledge loss: urbanisation (e.g. increased exposure to broadcast media and the internet), globalisation (e.g. pressure to learn an international lifestyle). Lekhi (2019) has argued that the heavy presence of the media and internet in contemporary times has caused a lack of interest among people in following their tradition and cultural practices; youth are becoming more attracted to Western culture and following tradition among the younger generation is considered backward looking.

The participants of the study noted that the non-promotion of IK on ocean management and its sustainability pose dire consequences in the form of extinction of some specific fish species, pollution of our water bodies and even encourage more unsafe means of fishing like light fishing, the usage of under-size mesh net and also lead to a fast eroding of our culture and customs related to fishing.

The chief fisherman succinctly expressed this in the following words:

> *If care is not taken, there will come a time where we will not have any fish to catch because we have abandoned our own ways of preserving the sea. These children who are coming up will know nothing about ocean related customary practices if care is not taken (A 68-year-old Chief Fisherman, Upper Axim, July 2022, IDI)*

The Chief of Upper Axim added that

> *if we do not continuously make this generation aware of our customary practices that we observe to preserve the sea, they will end up using all types of things like under-size mesh and light in fishing and they will see nothing wrong with that just as some of them have been doing. We will even end up not having some particular type of fishes in our water bodies. These things should also be shown on TV and radio so that this generation can understand. It shouldn't always be what they call "Kumkumbagya". (Chief of Upper Axim, IDI, July 2022)*

The above findings corroborate the findings of Luz et al., (2015) as they maintain that as local people change their cultural systems through their exposure to the media and western lifestyle; they are likely to abandon their traditional institutions of resource management, which potentially results in a deterioration of the natural resources available in the community. It therefore stands to reason that when indigenous communities, are exposed to mainstream or Western society through the media and the internet, they end up

adopting new behaviours, beliefs, and values contrary to their customs and traditions related to preserving the sea (Sam and Berry 2010).

Quite a number of the participants also revealed that mainstream schooling and education has been a contributing factor to the non-application of ocean related indigenous knowledge in the community of Axim. The participants were of the view that as people spend time schooling, they embrace some new form of civilization which is quite contrary to the traditional means of preserving the oceans. Such educated individuals end up seeing the community people who practise this indigenous knowledge as people who are resistant to the change, old-fashioned. The participants held the view that the younger generation that is fortunate to have some form of formal education see these customary laws and traditions used to preserve the oceans as not only fetishism but a preserve for only the aged in society. To the educated person, anyone who adheres and practices these traditions related to preserving the sea is uncivilized especially the ones involving serving of food to the sea god for bumper harvest or for bumper fish catch.

A fisherman expressed it in the following words:

> *The young ones who have been lucky to have some form of formal education think that some of the practices like Tuesday fishing holidays are needless. Some of them say that through formal education, they are wise enough to know that no bad omen will befall them when they go fishing on Tuesday. To them, these customs are mere superstitions (A 46-year-old fisherman, Upper Axim, FGD, July 2022)*

The Chief of Upper Axim added that:

> *These days, the children think that because they are able to go to school, they are not to respect the customary laws used in preserving the sea. They think that these customs are for the old people in the community (Chief of Upper Axim, IDI, and July 2022)*

Contrary to the participants narratives that mainstream schooling and education is a cause for the non-application of IK, Magni (2016) also notes that mainstream schooling has a different role in the dissemination of indigenous knowledge. Both the cause and a potential remedy for the disappearance and non-application of indigenous knowledge may be recognized in education.

The narratives of children who were engaged in this research also revealed that their peers have been a great influence on them in their adherence to ocean related indigenous knowledge in Axim. The common narrative was that children who devoted their time to ocean related indigenous knowledge were considered to be fetish, anti-Christian and outdated especially when they participated in serving food for the gods for bumper harvest. Interestingly, the children noted that indigenous knowledge like organizing communal labour to keep the ocean space clean , not dumping of refuse in the sea and customary laws against engaging in open defecation along the coast were not considered to be outdated by their peers, however, it becomes very difficult for them to adhere to such indigenous knowledge because they have been seeing the elderly in the community doing the exact opposite of what they tell them not to do as children when they go to the seashore. One of the children opined that

stopping the act of open defecation along the seashore will be difficult because it is always refreshing to engage in open defecation along the coast because of the presence of the gentle breeze that blows.

One of the children in the focus group discussion asserted that:

> *My father told me that the food they serve to BeboArizi (god on the island) helps in boosting bumper harvest of fish in this community but when you do that as child, your friends will be laughing at you that you are serving the gods (15-year-old child, Lower Axim, FGD, July 2022)*

Another child in the focus group discussion in Upper Axim expressly stated that:

> *My friends always laugh at us when we participate in sprinkling of the etor to the gods but they don't laugh at us when we help in sweeping around the seashore. (A 16-year boy, Lower Axim, FGD, July 2022)*

A 14-year-old boy in the focus group discussion conclusively added that:

> *It is not good for us to go openly defecate along the shores of the sea. Sometimes they warn us not to do that but when we are doing that, the wind blows around you and that feeling is nice. If you want us to stop defecating along the coast, then they should build a toilet facility with an air-conditioner for us so that we will feel fine when easing ourselves (17-year-old, Lower Axim, FGD, July 2022)*

Making inferences from the narratives of the children, it becomes clear that their peers have much influence in determining whether or not these children adhere to the ocean related indigenous knowledge or not. It therefore stands to reason that these children's perception, behaviour and attitude towards ocean related indigenous knowledge which has been used to preserve the ocean and its resources has always been shaped by the opinions of their colleagues who they hold in high esteem.

The above narratives resonate well in the argument of Sam and Berry (2010) as they argue that such peer influence is real and may not be intentional, planned, and it is often unconscious and undetected. Following this same line of trajectory, Luz et al., (2015) also intimates that peer influence on the adherence to indigenous knowledge may come in the form of comments, looks, attitudes and behaviour which may come in a subtle way thereby affecting how an individual perceives and adheres to ocean related indigenous knowledge.

The findings could also be situated within the findings of Lekhi (2019) as he argues that Peers who want to feel a sense of belonging among their peers will decide not to adhere to ocean related IK. Conclusively, it should be noted that both boys and girls are also susceptible to peer pressure as to what to eat, the traditional beliefs to conform to and what not to conform to, how to act, and what behaviour is generally acceptable in a given community (Perrin and Roland, 2007; Lekhi, 2019; Reyes-Garcia, 2015; Si, 2016).

Summary

It could be deduced from the narratives so far that what makes it difficult for people to adhere to ocean related indigenous knowledge with the

communities of Upper Axim, Lower Axim and Apewosika are varied and multi-faceted including issues about religion, politics, peer influence, the heavy presence of social media in contemporary times and the strong sense of globalization within our current dispensation.

Integration of Indigenous Knowledge in Ocean Management Practices

Many researchers of various dispositions involved in interdisciplinary research on the marine environment acknowledge the value of ocean related indigenous knowledge and advocate for its more comprehensive inclusion into research and management practices for an extension of the "collective knowledge base" (Christie, 2011; Fa et al., 2020: 82; Turner et al., 2017). Contrary to the relevance of integrated ocean management established in the literature, majority of the participants of this research were of the view that they were not privy to any support systems by the government for the integration of indigenous knowledge in ocean management practices within the community of Axim. Common among the narratives of the fishermen, chief priest and chief was the idea that the government had no interest in the local knowledge that they have used as locals to preserve the oceans till date. They reported that the government is only interested in making revenue from the natural resource which is located in their community. A 39-year-old fisherman retorted that:

> *What has the government to do with our local knowledge and how we have used it to preserve the oceans? They don't really care about our tradition and customary laws in this community (39-year-old fisherman, Upper Axim, FGD, July 2022.)*

The chief priest of the community of Lower Axim also intimated that:

> *Okay, based on traditional rites and customs we do to preserve the sea, the government has no say. This is because he is on his seat up there and we are down with the people so you the chief and elders will be best to make some policies that will be best for the people you are governing and how they should relate with the sea. As we are about to celebrate the Kundum festival at least one MP or Minister will be present. When they come, they pledge to support developmental projects that the community has. The pledge may be in cash or items but the customary rites concerning fishing activities are not provided for in any way by these MPs. I have not heard the government say take this amount to buy yam or other things for the sacrifice we make to the gods in the sea (Chief Priest, Lower Axim, IDI, and July 2022).*

The chief of Lower Axim also added that:

> *The government has not really been of help in terms of preserving this local knowledge that we have used in preserving the oceans aside the closed fishing season that the government introduced. Their main focus is to allow the Chinese Trawlers to fish in our water bodies so that they can make much revenue as a government (The chief of Lower Axim, IDI, and July 2022)*

Deducing from the narratives so far, it becomes instructively apparent that the indigenes of the community feel that government's control and support for ocean related indigenous knowledge in the community of Axim lacks strong political will. Their narratives concerning the government's lack of interest in supporting the integration of indigenous knowledge in ocean management practices finds expression in the literature (Boadu, 2022; Kaya and Seleti, 2013; Dunn et al., 2017). Boadu (2020) has argued that despite the growing relevance of indigenous knowledge in contemporary times and how it has been used in the management of natural resources in communities, government in many countries lack the political will to integrate it in national policies. Boadu (2022) notes that despite calls to integrate ocean related indigenous knowledge in national policies of management practices, government is still yet to pay full attention to it.

Concerning the measures to put in place to promote ocean related indigenous knowledge in management practices, the chief fisherman, and chiefs of Lower and Upper Axim were of the view that there should be broader stakeholder engagement and consultation to take their views on what constitute indigenous knowledge in the community of Axim and how such indigenous knowledge could be incorporated in national policies. They further reported that this consultation should be done through town hall meetings, surveys and community campaigns. The chief of Upper Axim noted that:

> *Sometimes, government officials will have the mind-set that our local knowledge that we have used all this while is not effective and it is backward looking. But they have to add it to the laws they bring to us here to manage the sea. It is*

important and should be part of the national laws for managing the sea (Chief of Upper Axim, IDI, July 2022)

A fisherman in a focus group discussion in Lower Axim also expressly stated that:

If the government will want to support our own knowledge that we have used to preserve the sea, they will have to come and meet us and take our views just as you are doing and after that they should make sure they add it to their planning. If they knew our local knowledge, we use in preserving the sea, they would have known that this closed fishing season was not necessary. All the time, they only call the chief fisherman to Accra for a meeting and we do not know what transpires afterwards (A 42-year-old fisherman, Lower Axim, FGD, July 2022)

The chief of Lower Axim also concluded that:

They do not engage us on our local knowledge about the sea. They call the chief fisherman and give them information, but the chief fisherman and his leaders go for these meetings for personal gains. If they are really concerned about fishing they will have come here to meet us and talk to us. (The Chief of Lower Axim, IDI, July 2022)

On the contrary, it should be noted that the chief fisherman of Upper Axim maintained that government do engage them to some extent concerning the management of the oceans.

They do call upon us to know how best way we can manage the sea. Example of that is the closed fishing season (Chief Fisherman, Upper Axim, IDI, 68 years, July 2022)

He however reported that whenever they are being called upon as chief fishermen to Accra, government only tells how the sea should be managed and not what they think as chief fishermen. According to him, the consultation should be broadened and decentralized to the communities where these resources are situated. He stated;

When they call us, they only tell us what they have for us concerning managing the sea and not what we think as fishermen (Chief Fisherman, Lower Axim, 49 years, IDI, July 2022)

The fishermen on the other hand, also blamed the chief fishermen for not decentralizing every information that they received from Accra concerning the management of the sea. The chief priest noted that:

When the chief fishermen and his people are called to Accra, they only go there to serve their own interest. When they return, they don't tell the fishermen the details of whatever transpired in their meeting (Chief Priest, Upper Axim, IDI, July 2022)

Summary

It is important to note that there have been little or no consultations on how indigenous knowledge could be incorporated in ocean management practices within the community of Axim. However, the fishermen have a clear sight vision on how they want to be consulted in relation to ocean related

indigenous knowledge. The fishermen are of the view that government and his officials have no respect for ocean related indigenous knowledge. The narratives also make it clear that fishermen would want to be consulted in a broader manner in terms in the form of town hall meetings, survey and one on one interview. Transparency in consultations will go a long way to breed trust and loyalty between the chief fishermen and the fishermen.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The underlying theme of this study was to explore the existing ocean related indigenous knowledge in Axim and its role in ocean management practices. This study specifically looked at the forms of ocean related IK, the patterns of ocean related IK transfer in Axim, the relevance of ocean related IK, the impediments to the promotion of ocean related IK and how ocean related IK could be integrated in ocean management practices in Axim. This chapter provides a summary of the whole work, conclusions drawn from the study and relevant recommendations drawn from the analysis of the data which are expected to inform policy formulation and implementation in ocean management practices. Suggestions for further studies are also presented in this section.

Summary

The focus of this study is rooted in the role of ocean related indigenous knowledge in ocean management practices in the Western Region of Ghana, Axim. The study pointed out the forms of ocean related IK within the community of Axim and their relevance in managing the ocean space.

The study recognized that ocean related IK and its patterns of transfer were relevant in managing ocean space in Axim but there is a disconnect between their knowledge and practice of ocean related IK in managing the sea. The study then looked at the responses of the participants as guided by the research objectives of the study. This study was guided by four research objectives.

They include:

- To identify the nature and forms of indigenous knowledge in coastal communities regarding ocean management.
- To interrogate the patterns of indigenous knowledge transfer in Axim.
- To assess how indigenous knowledge has improved ocean management practices in Axim.
- To explore the impediments to the promotion of indigenous knowledge in ocean management and governance in Axim.

In addition, this research employed the qualitative research approach, and data was sought from primary sources using purposive and snow ball sampling techniques. Data was collected from 17th July through to 18th August, 202 with the help of Interview guides, drawings and photo-voice and observations. This study resorted to the use of thematic analysis and phenomenological analytic techniques to analyse the data collected from the participants.

Findings

The summary of the data gathered on the forms of ocean related IK in the community of Axim are presented as follows;

There was a strong knowledge on the forms of ocean-related indigenous knowledge used in managing the ocean space in Axim. However, It was evident that there was variation in the responses of the participants concerning ocean related indigenous knowledge in the community of Axim. The fishermen, youth, community members and opinion leaders (Chief, Chief Priests, Chief fishermen) engaged in the study identified the ocean related IK in the community to be observance of no-fishing holidays (Tuesdays) and serving of food to the sea gods for bumpe, *BeboArizi* for bumper harvest.

The avoidance of the use of light and other harmful substances like DDT, Omo, etc. in fishing was also identified as forms of ocean related IK. It became evident that these harmful substances in fishing did not only harm aquatic life and water but also irritated the gods in the sea. The digging of catholes along the coast to dump human waste was also identified by the fishmongers to be part of the ocean related IK in the community of Axim. It is apparent that IK was used by local communities to regulate the sea, and this practice was evident in the way of life and attitudes of those who lived in the past.

It is also evident that IK is firmly ingrained in the people's cultural fabric and has profoundly spiritual overtones, such as the veneration of the sea as a deity and the offering of food to the gods in the sea for bumper harvest. According to the participants' responses, their ancestors are the source of this indigenous knowledge that is used to manage the sea. It became apparent that IK is not a recent invention but rather something that has existed in the Axim society for a very long time.

The summary on the findings of the patterns of ocean related IK transfer in Axim are presented as follows;

The knowledge on the patterns of ocean related IK transfer in Axim was clearly demonstrated in the form of the processes of the knowledge transfer, the mechanisms through which IK was transferred to them and the changes that have occurred in the transfer of this ocean related IK in the community of Axim.

Concerning how community members were introduced to ocean related IK, it was revealed that older siblings and parents in the community

played a dominant role. Apart from being introduced to IK by their parents and older siblings, elders in the community also played a critical role in introducing community members to ocean related IK.

Considering how community members in Axim are introduced to ocean-related IK, it became clear that fishermen were exposed to this IK through instruction, coercion, and subtly persuasive tactics. It became abundantly evident from the fishmongers' stories that subtle persuasive techniques were the primary method of instruction for these ocean-related IK.

It is apparently instructive to note that if the chief priest declares as an oracle of the gods that fishermen are not to engage in harmful fishing practices, the fishermen have no choice but to obey because the status of the chief priest inspires respect and dread.

The participants who were interviewed gave a variety of answers with regards to the ways in which these ocean-related IK were transmitted to them. The fishmongers, children, and male and female community members identified oral tradition and folktales as the mechanisms through which these ocean-related IK were transferred to them in the community. The fishermen noted face-to-face social relations like observation as the main mechanism through which these ocean-related IK were transferred to them.

The participant's narratives revealed that IK is practical, describing a process and being context-specific since it is learned in circumstances where it is employed. Because of this, it is best learned through hands-on practice in real-world settings including face-to-face contacts, such as coaching, observation, oral traditions, networking, and the like. Also, it was clear that there was no intergenerational knowledge gap between the older populations

and the younger generation's understanding of ocean-related IK. It should be highlighted, nevertheless, that there are still modern obstacles to the intergenerational transfer of IK, such as religion, contemporary lifestyles, and the media (both print and electronic).

The findings of the participants on the relevance of ocean related IK in ocean management practices in Axim are presented as follows;

It became clear that ocean-related IK was extremely helpful in safeguarding the oceans for the present and the future. The participants explained the importance of ocean-related indigenous knowledge to the people of Axim by claiming that adhering to ocean related IK increases harvest, prevents pollution of the ocean and its surroundings (plastic pollution), preserves particular fish species, aids in weather forecasting to identify good fishing seasons, and facilitates the implementation of environmentally friendly fishing practices in Axim. To illustrate the importance of ocean-related IK within this area, photo-voice was also utilised. It became clear from the participants' accounts of the importance of indigenous knowledge (IK) related to the oceans in ocean management that acknowledging and promoting indigenous knowledge and cultures can increase the significance, effectiveness, and efficiency of ocean preservation.

The challenges and hurdles which impede the advancement of ocean related IK were also elaborated and presented as follows:

The participants shared their understanding of the barriers to IK promotion within the Axim community. The promotion of IK takes into account the barriers preventing its incorporation in national marine resource management plans, the patterns of its transfer in the community, and the

factors undermining the relevance of ocean-related IK in Axim. Many of the fishermen, fishmongers, community members, chiefs, and chief priests who took part in the study revealed that social change issues—including the high levels of religion and modernity, political influence, media impact, mainstream education, and the perception of IK as archaic—formed parts of the barriers preventing the promotion of Indigenous in the community of Axim. In the town of Axim, it was evident that the strong influence of religion and contemporary western lifestyles were rapidly diminishing indigenous knowledge relating to the ocean.

According to the narratives, people in the communities of Upper Axim, Lower Axim, and Apewosika have difficulty adhering to ocean-related indigenous knowledge for a variety of complex reasons, including issues with peer pressure, political influence, and influence of religion, social media use, and a strong sense of globalization in our current era.

The findings of the participants in terms of how ocean related IK could be integrated in ocean management practices are summarised below:

Contrary to the importance of integrated ocean management that has been demonstrated in the literature, the majority of the research participants felt that the government had not provided any support for the incorporation of indigenous knowledge into ocean management practices within the community of Axim. The notion that the government had no interest in the local knowledge that they as locals had employed to conserve the oceans to this day was a recurring theme in the participants' narratives. The idea that the government only cared about generating income from the natural resource that was located in their neighbourhood was painted by the participants.

It is significant to note that in the community of Axim, there have been few or no conversations on how indigenous knowledge might be incorporated into techniques for managing the ocean. But, when it comes to indigenous knowledge about the ocean, the fishermen are very clear about how they want to be consulted. The fishermen believe that the government and its representatives have no regard for indigenous knowledge relating to the ocean. Also, it is evident from the narratives that fisherman would prefer to be consulted in a more extensive way through town hall meetings, surveys, and one-on-one interviews. Between the head fishermen and the fisherman, transparency in talks will go a long way toward fostering loyalty and confidence.

Conclusion

As per the findings gathered, it is imperative to draw the following conclusion. It became evident that participants had good knowledge on the forms of ocean related indigenous knowledge existing in Axim and that ocean related IK was not a new creation or innovation to the indigenes of Axim with their ancestors as the source. The evidence gathered showed that ocean related IK in the community of Axim has manifested itself in the forms of the observance of no-fishing holidays, customary laws against the harvest of specific species, digging of catholes to dump waste along the shores, serving of food to *BeboArizi* for bumper harvest and the reliance on the sea to predict fishing seasons. The avoidance of unsafe fishing practices like the use of DDT, omo and daynamite and light fishing as forms of ocean related IK is only demonstrative of the reality that the natives of Axim have no shortage of ocean reated IK in the area.

Ocean related IK and its patterns of transfer in Axim are necessary for a continuous clean ocean space. The evidence gathered showed that ocean related IK could be transferred and best learnt through through hands-on practice in real-world settings including face-to-face contacts, such as coaching, observation, oral traditions, and the like. The patterns of ocean related IK transfer are challenged by modern obstacles such as religion-Christianity, contemporary lifestyles and the media.

It is evident from the evidence gathered that the relevance of ocean related IK in the community of Axim was manifested in its ability to safeguard the present and future generation by seeing to it that fishers deployed safe practices in fishing. The importance of ocean related (IK) in ocean management increases the significance, effectiveness, and efficiency of ocean preservation.

Despite the increasing relevance of ocean related IK, It is evident that the successful promotion of ocean related IK in the community of Axim is hindered by varied and multiplicity of factors. The obstacles inhibiting the promotion of IK in the community of Axim included social change issues such as the high levels of religion and modernism, governmental influence, media impact, mainstream education, and the perception of IK as antiquated. It is apparent that the heavy influence of religion and modern western lifestyles was quickly eroding local understanding of ocean related IK in managing the ocean.

Generally, it is instructively apparent that ocean related IK is still relevant in contemporary times and has the potential to better the lots of coastal communities. Nonetheess, it should be noted in order to ensure the

incorporation of ocean related IK in ocean management practices in Axim and ensure its successful transfer to the younger generation, there is the increasing need for the locals and fishers of Axim to be consulted in a more extensive way through town hall meetings, surveys, and one-on-one interviews. Between the Chief fishermen and the fishermen, transparency in talks will go a long way toward fostering loyalty and confidence.

Recommendations

First, to chronicle and conserve the numerous forms of indigenous knowledge relating to the ocean that exist in Axim, traditional leaders should launch a comprehensive documentation initiative in cooperation with non-governmental organizations. Oral traditions, customs, and the meaning incorporated into objects, totems, and canoe inscriptions should all be included in this. Working together with community members, cultural specialists, and local historians to develop a repository that fully embodies Axim's rich maritime history and the forms of ocean related indigenous knoiwldge for posterity.

Moreover, traditional leaders in fishing communities should be empowered to be able to punish offenders of ocean related customary laws and practices without political interference or favour.

It is important to approach the incorporation of indigenous knowledge into formal education with sensitivity and respect for the cultural context in which the knowledge was developed. Indigenous communities should be involved in the process of deciding what knowledge is appropriate to be shared, how it should be shared, and by whom. This can help ensure that the knowledge remains authentic and that its transmission continues to be

grounded in the values and traditions of the indigenous communities from which it originated.

The Traditional Authority and and NGOs should collaborate to Encourage apprenticeships: Encouraging apprenticeships between younger and older members of the community can also be an effective way to transfer indigenous knowledge. This can involve pairing younger apprentices with experienced fishermen or other experts in traditional ocean management practices.

Finally, the traditional leaders and non-governmental organizations should collaborate in forming intergenerational learning programs or clubs. Intergenerational learning programs or clubs will bring together younger and older members of the community to share knowledge and learn from each other. These programs can be organized through community centers or local NGOs, and can involve activities such as storytelling, traditional fishing techniques, and hands-on experiences.

Suggestions for Further Studies

First, mixed method should be employed in the future as the findings of this study could not be generalized since it employed qualitative research approach only. In addition, future research should incude state institutions to explore their responses on how ocean related IK could be integrated in ocean management practices in Ghana.

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APPENDICES

Appendix 1: In-depth Interviews for Chiefs

Self-Introduction for interviewer: My name is Elvis Effah. I am conducting a research to understand the importance and role of ocean-related indigenous knowledge in this community and how it could be integrated in national policies to preserve these oceans.

Biographical Data

Brief profile of the Chief (Name, age, number of years on the throne, level of education, etc.) (Self-Introduction)

Forms and nature of Ocean Related Indigenous Knowledge

1. Can you please describe the nature of the ocean and what do you know about what the ocean does? (probe into their beliefs, thoughts and perceptions about the ocean)
2. What are the prevailing ocean- related indigenous knowledge in this community?
3. What are the forms of ocean related indigenous knowledge in Axim that you are aware of?
4. Please what do you know about the evolution of this ocean-related indigenous knowledge in this community?
5. What are your sources of such ocean related indigenous knowledge as chief of the community?
6. Are there any values/intents behind these ocean-related indigenous knowledge expressions, if so, please what are these values/intents ?

Practices related to ocean-related indigenous knowledge

1. How has this knowledge been expressed in your ocean management practices?
2. Which images do you know that portray the existence of these ocean related indigenous knowledge? (probe further into existing totems, artefacts, inscriptions on canoes, etc)
3. What do these images and totems tell the community about their relation to the oceans?
4. What are the interpretations or meanings attached to such images that portray this ocean-related indigenous knowledge in this community?
5. How is this ocean related indigenous knowledge expressed in the daily activities of the community members?
6. What are the existing customs and traditions in this community regarding the management of the oceans and its resources?
7. How are ocean-related indigenous knowledge in managing the oceans expressed in the taboos of this community? **OR; In managing the oceans, how is ocean-related indigenous knowledge expressed in the taboos of this community**

Patterns of Ocean Related Indigenous Knowledge Transfer

1. How are community members first introduced to this ocean-related indigenous knowledge? ?(probe whether it was parents, elders in the community, older siblings or other agents of socialization)
2. Through what processes are they introduced to this knowledge? (Probe whether it was through teaching, persuasion, coercion etc.)

3. Which mechanisms were used to transfer this ocean-related indigenous knowledge to you? (probe whether it was face-to-face social relations like observation, oral tradition, or other mechanism)
4. Is there a difference between what you were taught about ocean-related indigenous and what you are teaching the community members?
5. What exactly were you taught about ocean related indigenous knowledge and which ones are you teaching the young ones now?
6. Are there some things the community is no longer teaching the young people now in relation to the preservation of the oceans and which ones are they?
7. How does the community intend to transfer this ocean-related indigenous knowledge to the children in this generation?(probe this issue further)
8. What has been the role of the traditional authority in maintaining and transferring this ocean related indigenous knowledge with regard to managing the oceans? (Probe further for exact instances…)

Relevance of Indigenous Knowledge in Ocean Management

1. Do you think ocean-related indigenous knowledge is relevant in managing the oceans in this community? If yes, how?
2. is the community able to apply their knowledge about ocean-based indigenous knowledge in preserving the oceans? (Probe the exact ones and how have they been applied?)
3. Based on the knowledge you have about the ocean, what kind of behaviours towards the ocean would you advise members of the community put a stop to? (Probe how it has helped in tackling plastic pollution in the oceans, depletion of fish stock, open-defecation etc.)

4. Which kind of behaviours will you now advise members of the community to put across as a way of preserving the oceans?
5. What is the expression of ocean-related indigenous knowledge in tackling the issue of waste and open defecation around the oceans?
6. Have there been instances when some community members were hesitant in using this ocean-related indigenous knowledge in managing the oceans in this community and why?
7. What benefits have the community gained as a result of using ocean-related indigenous knowledge in managing the oceans in this community?
8. Has ocean related indigenous knowledge enhanced the deployment of useful practices in managing the oceans all this while? If so, how?

Impediments to the Promotion of Ocean-related Indigenous Knowledge

1. What makes it difficult for the community to apply the knowledge they have acquired in preserving the oceans? (Probe into issues relative to religion, politics, health, peer influence, etc.)
2. Please have the community members learnt anything different in churches and mosques, from peers, media, schools, etc that contradicts what they know traditionally about preserving the oceans?

Integration of Indigenous Knowledge in Ocean Management Practices

1. Are you aware of any support systems by the government for the integration of indigenous knowledge in ocean management practices in this community?
2. In your opinion, how has ocean related indigenous knowledge been recognized by policy implementers as an effective management practice in this community?
3. What can be done to promote the inclusion of ocean-related indigenous knowledge in ocean management practices?

Appendix 2: Indepth Interview for Chief Priest (ess)

Self-Introduction for interviewer: My name is Elvis Effah. I am conducting a research to understand the importance and role of ocean-related indigenous knowledge in this community and how it could be integrated in national policies concerning the oceans in order to preserve these oceans

Biographical Data

Brief profile of the Chief Priest/priestess (Name, age, number of years as chief priest/priestess, level of education, etc.) (Self-Introduction)

Forms and nature of Ocean Related Indigenous Knowledge

1. Can you please describe the nature of the ocean and what do you know about what the ocean does? (probe into their beliefs, thoughts and perceptions about the ocean)
2. What are the prevailing ocean- related indigenous knowledge in this community?
3. What are the forms of ocean related indigenous knowledge in Axim that you are aware of?
4. Please what do you know about the evolution of this ocean-related indigenous knowledge in this community?
5. What are your sources of such ocean related indigenous knowledge in this community?
6. Are there any values/intents behind these ocean-related indigenous knowledge expressions, if so, please what are these values/intents ?

Ocean Management Practices related to ocean-related indigenous knowledge

1. How has this knowledge been expressed in your ocean management practices?
2. Which images do you know that portray the existence of these ocean related indigenous knowledge? (probe further into existing totems, artefacts, inscriptions on canoes, etc)
3. What do these images and totems tell the community about their relation to the oceans?
4. As a chief priest/priestess, what are your interpretations or meanings attached to such images that portray this ocean-related indigenous knowledge?
5. What are the existing customs and traditions in this community regarding the management of the oceans and its resources?
6. How are ocean-related indigenous knowledge in managing the oceans expressed in the taboos of this community? **OR; In managing the oceans, how is ocean-related indigenous knowledge expressed in the taboos of this community?**

Patterns of Ocean Related Indigenous Knowledge Transfer

1. How do you introduce members of the community to this ocean-related indigenous knowledge? ? (probe whether it was parents, elders in the community, older siblings or other agents of socialization)
2. Through what processes are they introduced to this knowledge? (Probe whether it was through teaching, persuasion, coercion etc.)

3. Which mechanisms were used to transfer this ocean-related indigenous knowledge to you? (probe whether it was face-to-face social relations like observation, oral tradition, or other mechanism)
4. Is there a difference between what you were taught about ocean-related indigenous and what you are teaching the community members?
5. What exactly were you taught about ocean related indigenous knowledge and which ones are you teaching the young ones now?
6. Are there some things you are no longer teaching the young people now in relation to the preservation of the oceans and which ones are they?
7. How do you intend to transfer this ocean-related indigenous knowledge to the children in the community? (probe this issue further)
8. What has been the role of the traditional authority in maintaining and transferring this ocean related indigenous knowledge with regard to managing the oceans? (Probe further for exact instances…)

Relevance of Indigenous Knowledge in Ocean Management

1. Do you think ocean-related indigenous knowledge is relevant in managing the oceans in this community? If yes, how?
2. is the community able to apply their knowledge about ocean-based indigenous knowledge in preserving the oceans? (Probe the exact ones and how have they been applied?)
3. Based on the knowledge you have about the ocean, what kind of behaviours towards the ocean would you advise members of the community put a stop to? (Probe how it has helped in tackling plastic pollution in the oceans, depletion of fish stock, open-defecation etc.)

4. Which kind of behaviours will you now advise members of the community to put across as a way of preserving the oceans?
5. How has ocean-related indigenous knowledge in managing the oceans in this community helped in boosting your fish catch as a community?
6. What is the expression of ocean-related indigenous knowledge in tackling the issue of waste and open defecation around the oceans?
7. Have there been instances when some community members were hesitant in using this ocean-related indigenous knowledge in managing the oceans in this community and why?
8. What benefits have the community gained as a result of using ocean-related indigenous knowledge in managing the oceans in this community?
9. Has ocean related indigenous knowledge enhanced the deployment of useful practices in managing the oceans all this while? If so, how?

Impediments to the Promotion of Ocean-related Indigenous Knowledge

3. What makes it difficult for the community to apply the knowledge they have acquired in preserving the oceans? (Probe into issues relative to religion, politics, health, peer influence, etc.)

4. please have the community members learnt anything different in churches and mosques, from peers, media, schools, etc that contradicts what they know traditionally about preserving the oceans?

Integration of Indigenous Knowledge in Ocean Management Practices

7. Are you aware of any support systems by the government for the integration of indigenous knowledge in ocean management practices in this community?
8. In your opinion, how has ocean related indigenous knowledge been recognized by policy implementers as an effective management practice in this community?
9. What can be done to promote the inclusion of ocean-related indigenous knowledge in ocean management practices?

Appendix3: FGD For Fishermen

Self-Introduction for interviewer: My name is Elvis Effah. I am conducting a research to understand the importance and role of ocean-related indigenous knowledge in this community and how it could be integrated in national policies concerning the oceans in order to preserve these oceans.

Biographical Data

- ✓ Age
- ✓ Gender
- ✓ Educational Level
- ✓ Marital status
- ✓ Number of Children
- ✓ Ethnicity
- ✓ Religion
- ✓ Occupation
- ✓ Number of years in this occupation

Forms and nature of Ocean Related Indigenous Knowledge

1. Can you describe the nature of the ocean and what do you know about what the ocean does? (probe into their beliefs, thoughts and perceptions about the ocean)
2. What are the prevailing ocean- related indigenous knowledge in this community?
3. What are the forms of ocean related indigenous knowledge in Axim that you are aware of?
4. What is the history behind this ocean-related indigenous knowledge in this community?
5. What are your sources of such ocean related indigenous knowledge as fish processors?
6. Are there any values behind these ocean-related indigenous knowledge expressions?
7. What are the values, OR what are some of these values behind these ocean related indigenous knowledge in this community?

Practices related to ocean-related indigenous knowledge

1. How has this knowledge been expressed in your ocean management practices?
2. Which images do you know that portray the existence of these ocean related indigenous knowledge? (probe further into existing totems, artefacts, inscriptions on canoes, etc)
3. What do these images and totems tell you about your relation to the oceans?
4. What are your interpretations or meanings attached to such images that portray this ocean-related indigenous knowledge?
5. How is this ocean related indigenous knowledge expressed in your daily activities in on the coast as a fish processor?
6. What are the existing customs and traditions in this community regarding the management of the oceans and its resources?
7. How are ocean-related indigenous knowledge in managing the oceans expressed in the taboos of this community? **OR; In managing the oceans, how is ocean-related indigenous knowledge expressed in the taboos of this community?**

Patterns of Ocean Related Indigenous Knowledge Transfer

1. How has ocean related indigenous knowledge evolved over time in this community?
2. What's the history behind these ocean related indigenous knowledge in this community?
3. How were you introduced to this ocean-related indigenous knowledge in this community? (probe whether it was parents, elders in the community, older siblings or other agents of socialization)
4. Who first introduced you to this ocean related indigenous knowledge?
5. Through what processes were you introduced to this knowledge? (Probe whether it was through teaching, persuasion, coercion etc.)
6. Which mechanisms were used to transfer this ocean-related indigenous knowledge to you? (probe whether it was face-to-face social relations like observation, oral tradition, or other mechanism)
7. Is there a difference between what you were taught about ocean-related indigenous and what you are teaching your children now?

8. What exactly were you taught about ocean related indigenous knowledge and which ones are you teaching your children now?
9. Are there some things you are no longer teaching your children now in relation to the preservation of the oceans and which ones are they?
10. How do you intend to transfer this ocean-related indigenous knowledge to your children? (probe this issue further)
11. What has been the role of the traditional authority in maintaining and transferring this ocean related indigenous knowledge with regard to managing the oceans? (probe further for exact instances…)

Relevance of Ocean-related Indigenous Knowledge in Ocean Management

1. Do you feel the things you are no longer teaching your children about ocean-related indigenous knowledge are irrelevant? If yes, how?
2. Do you think ocean-related indigenous knowledge is relevant in managing the oceans in this community? If yes, how?

   Based on the knowledge you have about the ocean, what kind of behaviours towards the ocean have you put a stop to? (Probe how it has helped in tackling plastic pollution in the oceans, depletion of fish stock, open-defecation etc.)
3. Which kind of behaviours will you now put across as a way of preserving the oceans?
4. How has ocean-related indigenous knowledge been expressed in the implementation of the closed fishing season as a management of technique of the oceans?
5. How has ocean-related indigenous knowledge in managing the oceans in this community helped in boosting your fish catch?
6. What is the expression of ocean-related indigenous knowledge in tackling the issue of waste around the oceans?
7. What has been the role of ocean-related indigenous knowledge in tackling the issue of open-defecation along the coast in this community?
8. Have you ever been hesitant in using this ocean-related indigenous knowledge in managing the oceans in this community and why?

9. What benefits have you gained as a result of using ocean-related indigenous knowledge in managing the oceans in this community?
10. Has ocean related indigenous knowledge enhanced your innovativeness in managing the oceans all this while and how?

Impediments to the Promotion of Ocean-related Indigenous Knowledge

1. Are you able to apply your knowledge about indigenous knowledge in preserving the oceans?
2. What will make it difficult for you to apply the knowledge you have acquired in preserving the oceans?
3. Have you learnt anything different in churches and mosques aside what you know traditionally about preserving the oceans?
4. If yes, how is such knowledge advancing or impeding the usage of indigenous knowledge in managing the oceans?

Integration of Indigenous Knowledge in Management Practices

1. Are you aware of any support systems by the government for the integration of indigenous knowledge in ocean management practices in this community?
2. Do you think ocean related indigenous knowledge has been recognized by policy implementers as an effective management practice in this community and why?
3. What can be done to promote the inclusion of ocean-related indigenous knowledge in ocean management practices?

Appendix 4: Focus Group Discussions for Children

Self-Introduction for interviewer: My name is Elvis Effah. I am conducting a research to understand the importance and role of ocean-related indigenous knowledge in this community and how it could be integrated in national policies to preserve these oceans

Focus Group Discussion for Children

Biographical Data

- ✓ age
- ✓ gender
- ✓ ethnicity
- ✓ religion
- ✓ Who do you live with?(probe number of siblings, home environment and structure of house)
- ✓ Occupation of parents/ guardians
- ✓ Are you schooling? If so, what class/form?

Forms and nature of Ocean Related Indigenous Knowledge

1. **How will you describe the sea in terms of what it is used for, what is in it and its colour? (Photovoice)**
2. Can you describe the nature of the ocean and what do you know about what the ocean does? (probe into their beliefs, thoughts and perceptions about the ocean)
3. What are the prevailing ocean- related knowledge in this community that you are aware of?
4. Have you been told of how we had this knowledge in managing the oceans in this community?

5. What do you know about the values/intents behind these ocean related **indigenous knowledge in this community?**
6. How is knowledge about the oceans expressed in the taboos of this community? **OR; In managing the oceans, how is ocean-related indigenous knowledge expressed in the taboos of this community?**
7. Are there sanctions for someone who does not adhere to these practices in managing the oceans and what are they?
8. Are there rewards for someone who does adhere to these practices in managing the oceans in this community and what are they?

Ocean Management Practices related to ocean-related indigenous knowledge

9. How does such knowledge play out in your daily activities? (eg. Morning routines of dumping refuse and open defecation) another section
10. Have you been introduced to some images (totems, artefacts, inscriptions on canoes) which are related to ocean indigenous knowledge?
11. **Which images have you been introduced to that portray the existence of these ocean related indigenous knowledge? (probe further into existing totems, artefacts, inscriptions on canoes, etc) (photovoice)**
12. What do these images tell you about your relation to the ocean?
13. What are your interpretations or meanings attached to such images that portray this ocean-related indigenous knowledge?

Patterns of Ocean Related Indigenous Knowledge Transfer

1. How were you introduced to this ocean-related indigenous knowledge in this community and who introduced you to this knowledge? (probe whether it was parents, elders in the community, older siblings or other agents of socialization)
2. Through what processes were you introduced to this knowledge? (Probe whether it was through teaching, persuasion, coercion etc.)
3. Which mechanisms were used to transfer this ocean-related indigenous knowledge to you? (probe whether it was face-to-face social relations like observation, imitation oral tradition or other mechanisms)
4. Would you also want to teach your children this knowledge that you have acquired about managing the oceans when you grow up and why?

Relevance of Indigenous Knowledge in Ocean Management

1. Do you think ocean-related indigenous knowledge is relevant in managing the oceans in this community? If yes, how?
2. How has ocean-related indigenous knowledge helped in managing the oceans in this community? (Probe how it has helped in tackling plastic pollution in the oceans, depletion of fish stock, open-defecation etc.)
3. Based on the knowledge you have about the ocean, which behaviours towards the ocean have you put a stop to?(probe further in how they dump waste and defecate around the oceans)
4. Which kind of behaviours will you now put across as a way of preserving the oceans based on your knowledge of indigenous knowledge?

5. Describe how the oceans will look by incorporating indigenous knowledge in modern ocean management practices (photo voice)
6. Demonstrate how the oceans will look if indigenous knowledge is not incorporated in modern ways of managing the oceans (photo voice)

Impediments to the Promotion of Ocean-related Indigenous Knowledge

1. Will you be able to apply the knowledge you have acquired about the ocean?
2. What makes it difficult for you to apply the knowledge you have acquired in preserving the oceans?
3. Have you learnt anything different in schools, churches and mosques, peers, social media that contradicts what you know traditionally about preserving the oceans?

NB; The highlighted questions will be demonstrated pictorially by children with the help of drawing papers, crayons, and pencils.

Children will also be asked to take their own pictures of the ocean based on how they feel indigenous knowledge has helped in managing the oceans (specific attention to issues of pollution, plastic waste, open defecation, etc)

Appendix 5: Focus Group Discussion for Youth Group

Self-Introduction for interviewer: My name is Elvis Effah. I am conducting a research to understand the importance and role of ocean-related indigenous knowledge in this community and how it could be integrated in national policies to preserve these oceans

Focus Group Discussion for Youth Group

Biographical Data

- ✓ Age
- ✓ Gender
- ✓ Educational Level
- ✓ Marital status
- ✓ Number of Children
- ✓ Ethnicity
- ✓ Religion
- ✓ Occupation
- ✓ Number of years in such occupation

Forms and nature of Ocean Related Indigenous Knowledge

1. Can you describe the nature of the ocean and what do you know about what the ocean does?(probe into their beliefs, thoughts and perceptions about the ocean)
2. What are the prevailing ocean- related indigenous knowledge in this community?
3. What are the forms of ocean related indigenous knowledge in Axim that you are aware of?

4. What do you know about the evolution of this ocean-related indigenous knowledge in this community?
5. What are your sources of such ocean related indigenous knowledge as young people?(probe where and who these indigenous knowledge are coming from)
6. Are there any values/intents behind these ocean-related indigenous knowledge expressions?
7. What are the values, OR what are some of these values behind these ocean related indigenous knowledge in this community?

Ocean Management Practices related to ocean-related indigenous knowledge

1. How has this knowledge been expressed in your ocean management practices?
2. Which images do you know that portray the existence of these ocean related indigenous knowledge? (probe further into existing totems, artefacts, inscriptions on canoes, etc)
3. What do these images and totems tell you about your relation to the oceans?
4. What are your interpretations or meanings attached to such images that portray this ocean-related indigenous knowledge?
5. How is this ocean related indigenous knowledge expressed in your daily activities in on the coast as young people?
6. What are the existing ocean-related knowledge-based customs and traditions in this community regarding the management of the oceans and its resources?

7. How are ocean-related indigenous knowledge in managing the oceans expressed in the taboos of this community? **OR; In managing the oceans, how is ocean-related indigenous knowledge expressed in the taboos of this community?**

Patterns of Ocean Related Indigenous Knowledge Transfer

1. How were you introduced to this ocean-related indigenous knowledge in this community? ?(probe whether it was parents, elders in the community, older siblings or other agents of socialization)
2. Who first introduced you to this ocean related indigenous knowledge?
3. Through what processes were you introduced to this knowledge? (Probe whether it was through teaching, persuasion, coercion etc.)
4. Which mechanisms were used to transfer this ocean-related indigenous knowledge to you? (probe whether it was face-to-face social relations like observation, oral tradition, or other mechanism)
5. Is there a difference between what you were taught about ocean-related indigenous and what you are teaching your children now?
6. What exactly were you taught about ocean related indigenous knowledge and which ones are you teaching your children now?
7. Are there some things you are no longer teaching your children now in relation to the preservation of the oceans and which ones are they?
8. How do you intend to transfer this ocean-related indigenous knowledge to your children?(probe this issue further)
9. What has been the role of young people in maintaining and transferring this ocean related indigenous knowledge with regard to managing the oceans? (probe further for exact instances…)

10. What has been the role of the traditional authority in maintaining and transferring this ocean related indigenous knowledge with regard to managing the oceans? (probe further for exact instances…)

Relevance of Indigenous Knowledge in Ocean Management

1. Do you think ocean-related indigenous knowledge is relevant in managing the oceans in this community? If yes, how?
2. Are you able to apply your knowledge about indigenous knowledge in preserving the oceans as young people? (probe the exact ones and how have they been applied?)
3. Based on the knowledge you have about the ocean, what kind of behaviours towards the ocean have you put a stop to as youth? (Probe how it has helped in tackling plastic pollution in the oceans, depletion of fish stock, open-defecation etc.)
4. Which kind of behaviours will you now put across as a way of preserving the oceans?
5. How has ocean-related indigenous knowledge been expressed in the implementation of the closed fishing season as a management of technique of the oceans?
6. How has ocean-related indigenous knowledge in managing the oceans in this community helped in boosting your fish catch?
7. What is the expression of ocean-related indigenous knowledge in tackling the issue of waste around the oceans?
8. What has been the role of ocean-related indigenous knowledge in tackling the issue of open-defecation along the coast in this community?

9. Have you ever been hesitant in using this ocean-related indigenous knowledge in managing the oceans in this community and why?
10. What benefits have you gained as a result of using ocean-related indigenous knowledge in managing the oceans in this community?
11. Has ocean related indigenous knowledge enhanced the deployment of useful practices in managing the oceans all this while? If so, how?

Impediments to the Promotion of Ocean-related Indigenous Knowledge

4. What makes it difficult for you to apply the knowledge you have acquired in preserving the oceans? (Probe into issues relative to religion, politics, health, peer influence, etc.)

5. Have you learnt anything different in churches and mosques, peers, media, schools, etc that contradicts what you know traditionally about preserving the oceans?

Integration of Indigenous Knowledge in Ocean Management Practices

1 Are you aware of any support systems by the government for the integration of indigenous knowledge in ocean management practices in this community?

2 in your opinion, how has ocean related indigenous knowledge been recognized by policy implementers as an effective management practice in this community?

3 What can be done to promote the inclusion of ocean-related indigenous knowledge in ocean management practices?

Appendix 6: Focus Group Discussion for Male Community Members (non-fishermen)

Self-Introduction for interviewer: My name is Elvis Effah. I am conducting a research to understand the importance and role of ocean-related indigenous knowledge in this community and how it could be integrated in national policies to preserve these oceans.

Focus Group Discussion for Male Community Members (non-fishermen)

Biographical Data

- ✓ Age
- ✓ Gender
- ✓ Educational Level
- ✓ Marital status
- ✓ Number of Children
- ✓ Ethnicity
- ✓ Religion
- ✓ Occupation
- ✓ Number of years in such occupation

Forms and nature of Ocean Related Indigenous Knowledge

1. Can you describe the nature of the ocean and what do you know about what the ocean does?(probe into their beliefs, thoughts and perceptions about the ocean)
2. What are the prevailing ocean- related indigenous knowledge in this community?
3. What are the forms of ocean related indigenous knowledge in Axim that you are aware of?

4. What do you know about the evolution of this ocean-related indigenous knowledge in this community?
5. What are your sources of such ocean related indigenous knowledge as community members?(probe whether it's from parents, ancestors, oral tradition, etc)
6. Are there any values/intents behind these ocean-related indigenous knowledge expressions?
7. What are the values, OR what are some of these values behind these ocean related indigenous knowledge in this community?

Ocean Management Practices related to ocean-related indigenous knowledge

1. How has this knowledge been expressed in your ocean management practices?
2. Which images do you know that portray the existence of these ocean related indigenous knowledge? (probe further into existing totems, artefacts, inscriptions on canoes, etc)
3. What do these images and totems tell you about your relation to the oceans?
4. What are your interpretations or meanings attached to such images that portray this ocean-related indigenous knowledge?
5. How is this ocean related indigenous knowledge expressed in your daily activities in on the coast as community members?
6. What are the existing ocean-related knowledge-based customs and traditions in this community regarding the management of the oceans and its resources?

7. How are ocean-related indigenous knowledge in managing the oceans expressed in the taboos of this community? **OR; In managing the oceans, how is ocean-related indigenous knowledge expressed in the taboos of this community?**

Patterns of Ocean Related Indigenous Knowledge Transfer

1. How were you introduced to this ocean-related indigenous knowledge in this community? ?(probe whether it was parents, elders in the community, older siblings or other agents of socialization)
2. Who first introduced you to this ocean related indigenous knowledge?
3. Through what processes were you introduced to this knowledge? (Probe whether it was through teaching, persuasion, coercion etc.)
4. Which mechanisms were used to transfer this ocean-related indigenous knowledge to you? (probe whether it was face-to-face social relations like observation, oral tradition, or other mechanism)
5. Is there a difference between what you were taught about ocean-related indigenous and what you are teaching the children now?
6. What exactly were you taught about ocean related indigenous knowledge and which ones are you teaching children now?
7. Are there some things you are no longer teaching your children now in relation to the preservation of the oceans and which ones are they?
8. How do you intend to transfer this ocean-related indigenous knowledge to your children?(probe this issue further)
9. What has been the role of community members in maintaining and transferring this ocean related indigenous knowledge with regard to managing the oceans? (probe further for exact instances…)

10. What has been the role of the traditional authority in maintaining and transferring this ocean related indigenous knowledge with regard to managing the oceans? (probe further for exact instances…)

Relevance of Indigenous Knowledge in Ocean Management

1. Do you think ocean-related indigenous knowledge is relevant in managing the oceans in this community? If yes, how?
2. Are you able to apply your knowledge about indigenous knowledge in preserving the oceans as community members? (probe the exact ones and how have they been applied?)
3. Based on the knowledge you have about the ocean, what kind of behaviours towards the ocean have you put a stop to as community members? (Probe how it has helped in tackling plastic pollution in the oceans, depletion of fish stock, open-defecation etc.)
4. Which kind of behaviours will you now put across as a way of preserving the oceans?
5. How has ocean-related indigenous knowledge been expressed in the implementation of the closed fishing season as a management of technique of the oceans?
6. How has ocean-related indigenous knowledge in managing the oceans in this community helped in boosting your fish catch?
7. What is the expression of ocean-related indigenous knowledge in tackling the issue of waste around the oceans?
8. What has been the role of ocean-related indigenous knowledge in tackling the issue of open-defecation along the coast in this community?

9. Have you ever been hesitant in using this ocean-related indigenous knowledge in managing the oceans in this community and why?
10. What benefits have you gained as a result of using ocean-related indigenous knowledge in managing the oceans in this community?
11. Has ocean related indigenous knowledge enhanced the deployment of useful practices in managing the oceans all this while? If so, how?

Impediments to the Promotion of Ocean-related Indigenous Knowledge

1. What makes it difficult for you to apply the knowledge you have acquired in preserving the oceans? (Probe into issues relative to religion, politics, health, peer influence, etc.)
2. Have you learnt anything different in churches and mosques, peers, media, schools, etc that contradicts what you know traditionally about preserving the oceans?

Integration of Indigenous Knowledge in Ocean Management Practices

1. Are you aware of any support systems by the government for the integration of indigenous knowledge in ocean management practices in this community?
2. In your opinion, how has ocean related indigenous knowledge been recognized by policy implementers as an effective management practice in this community?
3. What can be done to promote the inclusion of ocean-related indigenous knowledge in ocean management practices?

Appendix 7: Focus Group Discussion for Male Community Members (non-fish processors)

Self-Introduction for interviewer: My name is Elvis Effah. I am conducting a research to understand the importance and role of ocean-related indigenous knowledge in this community and how it could be integrated in national policies to preserve these oceans.

Focus Group Discussion for Male Community Members (non-fish processors)

Biographical Data

- ✓ Age
- ✓ Gender
- ✓ Educational Level
- ✓ Marital status
- ✓ Number of Children
- ✓ Ethnicity
- ✓ Religion
- ✓ Occupation
- ✓ Number of years in such occupation

Forms and nature of Ocean Related Indigenous Knowledge

1. Can you describe the nature of the ocean and what do you know about what the ocean does?(probe into their beliefs, thoughts and perceptions about the ocean)
2. What are the prevailing ocean- related indigenous knowledge in this community?

3. What are the forms of ocean related indigenous knowledge in Axim that you are aware of?
4. What do you know about the evolution of this ocean-related indigenous knowledge in this community?
5. What are your sources of such ocean related indigenous knowledge as female community members?
6. Are there any values/intents behind these ocean-related indigenous knowledge expressions?
7. What are the values, OR what are some of these values behind these ocean related indigenous knowledge in this community?

Ocean Management Practices related to ocean-related indigenous knowledge

1. How has this knowledge been expressed in your ocean management practices?
2. Which images do you know that portray the existence of these ocean related indigenous knowledge? (probe further into existing totems, artefacts, inscriptions on canoes, etc)
3. What do these images and totems tell you about your relation to the oceans?
4. What are your interpretations or meanings attached to such images that portray this ocean-related indigenous knowledge?
5. How is this ocean related indigenous knowledge expressed in your daily activities in on the coast as community members?

6. What are the existing ocean-related knowledge-based customs and traditions in this community regarding the management of the oceans and its resources?
7. How are ocean-related indigenous knowledge in managing the oceans expressed in the taboos of this community? **OR; In managing the oceans, how is ocean-related indigenous knowledge expressed in the taboos of this community?**

Patterns of Ocean Related Indigenous Knowledge Transfer

1. How were you introduced to this ocean-related indigenous knowledge in this community? ?(probe whether it was parents, elders in the community, older siblings or other agents of socialization)
2. Who first introduced you to this ocean related indigenous knowledge?
3. Through what processes were you introduced to this knowledge? (Probe whether it was through teaching, persuasion, coercion etc.)
4. Which mechanisms were used to transfer this ocean-related indigenous knowledge to you? (probe whether it was face-to-face social relations like observation, oral tradition, or other mechanism)
5. Is there a difference between what you were taught about ocean-related indigenous and what you are teaching the children now?
6. What exactly were you taught about ocean related indigenous knowledge and which ones are you teaching children now?
7. Are there some things you are no longer teaching your children now in relation to the preservation of the oceans and which ones are they?
8. How do you intend to transfer this ocean-related indigenous knowledge to your children?(probe this issue further)

9. What has been the role of community members in maintaining and transferring this ocean related indigenous knowledge with regard to managing the oceans? (probe further for exact instances…)
10. What has been the role of the traditional authority in maintaining and transferring this ocean related indigenous knowledge with regard to managing the oceans? (probe further for exact instances…)

Relevance of Indigenous Knowledge in Ocean Management

1. Do you think ocean-related indigenous knowledge is relevant in managing the oceans in this community? If yes, how?
2. Are you able to apply your knowledge about indigenous knowledge in preserving the oceans as community members? (probe the exact ones and how have they been applied?)
3. Based on the knowledge you have about the ocean, what kind of behaviours towards the ocean have you put a stop to as community members? (Probe how it has helped in tackling plastic pollution in the oceans, depletion of fish stock, open-defecation etc.)
4. Which kind of behaviours will you now put across as a way of preserving the oceans?
5. How has ocean-related indigenous knowledge been expressed in the implementation of the closed fishing season as a management of technique of the oceans?
6. How has ocean-related indigenous knowledge in managing the oceans in this community helped in boosting your fish catch?
7. What is the expression of ocean-related indigenous knowledge in tackling the issue of waste around the oceans?

8. What has been the role of ocean-related indigenous knowledge in tackling the issue of open-defecation along the coast in this community?
9. Have you ever been hesitant in using this ocean-related indigenous knowledge in managing the oceans in this community and why?
10. What benefits have you gained as a result of using ocean-related indigenous knowledge in managing the oceans in this community?
11. Has ocean related indigenous knowledge enhanced the deployment of useful practices in managing the oceans all this while? If so, how?

Impediments to the Promotion of Ocean-related Indigenous Knowledge

12. What makes it difficult for you to apply the knowledge you have acquired in preserving the oceans? (Probe into issues relative to religion, politics, health, peer influence, etc.)

13. Have you learnt anything different in churches and mosques, from peers, media, schools, etc that contradicts what you know traditionally about preserving the oceans?

Integration of Indigenous Knowledge in Ocean Management Practices

1. Are you aware of any support systems by the government for the integration of indigenous knowledge in ocean management practices in this community?
2. In your opinion, how has ocean related indigenous knowledge been recognized by policy implementers as an effective management practice in this community?
3. What can be done to promote the inclusion of ocean-related indigenous knowledge in ocean management practices?