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The local perspective on Ocean Plastic Pollution: Identifying Areas to Channel Ocean Literacy at Great Ningo in Ghana

Master's thesis in Globalisation and sustainable development

Supervisor: Dr Elizabeth Barron

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ABSTRACT

This thesis examines people's views in old Ningo on ocean plastic pollution and how to eradicate plastic pollution in the coastal environment through local initiatives with sustainable practices. From the data gathered, the study identifies some local agencies and agents that can be helpful to achieve this goal and enhance ocean literacy in the community. Through interviews, a focus group discussion and participant observation, the thesis provides details of how participants of the study understand the term "plastic pollution" in the coastal environment, its effects on the coastal environment and the sources of this pollution including internal causes. It identifies barriers that impede occasional interventions in the area and suggests possible remedies for sustainable outcomes through a collaborative effort of some identified agencies in the community.

By engaging the people of Old Ningo, the study contributes to local people's involvement in issues that affect their development and bring some global development targets to their doorstep such as ocean sustainability. Through purposive sampling, study participants were selected based on their related connections with the sea. Extensive participation was established through the snowballing approach. Participants for the study included traditional authorities, fisherfolk, residents that stayed close to the beach, Salt miners and workers at recreational resorts along the sea.

Through social constructionism, the people's knowledge about the sea and coastal environment showed a knowledge construction pattern based on their daily interactions with the sea over a period through which values have been created, normalized, and passed on to many generations. Kollmuss & Agyeman's Pro-Environmental Behaviour Model explains various habits that contribute to the internal cause of pollution and barriers that limit a drastic change in such negative behaviours.

In the findings, the study realizes the existence of an institutional structure in the community for managing the coastal environment and its resources. However, it identifies elements that impede its function and weaken the traditional authority system, while identifying an inadequate collaboration between the traditional and formal government agencies within the area.

Finally, the thesis presents a list of recommendations to achieve sustainable practices and reduce ocean plastic pollution in Old Ningo and promote ocean literacy in the community among others. Subsequent studies can investigate the experiment of these recommendations against behavioural change in the community particularly in the area of waste management.

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I am grateful to God for everything I learnt on this journey. I'm grateful to my family, especially my husband. To my supervisor, I say thank you for not giving up on me. Per Ivar my study advisor, Benjamin, the research team of BC5 and everyone that made the journey successful. God bless you all.

We cannot shape the world alone. We must work together, building bridges, finding a resolve in our human diversity, learning from one another and embracing our place within nature's perfect plan. (Obaidullah, 2023).

ABBREVIATIONS

AIM	-	Africa Integrated Maritime
AMCEN	-	African Ministerial Conference on the Environment
APEC	-	Asia–Pacific Economic Cooperation
BC5	-	Building Capacity to Cross-Link Coastal Pollution with Climate Change
GPML	-	Global Partnership on Marine Litter
IUCN	-	International Union for Conservation of Nature
MESTI	-	Ministry of Environment, Science, Technology and Innovation
NPAP	-	National Plastic Action Partnership
NPMP	-	National Plastics Management Policy
PRF	-	Plastic Revolution Foundation
UG	-	University of Ghana
UN	-	United Nations
UNEP	-	United Nations Environmental Program
UNCLOS	-	United Nations Convention on The Law of The Seas
SUP	-	Single-Use Plastic

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CHAPTER ONE

1.1 Introduction

Given the UN Decade of Science for Sustainable Development, this study examines ocean plastic pollution at Old Ningo, a coastal community in Ghana to contribute meaningfully to the broader conversation on ocean sustainability. This chapter starts with the background that inspired this study with an overview of the problem statement of this research. This chapter explains the study objective with a breakdown of the research questions of this study. It finally acknowledges some limitations identified in the research process and states the significance of the study to the field of ocean sustainability.

1.2 Background of this Study

During my internship at NTNU Oceans, I became more interested in ocean-related issues especially how our everyday lives as humans affect the ocean and its functions. Within that same period, the organization started a research project that was a collaboration between three countries which Norway was spearheading. I was tasked during that period to identify areas and themes in the project that was relevant to the social sciences and my study program. Themes that caught my attention during my search included climate change, sustainability, local people's involvement in coastal resource management and ocean literacy. The project is fondly referred to by the abbreviation "BC5".

Building Capacity to Cross-link Coastal Pollution with Climate Change (BC5)¹ is a strategic north-south-south collaboration between the Norwegian University of Science and Technology (NTNU), the University of Ghana (UG) and an affiliated collaboration with the University of Dar Es Salaam, Tanzania to address key issues related to climate change and natural resources. It aims at building knowledge on sustainable management of marine coastal ecosystems and resources while strengthening and improving existing coastal and regional research. Activities of BC5 are based on objectives centralized around the Sustainable Development Goals (SDGs) 14, Life under Water and other cross-cutting relevant SDGs. The BC5 project has three study sites in Ghana, which are Agbogbloshie, the Ankobra River, Ada and Great Ningo. The sites represent a range of coastal environments for BC5. NTNU Oceans is an active player in the NTNU group of

¹ BC5 is a project in the Norhed II program funded by Norad under "Climate Change and Natural Resources". It is associated with Grant Number: 71762

BC5, hence, my involvement in this project. Their vision is to help solve big sustainability issues in ocean space, which include related plastic waste. Within the scope of BC5, this study focuses on plastic pollution in the coastal environment at a study site in Ghana called Great Ningo also known as Old Ningo.

1.3 Problem Statement

In a preliminary study on the state of ocean pollution in Ghana, Biney (1982) attributes a greater proportion of ocean pollution to humanly induced activities. After about three decades, Anim et al. (2013) in their assessment of man-made causes of coastal pollution in Ghana states that locals do not understand the impact of their actions on the ocean. The BC5 project proposal acknowledges that Ghana lacks crucial data and knowledge on the status of its marine environment and that educational programs in West Africa do not directly respond to the needs of the local people to make smart policies. Larbi (2017) records that piles of plastic waste are a major threat to the coastal ecosystem of Ningo in addition to the intense sea erosion. This study in Old Ningo evaluates the assertion of Anim et al. (2013) that locals do not understand the impact of their actions on the ocean and examine whether people in this community desire an opportunity to contribute positively to finding a solution to marine plastic pollution. From the sources above, I identify that local people in the areas mentioned are caught in between the cause and impact of ocean plastic pollution, and having their needs directly responded to by educational programs towards a positive change.

Cyvin (2022) states that intellectual capacity outside academia is enormous and involving it in the scientific pursuit of solutions for environmental challenges can be useful. In macro and microplastic studies, he encourages academics to explore low-cost but high-quality studies. Such studies should go beyond just gathering data from citizens to setting up a model of involvement towards the desired change. Though this study focuses on gathering data based on the perceptions of the people of Old Ningo, it provides a basis for their involvement towards the desired change. This is because BC5 envisions that participatory research with local communities can provide solution-oriented guidance for better policies and practices in the long-term goal of BC5. In the case of Old Ningo, this study identifies various agencies and agents that are willing to be drafted into structures that promote sustainable ocean practices and create more awareness in terms of ocean literacy. Cyvin (2022) challenges researchers to consider what value is provided when

citizens are involved further in the research process beyond data collection (crowdsourcing or citizen science). He asks if their involvement has a long-term effect on their understanding of the problem. And to what degree can their involvement contribute to sustainable citizenship or stewardship of the environment? He also questions if academia is a social builder, where the use of citizen science can create a behavioural change towards a circular plastic economy.

1.4 Research Question and Objectives

This project addresses several objectives of BC5 including shortening the pipeline of knowledge transfer and promoting networks, citizen science, and ocean literacy. Based on these objectives, this study seeks to investigate the views of the people of Old Ningo on ocean plastic pollution. It explores ways that their experiences, skills, and knowledge can be included in an ocean literacy framework suitable for implementing sustainable practices in their coastal environment. The rationale behind investigating experiences, skills and knowledge is to help identify which locals have ideas about sustainable practices and experiences. The sustainable knowledge identified can be incorporated to benefit those without such knowledge. The overarching research question is, “What sustainable measures can be taken to protect the ocean and coastal resources against the obvious threat of ocean plastic pollution in Ningo”?

Specifically, this research seeks to:

- A) Investigate how participants understand Plastic Ocean Pollution in Old Ningo
- B) Investigate existing practices that encourage plastic pollution in the coastal environment.
- C) Identify sustainable practices that can reduce plastic pollution in the coastal environment (such as alternatives for plastic use) and agents that can be stewards of this change.

1.5 Study Limitation

The study has the potential to develop local initiatives that manage plastic ocean pollution, yet the duration on the study site was short due to the allocated timeline for this thesis. There was a bottleneck in accessing key stakeholders (such as observing traditional protocols to access traditional rulers) who can initiate some ideas suggested. Other limitations include the means of transportation within the study area and the language barrier. The duration to access travel

documents for data collection took longer than expected and affected the timeline scheduled for the study.

1.6 Significance of Study

Focusing on SDG 14, the study contributes to the body of knowledge that can inform target 1, indicator 1.1 (b), to conserve and sustainably use the oceans, seas and marine resources for sustainable development, prevent and significantly reduce marine pollution of all kinds, from land-based activities, including marine debris and index of plastic debris density respectively (United Nations, 2016). While this is a large-scale problem, addressing the issues of marine pollution of all kinds often requires local-scale attention, which can then ideally be used to inform related work.

Aside from contributing significantly to the fight against ocean plastic pollution in Ghana, the study assesses the ocean literacy of the community by documenting their local knowledge. It provides a basis for inclusion to the people in Old Ningo to be part of a holistic research project as BC5 and contribute to meeting various objectives of the bigger project. This study also provides relevant knowledge that forms the basis for other research across various disciplines in BC5 and beyond. To empower the African voice in the global discourse of marine resource management is of interest to BC5 and this study contributes to this course. As an African, engaging other Africans in this study contributes to empowering the African voice in the global discourse of marine resource management since it brings on board more Africans especially those at the local level. This study provides grounds for further research to determine the progress of local initiatives on eradicating plastics in the ocean in Ningo and neighbouring communities.

To summarize, this chapter introduces the field of study this research examines by providing the background that inspired the interest for this work. It presents the problem statement for the work and establishes the objective and research questions for this project. Challenges that were identified throughout the process were stated and the importance of this study to the various stakeholders was also mentioned.

CHAPTER TWO

2 LITERATURE REVIEW

This chapter draws from previous studies on plastic pollution in the ocean, its impact on the coastal environment and its related nuances to establish a basis for this study. It covers peer-reviewed and grey literature (government reports and website). I examine actions across scalar levels to account for some global, regional, national and local interventions against ocean plastic pollution. The section then evaluates how the identified actions can be appropriated to local communities like Old Ningo, a coastal community heavily polluted by plastics. Theoretical frameworks for this study include social constructionism and the pro environmental behaviour model. A social construct is employed to illustrate that sustainable local practices can be intentionally cultivated through everyday practices and norms. The pro environmental behaviour model examines the trend in the actions of locals considering their ocean literacy rate to ascertain what encourages sustainable practices and hinders such practices in the community.

2.1 What is Ocean Plastic Pollution?

Plastic pollution is the accumulation of synthetic plastic products in the environment, creating problems for biodiversity, including humans (Moore, 2023). The accumulation of plastics in the ocean is what this study refers to as ocean plastic pollution. Areas of the ocean we find plastics include the shoreline, the sea surface, marine organisms, the seafloor or sediment and in water columns (IUNC, 2021).

Plastics are often categorized into four types, namely, mega plastics, macro plastics, meso plastics and microplastics. The category of plastics often is as a result of variation in their sizes. Mega plastics is (>100mm), macroplastics range between (20-100mm), mesoplastics (5-20mm) and microplastics (<5mm) (Barnes et al., 2009). As part of the general research on plastics, this work focuses on macro plastics and their leakage into the ocean through the sea and coastal environment at Old Ningo.

The Ocean represents a large body of water that covers over 70% of the earth's surface with an average depth of 3800 meters. The sea is a smaller part of an ocean that is usually contained by an area of land (Dempsey, 2020). I study ocean plastic pollution through the lens of the sea because rubbish disposed of in human habitations may often leak into the sea and further into the

ocean. Consultants McKinsey and Company reported that 260 million tonnes of plastic are thrown away worldwide annually, and only about twelve percent per cent (12%) is recycled. While some are incinerated or sent to landfills, others end up in unlikely places such as the sea (Iberdrola, 2023). Moreover, Eriksen et al. (2014) note that plastic debris weighing more than 260000 tonnes is floating over the world's oceans due to improper waste disposal and has therefore become a global concern for both the developed and underdeveloped parts of the world (Thushari & Senevirathna, 2020).

2.2 Overview of Ocean plastic pollution: Global, Regional and National Perspectives

Ocean plastic pollution has been a problem since the 1970s (Carpenter & Smith Jr, 1972) and it is only recently that the interest in ocean plastic pollution has been heightened on the global level (Eriksen et al., 2014; Vegter et al., 2014; Xanthos & Walker, 2017). Reports in literature has shown that over 275 million metric tons of plastic waste from 192 coastal nations enter world oceans annually (Gilardi et al., 2020; Jambeck et al., 2015). A review of this estimate in 2016 revealed that about 19 – 23 million metric tons of plastics are accumulated in the oceans, and this estimate, by 2030, is expected to increase to 53 million metric tons annually (Adam et al., 2021).

The accumulation of plastics in the ocean comes from various sources. Research shows that plastic waste escapes from freshwater ecosystems such as rivers and streams, which eventually end up in the ocean. As an example, Moore (2008) reported that about 2 billion plastic fragments were released during three days into the sea from two freshwater ecosystems around California.

In addition, domestic wastes and coastal recreational activities contribute to the ocean plastic pollution. Thushari et al. (2017) noted that more than sixty percent of beach debris on selected beaches in Thailand originated from tourism and recreational activities. Due to poor waste disposal systems in most developing countries, residents along the coastline resort use the ocean as their sole means for waste disposal (plastics included) (Ashai, 2021a). With increased production of plastics to meet the demands of a rapidly increasing population growth (Tan et al., 2022) said, ocean plastic pollution is bound to cause chaos in the coming years.

Plastic waste from residential and domestic activities can accumulate in the ocean during extreme climatic conditions such as storms, hurricanes and floods (Moore et al., 2002; Thompson et al., 2005; Thushari et al., 2017). Thushari et al. (2017) noted that the coastal debris was relatively

higher in the wet season than in the dry season and Lattin et al. (2004) also noted that average debris level was about eighteen times lower in normal seasons than stormy seasons. With an estimate of about 71% of urban settlements in Sub-Saharan Africa living in poor environmental and sanitary conditions (Ashai, 2021b; Organization, 2009), flood resurgence report in Ghana (Ashai, 2021a) state that plastics are washed into the ocean system through its currents (Cole et al., 2011). Ocean plastic pollution from this cause cannot be ruled out.

Other than the effects of ocean plastic pollution on biodiversity and climate, interest in ocean plastic pollution may be due to the plastic quantities deposited in the ocean, and the cost involved in collecting the plastic waste. Briard et al. (2018) reports that Europe spends 630 million euros per year to collect plastic debris and (Beaumont et al., 2019) states that 2.5 billion dollars (about \$8 per person in the US) is lost yearly through ocean plastic pollution.

2.3 Effects of Ocean Plastic Pollution

I group the effects of ocean plastic pollution into three classifications, which are: ecological, socio-economic and health aspects.

2.3.1 Ecological impact

Ecological impacts of plastic debris in the ocean include entanglement of wildlife, suffocation, ingestion and reduced ability to swim (IUNC, 2021). The ingestion of plastic particles can have lethal or sub-lethal effects on the ecosystem (Thushari & Senevirathna, 2020). The lethal effect includes the death or lethal injuries that would be caused to marine organisms and the sub-lethal effects include the impairment of the reproductive capacity, loss of growth in body size and weight due to the inability to move, feed or even swallow food, and the inability to run from predators. This results in the reduction of marine species abundance and possibly leads to species extinction and endangerment (Gall & Thompson, 2015). Since the existence of some aquatic species ensure the survival of other aquatic species (for example, invasive aquatic species become predominant in oceans where their predators or competitors are extinct due to pollution (Keller et al., 2008), the ecosystem is left unbalanced and that affects the ecosystem health. Moreover, Ford et al. (2022) assert that the end-of-life processes of plastic waste have differing and sometimes undetermined contributions to global greenhouse gas emissions. To this, microplastics could reduce the ability of plankton to remove carbon dioxide from the atmosphere.

2.3.2 Socio-economic effects

Ocean pollution has adverse effect on commercial fishery, tourism shipping and national economies (Jambeck et al., 2015; Ten Brink et al., 2009; Thushari & Senevirathna, 2020) (Al-Masroori et al., 2004; Anderson & Alford, 2014). Plastic pollution affects the aesthetic view of the ecosystem, and as a result, recreational activities along the coastal lines are not patronized, leading to low tourism. The reduced number of tourists leads to loss of job opportunities (Hardesty et al., 2015; Jang et al., 2014; Thevenon et al., 2014; Thushari & Senevirathna, 2020) and loss of government revenue. Moreover, the destruction of the ecosystem health caused by plastic pollution adversely affects the breeding and nursery grounds of fishes, leading to a significant reduction in the catch of commercial fishing (Dias & Lovejoy, 2012; Hardesty et al., 2015; Jang et al., 2014; Thevenon et al., 2014). Furthermore, ocean plastic pollution disturbs the operational activities of ships, and as such requires plastic removal to ensure smooth shipping activities. This can be very costly. For example, McIlgorm et al. (2008); Rossi and Morone (2023) reports that the Asia–Pacific Economic Cooperation (APEC) used an annual cost of about USD279 million to cover damages caused by plastic debris in the ocean. The loss of job opportunities, government revenue from tourism, and revenue from shipping activities contribute to the reduction in gross domestic products (GDPs) of nations.

2.3.3 Effects on human health

The breakdown of the macro plastics (and others) into microplastics (plastic particles less than 5mm), can lead to diseases when ingested by fish and eventually consumed by humans (Ashai, 2021b). Plastic ingestion has both immediate and long-term effects. Intestinal blockage and organ puncture account for some short-term effects in fishes, while long-term effects proven by some studies include sex determination in some organisms and nervous system damage in others (Watt et al., 2021). The long-term effects on organisms, however, may extend to other organisms in the food chain which include humans. Moreover, the physical and psychological well-being of people in coastal environments polluted by plastics can be affected in various ways says (IUNC, 2021). The safe state of seafood can influence its level of demand. Since fishery resources contribute a large proportion of animal protein intake in some developing states (Thushari et.al), unsafe seafood can affect the health of consumers and adversely affect the human resources of countries.

2.4 Interventions

Ocean plastic pollution is a global problem acknowledged by different actors. These players include global, regional, national and local actors from different backgrounds. Beyond acknowledging the problem, is the trend of soliciting ideas towards its solution. It often starts with acknowledging plastics in the ocean space as a challenge and then communicating this to potential players who could cause a change in their distinct capacities.

2.4.1 Global-scale interventions

The United Nations as a global actor, through its General Assembly on oceans and the law of the sea, has created a blueprint towards the oceans' sustainability. It encapsulates many issues on the ocean's health and includes ocean plastic pollution. The UN Convention on the Law of the sea (UNCLOS) is responsible for providing an international framework for the control of ocean plastic pollution (Thushari et al., 2017). To start with, SDG 14 creates a pathway under which the topic of ocean plastic pollution can be narrowed. The UN Environmental Assembly in December 2017 launched a follow-up on 1400 voluntary commitments aimed at sustainable use of the ocean at the UN Ocean conference held in June of that year. The UN Ocean Conference at Altice Arena in Lisbon, Portugal on 27 June 2022 declared the urgency of the pollution crisis and cautioned that without meaningful actions, emissions of plastics into the aquatic ecosystems may triple by 2040, UNEP. Thus, the United Nations as a global actor often creates platforms for experts and other actors to consider ways to combat this crisis.

Moreover, other global initiatives such as the Honolulu strategy, the G7 countries and the Global Partnership on Marine litter (GPML) have been put in place. The Honolulu strategy is a planning framework for the management and prevention of ocean pollution, reducing the ecological, human and economic effects of ocean plastic pollution (Löhr et al., 2017; UNEP, 2011). The GPML acts as a voluntary multi-stakeholder coordination tool that brings together the scientific community, private sector, civil society actors and policymakers to discuss solutions to ocean plastic pollution and spearhead actions on them (Löhr et al., 2017).

Although there are existing global policies from the United and other global bodies, many articles have discussed the possibilities of amending existing global policies on oceans to strengthen them or renew targeted policies on plastic pollution (Haward, 2018; Simon & Schulte, 2017). Their reason is that the issue of plastic pollution sits beyond national and regional

jurisdictions and the local and regional efforts fall short in their incentives to deal with such issues alone (Borrelle et al., 2017). Furthermore, economic considerations, perception of the urgency of the problem, domestic pressure in favor or against the agreement by non-profit organizations and industries and the lack of scientific evidence have been noted as factors influencing the global initiatives to curb ocean pollution (Tessnow-von Wysocki & Le Billon, 2019). Raubenheimer and Urho (2020); (Tessnow-von Wysocki & Le Billon, 2019) proposed a new framework that guides global policy makers to rethink the governance of ocean plastic pollution by considering issues such as the role of industries and what should be funded through the agreement from international sources.

2.4.2 Regional-scale interventions

Africa as a continent is surrounded by the Atlantic Ocean, Indian Ocean, Mediterranean Sea and the Red Sea (Preston-Whyte & Maes, 2022). As such, the global frameworks have been adopted by the African Union (AU) through its recent African Union Blue Economy Strategy (AU-IBAR, 2019), seeks to address the potential effects of ocean plastic pollution in Africa (Preston-Whyte & Maes, 2022). Secondly, the AU through the adoption of Agenda 2063 in 2015, seeks to promote and deliver inclusive and sustainable development (with oceans inclusive), but none of the flagship programs in the first implementation plan (2014 –2023) has directly impacted marine and coastal protection and management (Preston-Whyte & Maes, 2022). In addition to the two policies above, the AU developed the 2050 Africa's Integrated Maritime (AIM) strategy in 2012 (AU, 2012) which was to provide a framework for the region to protect its maritime domain by preventing marine pollution from various sources including plastics (Preston-Whyte & Maes, 2022). Lastly, the AU established the African Ministerial Conference on the Environment (AMCEN) in 1985 to also provide advocacy for the protection of the environment (which included the ocean) in Africa (Preston-Whyte & Maes, 2022). This forum is comprised of the member states' ministers of Environment and their representatives, and through its 17th session in 2019, plastic pollution and marine litter prevention were addressed, stressing the need for member states to reinforce existing ocean sustainability agreements (Preston-Whyte & Maes, 2022).

Moreover, global actors have regional coordinating centres in Africa that ensure that global initiatives are implemented on the regional level. For example, the Basel and Stockholm conventions have established a network of 23 regional and coordinating centres for capacity

building and the transfer of technology and six of these centres are in Africa (Preston-Whyte & Maes, 2022). These centres have taken the initiative of establishing working groups on ocean pollution and other projects on ocean plastic waste. The UN through its Regional sea program in Africa has enacted action plans and or legally binding conventions, four of which are the Abidjan Convention (for the protection of the coastal borders of the West, Central and South Africa region), the Nairobi Convention (for the protection of the Western Indian Ocean), the Jeddah Convention (conservation of the Red Sea) and the Barcelona Convention (protection of the Mediterranean) (Preston-Whyte & Maes, 2022). Other non-profit organizations in the Region such as the Sustainable Seas Trust and the African Marine Waste Network (which is a collaborative network for knowledge exchange), Western Indian Ocean Marine Science Association (which promotes marine science education) and the Ellen MacArthur Foundation Plastics Pact Network in Africa (which brings stakeholders together to discuss on plastic waste management including ocean plastic pollution) have made varied interventions through knowledge and technology sharing, as well taking the necessary actions to curb ocean plastic pollution.

Notwithstanding the efforts made on the regional level to curb ocean plastic pollution, has not been short of implementation challenges. The major implementation issue in Africa is sustainable funding. The policies and frameworks developed need funds for implementation, and with most African countries being lower to middle-income countries, priorities are placed on other aspects of the economy than on ocean plastic pollution.

2.4.3 National Interventions

Global and Regional implementation frameworks are adopted by nations. The government of Ghana through its ministries, metropolitan, district and local assemblies, as well as lawmakers in the parliament, has taken certain initiatives to deal with ocean plastic pollution, whether directly or indirectly. For example, Adam et al. (2020) documents measure to reduce single-use plastic (SUP) marine pollution in West Africa and report that twelve out of 16 countries in West Africa have instituted SUP reduction policies. While the main policy instrument used is legislative bans in many West African, Ghana is the only country among the 12 countries that uses a market-based strategy. Ghana has an excise tax on imported semi-finished and raw plastic materials but has no ban on plastics.

Interestingly, all the bans in this region are partial bans, and the Environmental Excise Tax Act 863 of Ghana only applies to imported semi-finished and raw plastic materials. Adam et al. (2020) speculate that the market strategy employed by Ghana seems to be motivated by a desire to raise revenue for the government rather than reduce SUP consumption and leakage. The speculation is buttressed by the fact that the most patronized SUP in Ghana is produced in the country and not imported, yet that is not affected by the Act. These include plastic bags, plastic beverage bottles and sachet water packs. The National Plastic Action Partnership (NPAP) Ghana was established through the Global Plastic Action Plan. In 2021, the NPAP of Ghana produced its first roadmap for the radical reduction of plastic pollution in Ghana. The action roadmap presents a pathway for eradicating plastic pollution in the marine environment and other water bodies by 2040. The document recommends multiple interventions which are coordinated with strong collaborations between all stakeholders, including directly affected communities (NPAP Ghana, 2021).

Moreover, article 3 (9) of the 1992 constitution of the Republic of Ghana stipulates a framework for the State's institutions and the individual contribution from each citizen in the protection and maintenance of a clean and healthy environment (Ghana, 1969). Through the Ministry of Environment, Science, Technology and Innovation (MESTI), the government of Ghana through the leadership of His Excellency, Nana Addo Dankwa Akuffo-Addo, the president of Ghana, has developed a National Plastics Management Policy (NPMP) in addition to the existing laws to ensure the proper management and sustainable use of the ocean. The NPMP focuses on behavioural change, strategic planning and cross-sectoral collaboration, good governance, inclusiveness and shared accountability and resource mobilization towards a circular economy to achieve its aim (Ghana, 2020). In addition, through the Plastic Revolution Foundation (PRF), the government of Ghana seeks to eliminate plastic waste in the ocean by collaborating with the metropolitan, municipal, district and local assemblies (Ashai, 2021a; Plastic Revolution Foundation, 2021).

Aside from efforts made by stakeholders in Ghana, there have been noticeable gaps in the existing implementation policy for the prevention of ocean plastic pollution. This includes inadequate infrastructure and investment capacity, lack of education and awareness of the effects of ocean plastic pollution and weak legal enforcement for the development of national policies and frameworks (Ashai, 2021b; Global Environment Facility, 2019).

2.4.4. Local Interventions

Individual and local organizations have also contributed to the reduction of ocean plastic pollution on the local level. Their involvement have been through data collection for scientific research, clean-up exercises and involvement in decision making processes that leads to the (Van Dyck et al., 2016) observed tourists organizing clean-up exercises along the Sakumono, La Pleasure, Mensah Guinea and Sakumono beaches in the city of Accra in Ghana. Moreover, (Nunoo & Evans, 2007) noted that secondary school students were given opportunity to play roles as environmental stewards, after which the students debated and developed environmental plans for the area during the “citizen day”. During this 1-day “citizen day”, students are given information about a habitat of their interest (usually a natural reserve which can be along the coastal borders) and they conduct their own surveys.

In the governance of the nation, the district assemblies are the basic unit of the governance structure and are tasked with the responsibility of implementing national and municipal or metropolitan policies (and that includes those on ocean pollution management) (Hens & Boon, 1999). The district assemblies are constituted by local representatives in the district called “assembly men” and about thirty percent of its membership being chiefs or representatives of the local traditional council (Loftus, 2015). These local representations create awareness of the ocean pollution threats in their local areas, and spearhead district assembly initiatives at improving the pollution.

2. 5 The Ocean and Globalization

In considering factors that motivate me to engage in this study, two terms from my study program come to mind, (globalization and sustainability). The World Commission on Environment and Development (Brundtland Commission) defines the concept of sustainability as an economic development that meets the needs of the present without compromising the ability of future generations to meet their own needs, WCED 1987: 39 in (Portney, 2015). From its conception, the definition seemed to tilt towards economic development, however, it has been appropriated to many spheres over the years. From a viewpoint of sustainability, this work explores how people from Old Ningo can help combat plastic ocean pollution. The ocean is a common natural resource that connects almost all biodiversity; hence, its relevance must be protected in every possible way.

The ocean has existed for about 4 billion years across many generations (Elkins-Tanton, 2011). This natural resource has promoted interconnectivity between different people and places over the years.

The mention of one role of the ocean as a means of interconnectivity brings me to the concept of globalization. Thus, the increasing interconnectedness of the world through time and space compression, such that, the interconnections between time and space form part of the processes of social change (Harvey, 1990). In broad terms, it is the worldwide integration of economic, technological, political, cultural and social aspects between countries (Hamilton, 2009). Frequently discussed concepts in globalization include migration, neoliberalism, governance, commerce, the flow of information and more recently sustainability which directly captures the ocean in its recent framework, thus, the Sustainable Development Goals (SDGs). Arguably, the ocean can be viewed as a global phenomenon in both the tangible and abstract sense as it connects everyone, including all biodiversity.

2.6 Conceptual Framework

This section illustrates the relationship among variables used in this study. It provides definitions that bring a better understanding of their usage in the work. Since these variables can be explained in various capacities like other terms, I choose definitions and explanations that reveal their relationship with other concepts of this study for a better understanding of how they connect to meet the study objective.

2.6.1 Ocean Literacy

According to Santoro et al. (2017), ocean literacy (OL) is understanding the ocean's influence on us and our influence on the ocean. The term, however, can have different meanings in different cultures (Santoro et al., 2017). Ocean literacy seeks to create awareness of the sensitivity of their activities on the environment and the problems they pose, help them change their behavior towards the environment, acquire the necessary skills to identify and solve environmental problems and participate in preserving the ocean (Cannady et al., 2018). There are three dimensions to ocean literacy, which helps define an ocean-literate person: knowledge, communication and decision-making (Cannady et al., 2018; María C & Borja, 2016). That is, "an ocean-literate person: (i) understands the essential principles and fundamental concepts about the

ocean; (ii) can communicate about the ocean in a meaningful way; and (iii) is able to make informed and responsible decisions regarding the ocean and its resources” (Carley et al., 2013).

The meaning of the term to a specific group may depend on how they engage with the coastal environment. As participants in this study shared ways they interact with the sea, the extent to which they influence it and vice versa was captured in the data. As said by Emily King, “People know less about the ocean than they do about the moon” (Santoro et al., 2017). This statement can be generic and may apply to both experts and ordinary everyday people. By sharing their practices, experiences and beliefs in the data collection process, they identify possible agencies and agents that can help implement sustainable practices against marine plastic pollution in the community. Several studies suggest the ocean’s vulnerability is a result of various anthropogenic factors (Büyükdeveci & Gündoğdu, 2021) worsened by a lack of knowledge and understanding about oceans. Some scholars go so far as to suggest that creating a more ocean-literate society is crucial for our survival and happiness (Santoro et al., 2017)

2.6.2 Agency

The study also attempts to identify agents or agencies as potential stewards of the coastal environment of Old Ningo. Brun and Blaikie (2014, p. 25) explain agency as people’s capacity to choose and pursue their goals. This study presents a platform for the people of Old Ningo to do this in the area of marine plastic pollution. The participation of the local people of Ningo in this project may help discover capacities to preserve the ocean specifically in the area of plastic pollution. Achieving this kind of involvement will contribute meaningfully to ocean sustainability. In addition, it will meet the original meaning of participation as an aspect of Alternative development. This means, making people central to development by encouraging beneficial involvement in interventions that affect them and over where they previously had limited control of influence (Cooke et al., 2001, p. 5). Alternative development according to Piers Blaikie (2014) is characterized by local and participatory decision-making in which the voices of the marginalized have a say.

The study also adapts related works on ocean literacy, climate change and specific strategies that several communities use to promote ocean sustainability. The ocean and its relatable issues are under constant exploration for many reasons. community involvement will have relevance on the topic both for themselves and the global community.

2.7 Theoretical Framework

Social constructionism considers human cultures, institutions, and notions of humanity and nature as produced through social interactions, norms and agreed-upon meanings. Social constructionism also suggests that society and space express the material landmarks and lived experiences of a place (Hay & Cope, 2021).

2.7.1 The constructionist theory

Constructionism is an actively learning approach which states that learning is an active process of creating knowledge with the goal of making sense of the world (Adam et al., 2020; Adams, 2003, 2006). There are several constructionist theories proposed, but their commonality comes from the active participation of the learner and the knowledge is constructed in the context of the problems that are intended to be solved (Adams, 2006). Amongst the constructive theories, individual or personal constructivism and social constructivism are the most used as learning theories.

- Individual or Personal Theory

This theory originated from Jean Piaget (Liu & Chen, 2010) and it involves the process where the learner actively constructs knowledge by himself rather than passively from his environment. This theory, as (Liu & Chen, 2010) argued relies on the prior knowledge of the learner and not on the traditional method where knowledge is passed on from a more experience person to others. In the context of ocean literacy, this theory seeks to ascertain how previous knowledge and experience of the agencies or actors helps them to actively gain knowledge about the ocean without the passing of knowledge from an expert. This can be very challenging, and as (Liu & Chen, 2010) argues there is a challenge is drawing the connection between knowledge and the environment.

- Social Constructivism Theory

An alternative theory of constructionism which this study uses to analyze how knowledge is constructed by the actors is the social constructionism theory. The social constructionism theory was first proposed by the soviet Vygotsky, who posits that a learners construction of knowledge is based their social interaction, understanding and interpretation (Vygotsky, 2012). Risse defined social activism as “a truism that social reality does not fall from heaven, but that human agents construct and reproduce it through their daily practices” (Risse, 2007). Knowledge is therefore constructed from the interaction between both subjective and environmental factors (Liu & Chen,

2010), and active knowledge construction cannot be separated from the social environment (social norms and practices) it was formed in (Woolfolk, 1998).

The difference between the social and individual constructionist theory is that knowledge is formed first on an inter-psychological level (such as through group projects, field trips) before it is processed internally for the social constructionist theory (Daniels, 2016); the individual constructionist theory forms knowledge based on intra-psychological level (through experiences or previous knowledge) before engaging the environment with the knowledge formed (Liu & Chen, 2010).

The socialist theory involves three main processes as noted by (Hurst, 2021):

- Construction - The process of understanding building by putting together separate pieces of information.
- Storage – The process of mentally assimilating the new information constructed into memory.
- Retrieval – The process of recollecting the information stored in memory and using that information.

The social constructionism theory will help analyze our findings based on how actors construct ocean knowledge based on the culture, and institutions of Old Ningo that are produced through social interactions and agreed-upon norms whether subtly or explicitly.

2.7.2 Pro-Environmental behavior model

In this study, we are not only interested in how agents construct knowledge, but in how the knowledge affects the behavior of the agents in this study. Behavioural models do not describe the processes that make people act the way they do, but rather as Triandis describes it as “a quick and imprecise way of organizing a lot of information in order to make more theoretical statements possible” (Triandis, 1977). They are diagnostic and designed to help us explain the determining factors that underlies actor’s behavior (Darnton, 2008).

There are various behavioral theories proposed, with an overview of the behavioural change models and their uses provided in (Darnton, 2008). This study will use the Kollmuss and Agyeman’s model of Pro-Environmental behaviour (Kollmuss & Agyeman, 2002).

(Kollmuss & Agyeman, 2002) identified that one single behavioural framework (displayed in Figure 1) and diagram is not enough to describe the complex nature of pro-environmental behavior. By incorporating various models, (Kollmuss & Agyeman, 2002) defined a theory that captures the complex pro-environmental behavior. The behavioral models Kollmuss and Agyeman considered included but not limited to:

- The early US linear pro-environmental models (such as that of (Burgess et al., 1998)), that assume a linear progression from environmental knowledge to environmental attitude to environmental behavior.
- The altruism, empathy and prosocial and behavior model like that of (Borden & Francis, 1978) who hypothesize that satisfaction of personal needs can more likely increase one's ecological action, since they now have enough resources (time, money etc) to deal with bigger, non-personal problems that faces the environment.
- Sociological models for analysing pro-environmental behavior such as the work done by (Fietkau, 1981) who identified five variables that affect pro-environmental behaviour. The five variables (Fietkau, 1981) identified are attitude and values, behavioural incentives such as quality of life, perceived feedback about ecological behavior (which can be intrinsic such as receiving money for plastics collected or extrinsic such as the satisfaction in collecting the plastics), knowledge which modifies attitudes and values of actors and the possibilities the actors must act ecologically such as the provision of recycling plants.

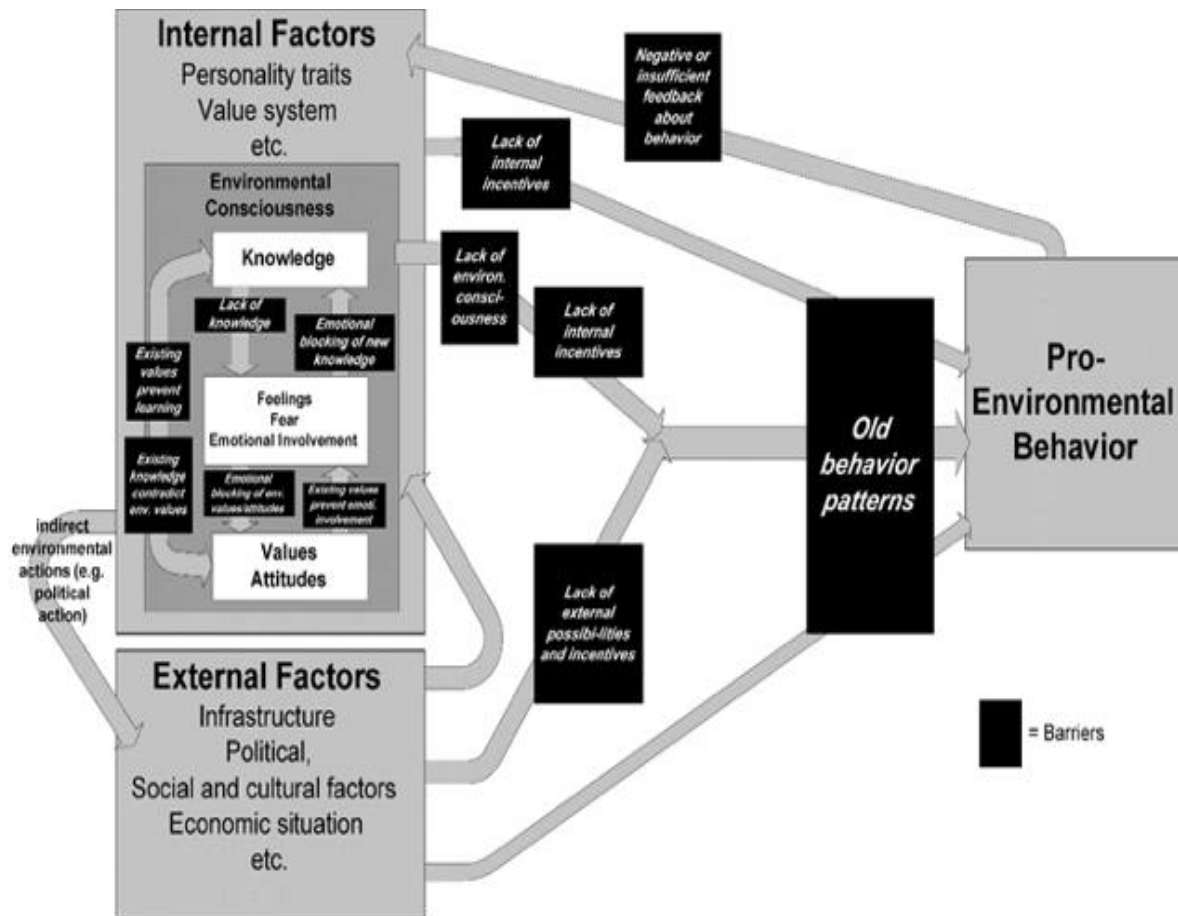


Figure 1: Kollmuss & Agyeman model of pro-environmental behavior reproduced from the original article (Kollmuss & Agyeman, 2002).

In summary, the Kollmuss & Agyeman pro-environmental behavior model (Figure 1) suggested three factors that can positively or negatively affect the pro-environmental behavior (Kollmuss & Agyeman, 2002). The factors and how they relate to this thesis are provided in Table 1.

Table 1: The factors identified by (Kollmuss & Agyeman, 2002) that affect pro-environmental behavior and how they are related to this thesis.

Table 1: The factors identified by (Kollmuss & Agyeman, 2002) that affect pro-environmental behavior and how they are related to this thesis.

Factor	Sub-divisions	Relation to thesis
Demographic	Gender	Some genders are responsible for taking certain sanitation actions in the ocean
	Years of education	Was not considered in this thesis

External factors	Institutional factors	Access to transportation to the ocean, recycling plants and/or dumpsters near the oceans
	Economic factors	Paying people as incentives to collect ocean plastics, funds available for residents to clean ocean
	Social & Cultural factor	
Internal factors	Responsibility and priorities	The position the person occupies can affect his behavior towards the ocean. For example, the chief of the ocean or the leaders of the fishermen association are more likely to take positive actions than normal residents.
	Locus of control	An individual's perception that they can cause changes
	Environmental awareness	How much aware the actors were of the environment and its effects on them
	Motivation	Actor's selective motives and personal comfort can override their primary motive of environmental values.

Chapter Summary

Chapter two cross examines existing work on ocean plastic pollution and defines the term in perspective to its usage in this study. It assesses some angles by which this phenomenon is handled on scalar levels by highlighting some interventions on the global, regional and national levels. The chapter identifies how the ocean is connected to globalization (a vital aspect of my study program). The chapter then evaluates some concepts and theoretical framework used in this study.

CHAPTER THREE

3. Methodology

Introduction

This chapter focuses on the background of the study area, location, population, geological features, and others. It proceeds to discuss the research design and methods used for data preparation, collection, and analysis. The sampling procedure used in selecting participants is also discussed in this section. The data collected is analyzed based on themes retrieved from the data gathered. To ensure rigour in this study, the ethical considerations that guided the data collection process and its analysis such as reflexivity, power relations, and confidentiality are discussed in the concluding part of this section.

3.1 Background of Study Area

The area is in the Ningo- Prampram district, located about 15 km to the east of Tema and 40km from Accra. The area is on latitude 5.3180⁰N and 0.10010⁰W, respectively, along the Gulf of Guinea. Old Ningo is in a district bounded on the North by the Shai- Osudoku district, the Gulf of Guinea is on its South, Ada on the East and Kpone Katamanso on the West (Darko et al., 2022). The district covers a total area of 622.2 square kilometres and has a total population size of about 70,923 of which 52.7 per cent are females and 47.3 per cent are males (citation). The district area has a gentle and undulating relief. It has relatively low plains which have prominent inselbergs and isolated hills. The geological formation of rocks in the district comprises ancient metamorphosed igneous rocks. The district is one of the hottest parts of the country with a maximum temperature of 40 degrees Celsius. Due to high temperatures, the streams in the area are mostly dry for most of the year, resulting in the construction of the Dawhenya dam to provide water for irrigational purposes (Ghana Districts, 2017).

The coastal community of Ningo is known for occupational activities like farming, fishing and salt mining (citation). The sea and Django Lagoon at Ningo continue to remain an important resource to the lives of people in the community. However, activities like excessive salt mining and plastic pollution have become threats to the coastal ecosystem. Among the main areas for solar salt production in Ghana, brine from lagoons or water bodies i.e., the Djangé lagoon in the case of Ningo is held up, concentrated, and later transferred into salt pans to produce salt (Atta- Quayson,

2018). The lagoon has become a receptacle of run-off water from farms, human settlements and salt ponds while still serving as a passageway into the Atlantic Ocean (Nartey, 2015).

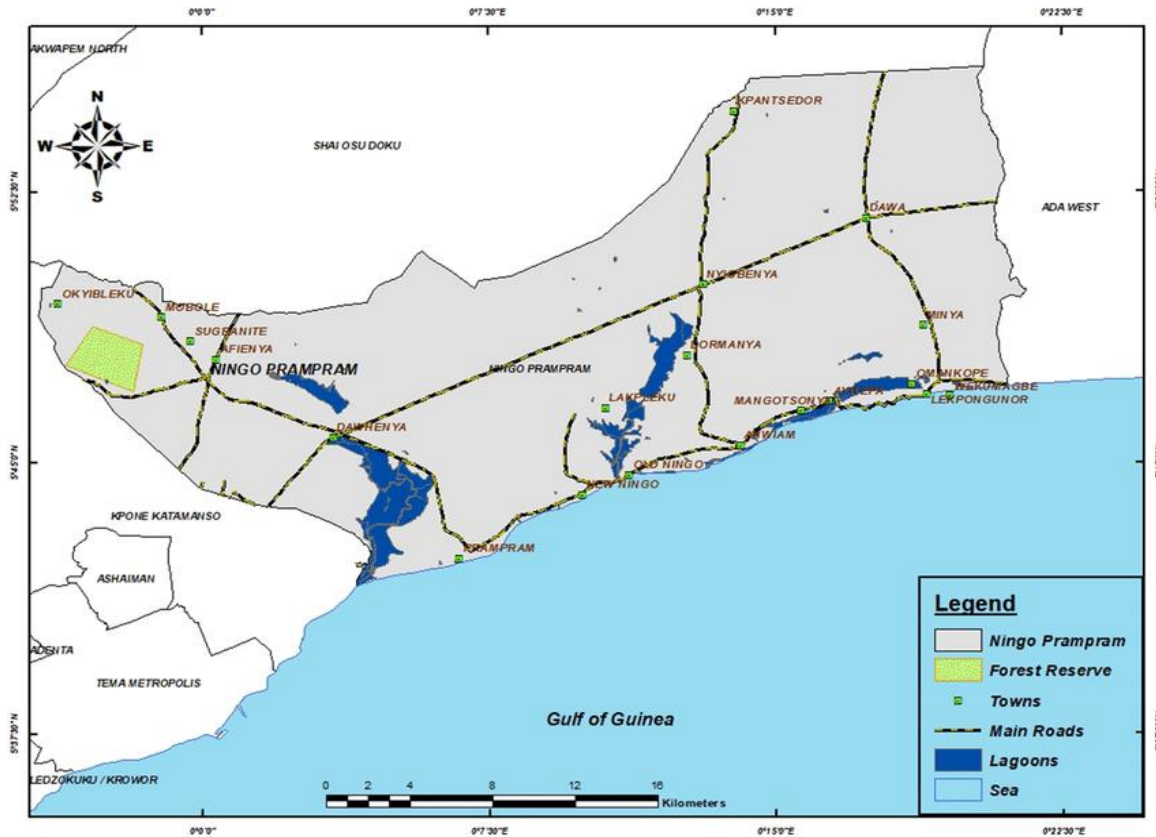


Figure 2: Map of the Ningo -Prampram District

3.2 Study Area Selection

The study area forms part of the three thematic areas identified under the project, Building Capacity to Cross-link Coastal Pollution with Climate Change (BC5). The thematic areas identified by BC5 in Ghana for research include Agbogbloshie, the Akobra River, Ada and Great Ningo. This project aims to build knowledge on sustainable management of marine coastal ecosystems and resources while strengthening and improving existing coastal and regional research that aligns with SDGs 14 and 15. The Old Ningo area was selected for the following reasons.

1. The heavy plastic pollution and exploitation of the Djange lagoon for salt along the shores of Old Ningo

2. The qualities BC5 foresees in this area as a potential site for a laboratory on ecosystem restoration (cite the BC5 research proposal).

Finally, I have an interest in community engagement and activities that support resilience and finding local-based solutions to environmental issues.

3.3 Research Design

To enable the collection of substantive data that highlights the traditional knowledge of the people across various groups in the community, this study adopted a qualitative research approach. This was to gain a deeper understanding of the motivations, perceptions and interests of the participants of the study. The qualitative methods of data collection applied in this research are interviews, participant observation, and focus group discussion which are explained in detail in subsequent sections.

As BC5 determined the focus of the research, I selected participants based on their frequent interaction with the sea. The conscious selection of participants ensured data gathering was from individuals and services that directly relate with the sea. Such participants can be considered as core actors in the coastal matters of the community. The primary approach used to select participants was purposive sampling. Purposive sampling was adopted because it helps select a specific group for the study based on the specific characteristics they possess (Hay & Cope, 2021). This approach enabled me to access a relevant gatekeeper of the community who controlled access to the coastal affairs of Ningo. In the purposive sampling approach, the snowballing or the chain approach, typical case sampling and criterion sampling approach were adopted. The snowballing or chain sampling technique identifies cases of interest reported by people who know other people involved in similar cases (Kirby & Hay, 1997). Typical sampling highlights what is considered typical, normal or average while the criterion sampling technique involves selecting participants who meet a certain criterion such as involvement in natural resource management (Lockwood et al., 2007).

I identified various actor groups relevant to this study by conducting a review of secondary data about the natural resources related to the study, thus, the ocean. Progressing from this, the targeted participants for the study were traditional rulers, fisherfolk (men and women), workers at recreational facilities at the beach, residents who lived near the sea, salt miners and a local representative of the government in the area.

3.4 Data Collection

This section details the process that went into collecting the data for this study. The methods used were interviews, participant observation and focus group discussion. Interviews and focus-group discussions are methods used in community engagement activities to reflect participants' views, interests and needs. Participant observation was employed because it enabled me, the researcher, to note my experiences on the fieldwork that will be relevant to the work. Participants of this study were informed about the study, its objective and its relevance to the community. They were informed about their rights to either consent or decline to be part of this study. The data collection process followed a data management plan made for the study through the Norwegian Center for Research Data (NSD).

3.4.1 Interviews

Interviews help capture a range of perspectives among different actors and enable a researcher to explore complex human behaviours and the motivation for such behaviours. Dunn (2021, pp. 149-150) states that interviews help show a group's consensus or divisiveness (Hyams, 2004) on an issue. Among the major forms of interviews used, I employed a semi-structured interview to investigate various opinions about the ocean plastic pollution facing the Old Ningo in this study. A semi-structured interview was preferred because it allowed me to ask topical questions related to the study and provided flexibility for participants to share their perceptions at the same time. This method provided a good balance of interest for me as the researcher and the 15 participants involved. While the data gathered were in line with the study, respondents were not made to fit into a box by providing predetermined answers.

Participants who were engaged in this study through semi-structured interviews include, traditional rulers, the assemblyman, fishermen, fishmongers, residents who lived close to the sea, salt miners and workers of recreational facilities on the beach. Among the traditional rulers of the area, the "wolaatse" was identified as the appropriate candidate relevant for this study. This traditional ruler oversaw the sea and its environment, and the meaning of his chieftaincy title is the father of fishermen. The assemblyman is the representative of the local government at the community level. The fishermen interviewed depended on fishing as their source of livelihood and the fishmongers were all women.

During the interview, a few individuals in the hospitality industry were interviewed. Their involvement in the study is because of the proximity of their facilities to the sea. Another actor identified through secondary data review for an interview was salt miners. During the interviews, it was mentioned that individuals in the community no longer engaged in salt mining though they used to do so in times past. At the time of the fieldwork, there were two major companies in charge of the salt mining activity in the community. The head of staff of one of these companies was interviewed because they are part of actors that closely engage with the sea. Though this company was located on the other side of the town, it was mentioned in an interview that water used in the production of salt was pumped from the sea into the constructed ponds.

Aside from the traditional ruler, the head of the mining company's staff and the local government representative, when participants within the same group in the study repeated data repeatedly, I interpreted that to be the end of my data collection process in that group.

Interview Guide

An interview guide is a list of general issues a researcher wants to cover in an interview and it is usually associated with semi-structured interviews (Dunn, 2021). Before conducting any interviews, I made a list of questions that were targeted at my research questions. The rationale was to receive answers that brought me closer to reaching the objective of this study. Questions in the interview guide were framed around topics and themes that were frequently identified in existing texts I reviewed at the preliminary stage of this project. The flexibility of the research guide enabled me to make changes to the wording of some interview questions at some point yet maintain the same topic. The guide allowed interviews to follow a natural flow. I, however, had to occasionally redirect the discussion towards relevant issues of the study.

To maintain rigour, it must be noted that though the interview guide was originally written in English, the questions were asked in “Ga-Adangme” as this is the dialect spoken by the people of Old Ningo. I must also mention that my interaction with participants who only communicated in this dialect was with the assistance of an interpreter. Though I speak the Ga language, differences in dialects required that I worked with an interpreter. While an aspect of the guide focused on various ways participants interacted with the ocean, it also captured issues related to macro plastic pollution. To get more relevant data, a guide was prepared around the research questions of this study. The guide had specific questions that were directed to some opinion leaders

in both the chieftaincy institution and local government respectively. This was to discover various interventions that may be ongoing in their capacities regarding ocean plastic pollution.

3.4.2 Focus Group Discussion

Focus group discussion uses similar skills needed for gathering data through interviews. A major difference is that many more people are involved in a focus group discussion than are involved in interviews. A focus group discussion is organized for people to meet and share their experiences and thoughts with others on a specific topic. Participants explore their social agency of collective knowledge production through the plurality of either competing or concurring views on a particular topic. The discussion focused on themes of this study such as ocean plastic pollution, sanitation, the impact of this pollution on livelihoods, the level of awareness of this pollution among members of the community, existing coastal management strategies and possible initiatives.

At Old Ningo, the focus group for this study consisted of about eight people and questions were deliberated on the themes mentioned above. The discussion was held in an open space before a recreational facility close to the beach. The venue was easily accessible since it was close to many houses along the beach and was an informal setting. Participants in the group interacted with the ocean on different levels. Some live very close to the sea (residents), others are fishermen, there was the owner of a recreational facility along the beach and a participant whose house had been eroded by the sea. The group also had a student who participated in the exercise. I shared food and drinks with the participants and spectators who just came to observe what was happening as (Cameron, 2021) suggested. This gesture was to create a relaxing atmosphere for the discussion. It was also to eliminate the perception that I (the researcher) could be a spy or a journalist that only wanted to make news of them.

I moderated the exercise and took notes of who spoke, in what order and a short description of what was said. This was done as I recorded the discussion with a recording device.

3.4.3 Participant Observation

In this method, researchers as instruments record and process their observations as data. Researchers that use this method participate in daily life activities while observing and writing about those practices. Unlike ethnography, participant observation does not aim to qualitatively

describe the interior worlds of cultures and situations (Watson, 2021). I employed participant observation to examine what I observed in the study area against the data I received from participants. Also, it is to triangulate the relation between what I observed on the field, the data gathered directly from participants of the area and the notions found in some literature I reviewed.

To enhance the credibility of the results, I sent formal notices to the agencies connected and was permitted before I used this, and any method employed in this study. The international house of the University of Ghana is the office of the University that promotes international relations, it assisted me in reaching out to all agencies needed for this study. The duration of the fieldwork was three weeks and I travelled from Kpone, a community around the area to Old Ningo daily. I often arrived at Old Ningo in the morning and left in the evening. I could not live in the community due to the cost of renting a hotel and a gatekeeper's advice. The comment was that, as a female researcher, I must be careful if I wanted to live in the community all by myself.

3.5 How I Gained Access

I submitted letters I received from the international house of the University of Ghana to the regional office of the Environmental Protection Agency, the Ministry of Environment, Science Technology and Innovation, the Ningo-Prampram District Assembly (NiPDA) and the Ningo Traditional Council. A meeting was scheduled for me to meet the traditional ruler that formed the council to explain the purpose of the study. In this meeting, I went with a translator, an elderly woman who was informed of the appropriate conduct expected in such meetings and I submitted a copy of my research proposal. The rulers had a couple of questions about my study after which I granted permission to continue with my fieldwork.

My first “gatekeeper”, a registrar at the traditional council, directed me to the traditional rulers and emphasized the importance of my visit to the “wolaatse”, the traditional ruler in charge of the coastal affairs of Old Ningo. It required that I needed a translator, one who was familiar with the customs of the community to help communicate my purpose for the visit to the traditional ruler and others when it was necessary. The “gatekeeper” recommended some people and eventually I secured a translator for the period. Though I travelled to Old Ningo by a commercial bus, a major means of transportation within the community was commercial motorbikes. My fear of using motorbikes meant we had to wait for a car to move from the traditional council to the central parts of the town, where we could find the house of the wolaatse. It took about three hours

to finally get a car into the central part of town. We had to end our search for the day because we were drenched in red dust from the untarred road, and our appearance was not appropriate for visiting the wolaatse. My translator and I had to visit the “wolaatse” the following day.

On our arrival the next day, we (my translator and I) asked random people right from the entry point of the town which is the town bridge where we can find the wolaatse. A good Samaritan led us to his house and granted us our first interview after welcoming us.

3.6 Data Management Plan

Before heading to the field, I drafted a comprehensive research proposal and data management plan. The proposal stated a workable strategy for the entire period considering the appropriate methods and designs suitable. Though some changes can occur in the main study, the proposal guides the study process (Crang & Cook, 2007). A data management plan is a set-up that outlines how data should be handled, retrieved and archived. It considers how data should be protected in the field, during the study and the ethical relations associated with data. It facilitates the entry, organization, retrieval, coding, and mapping of input data and archiving it (Hay & Cope, 2021). To safeguard data for this study, I prepared a data management plan that was verified by the Norwegian Center for Research Data (NSD). NSD ensures data about people and societies are collected, retrieved, stored and shared when necessary and legally. The data management plan included the methodology, methods for data collection, number of participants in the study, how to protect the data gathered, transcription and the rights of participants.

Methods	Data Gathered	Analysis	Data Protection
Semi-structured interviews	Audio transcribed into text.	Constructionism Theory and Kollmus & Agyeman’s behaviour model	Password protected documents saved on a personal computer and backed up on the institutional drive.
Focus Group Discussion	Audio transcribed into text.	Constructionism Theory and Kollmus & Agyeman’s behaviour model	Password protected documents saved on a personal computer

			and backed up on the institutional drive.
Participant Observation	Texts and Visual images.	Constructionism Theory and Kollmus & Agyeman's behaviour model	Password protected documents saved on a personal computer and backed up on the institutional drive.

Table 2 Data Management Plan

Other sections of the data management plan require that I state which personal data of the participants will be processed, whether their names, date of birth or national I.Ds. I submitted a document describing this study and its purpose in the plan. The proposal and interview guide for this study were the documents used. The data management plan that was assessed by the NSD included how I planned on processing the personal data of participants and ways of ensuring their information security. This included the start and end dates of data processing and what will happen to their data after the research. To state some ethical considerations in the plan, I documented what ways I could use to seek the consent of participants. NSD has a drafted consent form recommended by the centre to follow. Since some participants I met on the field cannot read, I sought their consent orally and documented their responses.

3.7 Analysis

In simple terms, Hay and Cope (2021) explain analysis as making sense of data while recognizing that it cannot be separated from the research process because a researcher's job is one of synthesis and translation. Researchers engage with the world and evaluate the data gathered to re-present the facts, ideas and events that were shared coherently. Since data gathering can produce so much data, Cope (2021, p. 356) advises that data be reduced into manageable chunks to help identify themes for rigorous interpretation. In evaluating, organizing, and making sense of data for presentation, either digital or manual functions are helpful. In this study, I used a manual approach for my data analysis. The data gathered on the field was recorded. The audio recordings were transcribed into a Word document and replayed severally to rectify any anomaly and ensure the correct data has been captured in the transcripts. I then incorporated memos in the transcripts. The

transcripts were proofread while I played the audio recording to verify the appropriate data had been transcribed and associated with the right participant.

Coding the transcripts was my next step. This was to allow me to handle a large amount of data by identifying the main themes relevant to the study. It helped to reduce the data at hand to work with those identified as the most relevant to the study. It helped to also organize the identified themes. Initial codes identified were descriptive codes as they were easy to identify on the surface and some were directly mentioned by research participants. While coding, analytic codes were also developed because some concepts are important to the study, and I had to explore how they function in the context of the marine plastic pollution in Old Ningo.

To further interpret my data and identified themes for presentation, I employ the textual analysis approach. Hawkins (2017) explains textual analysis as a methodology that involves understanding language, symbols, and/or pictures present in texts to gain information regarding how people make sense of and communicate life and life experiences. She further states that messages, (which I translate as data), can often be understood as influenced or reflective of larger social structures. As the data gathered is processed into transcripts, I employ a textual analysis approach to understand the cultural and social mechanisms that maintain or rupture the rules of validity embedded in the coastal issues of Old Ningo in relation to ocean plastic pollution. This will help understand the socio-cultural context that informs their choices and life experiences.

3.8 Ethical Considerations and Reflexivity

This section discusses the moral considerations that guide my conduct as a researcher and my obligations to those involved in the research as explained by (Hay & Cope, 2021). It considers my positionality, power relations, reflexivity and ways that ensure the confidentiality of participants connected to the study. Crenshaw, 1991 in Hay and Cope (2021) posit that people's identity in connection to their gender, education, class, age- group and others, affects how they experience and exercise power. This intersectional nature of identities I associate with can provide insight into the study from the data collection process to the interpretive framework of the experience.

Based on the recommendation of Crang and Cook (2007), I recognized and documented my situated subjectivity in the data collection experience as it was a resource for deeper understanding. I documented my social, locational and ideological placement relative to the

research and the participants of the study. Between being an “insider” and an “outsider”, I thought I fitted into both labels. I saw myself as an insider because I grew up in a coastal community near Ningo that shares many socio-cultural practices in common. The community, Kpone, is a Tema suburb, about 27km away from Old Ningo. Kpone is a coastal community that shares the same language and cultural festival with Ningo but has a slight difference in dialects. I also considered myself an outsider because, before the data collection on the field, I did not know anyone in Old Ningo.

My first contact at their traditional council disclosed to me that my inability to fluently communicate in their dialect could affect their willingness to participate in the purpose of my visit. For effective communication, I secured an interpreter for the whole period of data collection and that clearly labelled me as an outsider. The intersectionality between being an insider and an outsider continued throughout my stay in the community. After explaining why my study area is Old Ningo, some stakeholders applauded me for deciding to do this study “at home” and not elsewhere. To me, this statement meant I was considered a part of the community.

Some participants were reluctant to interact with me because they assumed I may be a journalist. I had to show them my student ID and explain the purpose of my study/visit. When they realized I was a student, some assumed I had the solution to the problem. I explained that I did not know it all and that I came to learn from them so we can find a solution that will last together. All participants of the study acknowledged that plastic pollution is a problem for the community. A participant said, this study must produce tangible results for the community and not simply be on paper. My position on this is to ensure rigour in this study so it serves as a good basis for progressive research in BC5 and other related projects.

3.8.1 Power Relations

Power in this study does not necessarily mean acting oppressively against others but rather, that individuals’ actions can be the effect of power. Power makes things possible and can also restrict possible actions or attitudes in research (Hay & Cope, 2021). In this study, many power relations are at play. As a researcher, I was suspended between powered groups while on the field. I met with a group of traditional rulers of the area who inquired about my purpose in Ningo. In their capacities as traditional authorities of the area, they could inhibit the entire study. I presented my approved proposal for the study to them and emphasized its significance. A member among

the rulers saw my interest in the study site as an opportunity to show the relevance of the community if a local initiative is developed to manage ocean plastic pollution. In this interaction, power dynamics shifted between me, the researcher and the rulers which reveal the axes of difference. During the focus group discussion, some participants were cautious in their choice of words, so they don't offend other participants in the group. I explained to the team that everyone's opinion is relevant. Another angle of this nexus is the power relation between my research institute and me, the researcher. The institution had requirements that must be considered, these included the study duration, funds for the study and an acceptable way of treating the personal data of the participant. This influenced the study in all stages. In this study, I identified power relations between the researcher and participants, among participants and researcher and the study institution.

Chapter Summary

In sum, this chapter addressed the methodology used in this study enlisting interviews, focus group discussions and participant observation as the methods. It documents the data management plan used in this study with its ethical considerations. The ethics section captures the researcher's positionality and reflexivity, power relations and confidentiality of participants. It states the limitations of the study and the significance of this study. In the following chapter, I will present the results obtained from the data collection.

CHAPTER FOUR

4. Results and Findings

4. 1 Introduction

I present my findings from the data collected through interviews, focus group discussions and participant observation. I gathered my data in order of the research questions in chapter 3, and the presentation of my findings will follow the same order. The rationale is to establish a connection between the findings and how they answer the research questions of this study. Starting from the knowledge people have about marine plastic pollution in the community, I move to practices in the community that foster marine plastic pollution and submit my results on sustainable practices that can reduce marine plastic pollution while identifying agents and agencies that can be potential stewards of the coastal environment of Old Ningo.

I conducted a total of seventeen (17) interviews during the period of the field work. The interviews were conducted in cohorts (group of participants who belong to the same actor groups), example a group of fishermen. I therefore provided a unique identification for each cohort and unique identification for each subject within that given cohort. In total, the interviews were conducted within ten (10) cohorts with a total of seventeen (17) participants. The participants included one (1) chief, seven (7) fishermen, three (3) residents, three (3) fish mongers, one (1) representative from the hospitality industry, one (1) representative from the local government and one (1) representative from the Salt mining limited at Old Ningo.

Table 3: Summary of interviews

Cohort ID	Subject ID	Gender	Category	Reason for Inclusion as a Research Subject
C1	C1-1	M	Chief	To investigate the causes and effects of ocean plastic pollution, and sustainable intervention measures by the traditional authorities
F1	F1-1	M	Fishermen	To investigate the sources and effects of ocean plastic pollution from and suggestions for dealing with them from the fishermen perspective.
	F1-2	M		
F2	F2-1	M	Fishermen	To investigate how the fishermen understand the term “ocean plastic pollution”, causes and effects of ocean plastic pollution, with suggestions to deal with them.
	F2-2	M		
	F2-3	M		
	F2-4	M		
M1	M1-1	F	Fish mongers	To investigate how fish traders understand ocean plastic pollution, its causes and effects and suggestions of how to deal with the situation.
	M1-2	F		
	M1-3	F		
F3	F3-1	M	Fisherman	To investigate the habits of fishermen in contributing to ocean plastic pollution and how it affects the fishing industry
H1	H1-1	F	Hospitality	To investigate the sources of ocean plastic pollution and effects on the hospitality industry
SM1	SM1-1	M	Representative from Salt Mining Ltd	To investigate how salt mining in the area contributes to ocean plastic pollution and how the ocean plastic pollution affects salt mining.
R1	R1 -1	M	Residents	To investigate the sources of ocean plastic pollution, its effects on residents and suggestions on how to deal with them.
R2	R2-1	F	Residents	To investigate the sources of ocean plastic pollution, its effects on residents and suggestions on how to deal with them.
	R2-2	F	Residents	

G1	G1-1	M	Local government representative	To investigate the sources of ocean plastic pollution and interventions made by the local government to handle them.
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During the field work, I organized one focus group session. The participants of the focus group discussions were residents, fishermen, hospitality industry representation, opinion leader and one other members in the district who did not live along the coastal borders. The purpose of the focus group discussion was to get varied opinions on the issues concerning ocean plastic pollution and brainstorm on possible solutions.

4.2 Observations at Old Ningo

Old Ningo welcomes all who visit the community with the beautiful sight of a fleet of colourful canoes on the right side of the bridge and the Djange lagoon has a notable mangrove area around it. In my first meeting with the traditional rulers of the community, I observed that one ruler was concerned about the reputation my research will give to the community if I am allowed to access the sea and its environs in their state. This ruler suggested that a clean-up exercise should be conducted first before I am permitted to go there. He explained further that this was to protect the prestige of the community and not discredit it. Other traditional rulers shook their heads in disagreement.



Figure 3: Picture of Old Ningo beach

4.2.1 Chieftaincy Institution

Before I visited Old Ningo for this fieldwork, I envisioned Ghana’s traditional leadership system, particularly the chieftaincy institution as one that played a ceremonial function with little effect on the lives of people in their communities. This positionality was based on my experience from growing up in Ghana. Almost all the participants of this study hinted that the traditional rulers of Old Ningo are significant players in environmental protection. Participants contacted from different points in the community showed more trust in the Chieftaincy institution than other institutions to my surprise. Almost all participants I contacted inquired whether I had met the Chief in this area before contacting them. This drew my attention to how important chieftaincy is to the people. One interesting observation I made was the contrast in the faith community members had for traditional rulers and the response of the contact person representing this institution. While the people felt a lot can change with the intervention of the “wolaatse” (traditional authority in charge of the sea), he, on the other hand, felt, he can do little about the situation alone. He agreed that plastic pollution in the sea and its environs are a challenge, and that any local intervention will need funds but cannot provide this fund alone, especially for the long term. There was no existing

structure to combat plastic pollution however, the wolaatse foresees possible collaboration with other local actors that can establish such a structure.

4.2.2 Access to Water

Old Ningo has access to tap water though not all houses have connected taps. The community has two dams that are used for domestic purposes like washing. The dams do not serve drinking purposes. Homes that do not have taps buy water from nearby houses that have pipes. However, it is common to notice that sachet water and bottled water are often sold to people. Tap water is often used for cooking and washing at home, though some use tap water, others prefer to drink sachet water at home. The water from the tap looks clear and clean. To the human eye, it doesn't look harmful for consumption. The packaged water often comes in plastic sachets and bottles. How they are disposed of and where they end up is something to be considered.

4.2.3 Sanitation

Though I walked across the length of the coastal community, I did not see any container designated to collect public waste. The only dustbin I saw during the fieldwork was at a hotel on the beach. While on the field, a vendor asked that I throw an empty plastic sachet to the ground after I drank water from it as there were other empty sachets there and she would sweep soon. From a glance, the community is not buried in filth, but you see traces of litter once you take a few steps. Heaps of rubbish can, however, be seen intermittently along the beach when pacing there. During a visit to interview a resident by the beach, I observed a child collecting rubbish from a place after someone had swept and walked away. The child returned after some time to inform the person who swept that the rubbish had been disposed of on the beach. While interacting with people at the beach on regular fishing days, I saw vendors who sold several items. Many of these items were either packaged in plastic or served in plastic. Sometimes, people bought from these vendors and disposed of the wraps the items came in on the beach a few minutes after the purchase. On one occasion, I saw human excreta along the beach. To better understand some of these observations, I transformed many of them into questions for my interviews in this study.

4.2.4 Road Network

The main road that leads to Old Ningo from New Ningo is tarred with a few potholes along the stretch. This road network can be traced from Prampram to New Ningo and Old Ningo. Within Old Ningo, the road network leads to different parts of the community. I observed that the streets in the central parts of the community were tarred and others that connected to it gradually faded into untarred stretches. I also observed that, within the area that was tarred, it was easy to get public transport using a vehicle. It was difficult to access a vehicle for public transport once you reach the untarred areas. The most available means of transport in such areas are motorbikes, all these road networks connect people to various parts of the community. From the main lorry station to the Traditional Council is about 54km and about 25km into the journey is tarred.

4.2.5. Education

There are two Senior High Schools in Old Ningo, a public and a private, respectively. About eight primary schools operate in the community. When the data collection exercise happened close to any school, I observed a good number of children in school. An interviewee mentioned that children of school-going age are encouraged to go to school because it prepares them for better opportunities in the future. Though some older interviewees had little or no education, they embraced the thought that children must be in school. I saw a group of children who did not go to school on one of my data-collection days and I asked why, one answered that his parent said there was no money for school that day. I observed some children in school uniforms on public transport who attended schools in nearby towns like New Ningo and its environs. The average primary school in Old Ningo admitted students from primary one to six and junior high school. This can be likened from grade one to ten in other parts of the world.

4.2.6. Economic activities

Many participants in this study expressed fishing as the main source of income for members of the community. The division of labour between men and women in the fishing industry of Old Ningo was obvious. While men predominantly went on fishing, the women purchased the fish from them and sold it to the public. Women that bought fish from fishermen in Ningo came in different groups. Some of these women sold the fish in their fresh state, others processed them before taking them to the market. Their methods of processing the fish included frying, smoking or sun-drying

them. While most women specialized in at least one of these areas, a few engaged in all these activities. Their market base extended from Old Ningo to Tema, Ashiaman and Accra.

Farming is done seasonally, a little before the rainy season and a little while after it. I noticed other small-scale businesses like grocery shops, local restaurants, and hair salons. Other men who did not go fishing drove commercial vehicles, taxis and commercial buses.

4.2.7 Salt-Mining

Salt mining is no longer a commercial activity for individuals of Old Ningo. The activity is now undertaken by companies. At the time of my data collection on the field, two main companies mine salt on a commercial scale. These companies employed some indigenes to work in their factories. The companies are located further away from residents and apart from each other. Both companies, however, are close to water bodies. This proximity is to access water that can be pumped from the water bodies into the ponds that hold up the brine for the crystallization of salt to happen. The crystallized salt is manually collected into a heap, which is bagged and transported to the factory. At the factory, the salt is iodized and packaged for the market.



Figure 4 Salt Mining Site.

4.3 Examining the local's understanding of ocean plastic pollution.

This section covers that the participants possessed a level of knowledge and understanding regarding the issue of ocean plastic pollution at Old Ningo, based on their engagement in fishing, cultural practices and daily activities. It appears that the regular interaction with the ocean contributed to understanding of how plastic pollution is affecting their daily lives and how important the ocean is as a resource to society. This understanding of the participants on plastic pollution, their knowledge on government policies and the importance of the ocean to society is detailed here, with which actor groups provided data on the specific issues.

During the interviews, most of the participants stated that ocean plastic pollution over the years has significantly increased in the area, especially along the coastal lines. Participants expressed concerns of how ocean plastic pollution has affected fishing practices in the community. In the discussion with a traditional leader in the community, he stated that this has become a major

challenge for the fisher folk who sometimes catch large amounts of plastics when they go to sea and have even caused some of the fishes to die because they feed on these plastics.

Plastics destroy our sea. Sometimes when we go to the fishing and throw the nets, plastics are the only things we catch, not because there are no fish in the sea. Some of these fishes include “richichie” and “bossu” are killed by these plastics ... Plastic waste is a challenge for all fishermen, fisherfolk and everyone in the community. – Participant C1-1.

Referring to the extent to which plastics disturb fishing activities, a fishmonger also agreed to the assertion by the traditional ruler stated above. She emphasized that plastics was a major challenge especially during harvest. She shared:

We see plastic pollution as our major challenge now. Plastics have polluted the coastal environment so much that we must separate all the plastics from shrimps and lobsters when harvested. (Participant M1-1)

The responses from the local participants suggest that they have an evidential understanding of plastic pollution and how it has affected their fishing activities. However, a representative who works with the salt mining company in the area claimed that plastic pollution was not a major challenge for their salt production, even though the extraction phase of the production is adversely affected. He said that:

In salt mining we use sea water and solar. We start by pumping the sea into the earth ponds to get evaporated... Plastic pollution in the sea is not a major problem for salt production but it affects us sometimes when plastics get stuck in the pumps while pumping sea water into the ponds. (Participant S1-1)

The above responses from the various users of the ocean in the area recognize plastic pollution as a major challenge in the community. This is because they see the ocean as a beneficial resource to the society.

When participants were asked on the importance of the ocean to the community, they expressed their views on the economic, cultural and recreational benefits they obtained from the ocean. During an interview with a fisherman, he stated that the ocean was valuable to the community because that was where they gained their income.

There is no other business at all, aside from fishing. We value the sea so much as a community because we get our income from the sea. (Participant F1-1).

In agreement with F1-1, another fisherman in the community stated that the ocean was economically beneficial to the society, and even added how important it was to their culture.

The most important benefit of the ocean to us is its economic benefit. The water from the sea also provides a base for salt production. The sea has cultural relevance as it is needed in times of festivals. – Participant F2-2

As a typical traditional coastal community in Ghana, the ocean serves as the shrine for their marine gods. During the periods of festivals, they pour libations to their marine gods at the shores of the ocean. Aside from the traditional religious affiliations, the Ningo community are particularly affectionate towards the sea because they derive their identity from it. In addition to the cultural and economic benefit of the ocean to the Ningo community, another fisherman stated that it served their recreational needs. He shared during the interview.

“The sea serves our recreational needs, I come to relax/swim at the beach every Sunday” (Participant F2-3)

To support this statement, there is a hotel established by the ocean to serve the recreational needs of the society and foreigners. During discussions with the hotel representative, she stated that some customers specifically come to lodge at the hotel and hold social events there.

“Some customers like to have a view of the sea and unwind” (Participant H1-1).

In summary, it was observed that the participants possessed a level of knowledge and understanding regarding the issue of ocean plastic pollution at Old Ningo, based on their engagement in fishing, cultural practices and daily activities. It appears that the regular interaction with the ocean contributed to understanding how plastic pollution is affecting their daily lives and how important the ocean is as a resource to society.

4.4 Causes and Effects of Ocean Plastic pollution.

This section covers the perspectives of the respondents on the main causes and effects of pollution on their livelihoods. Plastic pollution in Old Ningo is one that the people themselves acknowledge as a challenge and refer to different causes when asked directly for their views on the main causes of the pollution. Generally, it covered thematic areas such as population increase, unsustainable prevention measures, poor implementation of policies and regulation, poor waste management infrastructure, bad attitudes of residents towards the environment, and the plastics carried by ocean currents.

4.4.1 Plastics carried by ocean currents.

During the interviews, some participants stated that they were not aware of how the plastics ended up on the shore of Old Ningo. However, they believed that the plastics were carried from other locations to Old Ningo through the ocean currents. In an interview with the traditional leader of the sea, he claimed that the plastic pollution came from the bigger cities along the coast. He shared the following.

“When waste is dumped in the sea at Tema, for instance, the sea can carry it here. When refuse is dumped in the sea at Accra too, it can come here.” (Participant C1-1)

In support of the belief by the traditional leader, a fishmonger (participant M1-1) also alleged that the plastics were transported from coastal cities such as Accra, Tema, Nungua and even outside Ghana.

According to Participant F2-1, ocean plastic waste is especially difficult to manage because it comes from other parts of the sea into their shores. While the local users were certain that some of the plastics ended up on their shores from other coastal cities through the ocean currents, a local

government representative was not certain of how the plastics entered their communities. He claimed that the community themselves did not contribute to the plastic waste in the ocean. However, he agreed that it may have been transported by the ocean from neighbouring cities.

I do not know how the plastics end up at our beach. I don't know where the plastics come from. Normally we don't do it here. When plastics enter the sea from other communities, be it New Ningo or elsewhere, the waves can carry them here.
(Participant G1-1)

These responses suggest that the participants attribute the ocean plastic pollution in Old Ningo to the waste that is generated from neighboring coastal communities and carried by the ocean currents to their shores.

4.4.2 Poor implementation of regulation and policies

Not only did the participant attribute ocean plastic waste in Old Ningo to the transportation by ocean currents, but some also suggested that the poor implementation of policies at the local level contributed to the menace of ocean plastic pollution.

During the interviews, a fisherman stated that the community ocean activities were regulation by traditional structures. They used systems such as taboos and superstitions to conserve and manage improper waste disposal into the ocean.

There were traditional rules (superstition and taboos) for conserving the sea, it was upheld in the past but not now... No proper rules are made to govern the sea these days because the existing rules are not followed – Participant F1-1

According to him, in the past there was a system that was used to punish perpetrators of these traditional rules. Due to that, ocean pollution was not a major issue in the community. However, he further explained that these traditional rules are not adhered to in recent times.

A local resident hinted at the existence of a government policy to ensure proper waste disposal in the community. He revealed during the interview that there used to be coastal guards to enforce this policy.

There was a time when people that dumped rubbish near the sea were arrested, the sanitation around the coastal environment was better but since those guards left, things have gone worse (Participant R2-1).

He noted however that this government policy was ineffective in recent times and has consequently resulted to an increase in ocean pollution in the community. The local government who they believe are supposed to implement government policies at the community level is not effective, and some participants have expressed their mistrust in the local representative. Due to the culture of the community, the local representative hinted that it was difficult for residents who dump wastes in the ocean to be arrested. He retorted that;

There was another occasion when I brought the police here, but the police couldn't arrest anyone there because of the culture. You can't arrest people here because of the culture and you cannot just break in. It is possible to implement some things but due to other complex reasons, we need to manage the situation, so we move (Participant G1-1)

The responses from the participants revealed that ocean plastic pollution has increased due to inefficient implementation of government policies and traditional systems in the community.

4.4.3 Poor waste management infrastructure

The general assertion from the participants was that they do not have any waste disposal facility in the community and due to that the residents of the community disposed of their waste into the ocean. It was reported by a participant during the focus group discussion that there used to be waste bins at the shores, but they were removed due to the construction of sea defenses along the shores.

Then, there was also a public bin that helped to properly dispose of refuse which included plastics. Since the erosion of houses led to the construction of the sea defence, the bins have been removed. When women sweep, they throw the rubbish in the sea since there is no bin to throw the waste. (Participant R1-2)

From the participant, the unavailability of bins in the community has resulted in improper waste disposal into the ocean. According to participant R1-1, the only public waste bins in the community are located far from the residents. He explained that this makes it very challenging for residents to properly dispose off their wastes.

There has not been a huge bin around this coastal environment for as long as I've been here. There was once a bin like that on the bridge when you enter the township and another at the cemetery. The one at the bridge is no longer there. ... There is a public place of convenience, but their public waste bins are only found in the cemetery now and are far from residents... As we speak, the place designated to be a refuse dump is far and children get late if they are to dispose of waste before they go to school. (Participant R1-1)

In agreement with the statement of participant R1-1, the local government representative also revealed that there were no dumpsters to collect the waste of residents, which he stated would be helpful to their course of eradicating ocean plastic pollution.

Having huge public bins on our beach can help us, but for now, we don't have such bins here and I don't know what to do to get them. If you can help me, get the containers, I do not have a problem with that. The only channel I can use to help is the assembly and some individuals. – Participant G1-1

4.4.4 Population growth and poor environmental behavior

Apart from the above-mentioned causes of ocean plastic pollution in the area, some of the research participants also attributed the ocean plastic pollution to the increase in population and bad attitude of the residents to the environment. A participant reported that the population in Old Ningo has increased over the years, and this has correspondingly increased the ocean plastic pollution in the community.

... I think the current situation is a result of the population. Before now, the population was not like this and so was the plastic pollution (Participant F1-1).

This participant believes that as population has increased, the use of plastic products has also increased. The increase in plastic products was explained by another participant to be caused by the handling of plastic food packages of the residents.

“Some fishermen add to the pollution through their handling of plastic products after eating...” (Participant F1-2)

As I observed during the field work, most food vendors on the beach packaged their products in plastic bags and bottles and after use disposed them at the beach. Another participant also agreed that the residents of the community contributed to the ocean pollution by improper disposal of plastic food packages, contrary to the local government representative who claimed that the community members were not responsible for the ocean pollution.

The plastics we see here come from us, the packages of the food we eat and there are others from elsewhere. There are days when the sea brings lots of plastics so much that it becomes difficult to bring the canoes to shore when we return from fishing. (Participant F3-1)

Buttressing these observations and responses from the participants, Participant F2-2 asserted that the increase in ocean plastic pollution resulted from the increase in the production of plastic bags.

The more plastic bags are produced; plastic pollution will continue. (F2-2)

The poor handling of the food plastic packages was not the only concern as the population increased, but their attitude towards the environment was bad. The hospitality industry representative interviewed vehemently voiced her opinion that the residents were unconcerned about the ocean plastic pollution and insulted anyone who tried to draw their attention to their bad attitude. She retorted that the traditional authorities had been informed about the situation but there

has been no corresponding effort from them to handle the mess, whereas the residents thought the ocean was not part of their residence to be bothered about. She shared that,

We went to the chief to inform him about the condition of the place but over a period, nothing has been done about it. My boss also complains about some actions of the residents. He does not have an option because when he mentions it to those around, they argue his property does not extend to the sea. Some residents dump rubbish there and others defecate there... I think they seem unconcerned because they think this is not their house, so they do not care (Participant H1-1).

The local government also added to this assertion by the representative of the hospitality industry by citing instances where the residents dispose off their wastes (plastics included) into the ocean during hours the coastal guards are off duty. The residents, although they had been informed of the dangers of their actions to the community, still had deviants who cheated the regulatory system by the local assemblies.

We try to inform members of the community not to dump refuse anywhere else aside from that pit. Some deviants fail to comply. Sometimes I give money to some boys in the neighbourhood to watch out for those who will defy this order and other times, I go there myself at dawn, those that defy the order usually do so at odd hours (Participant G1-1).

The responses from the representatives of the hospitality and local government echoed the attitude of the residents to the environment. Some residents were unconcerned about the poor waste disposal whereas some were also ready to flout orders and regulations targeted at dealing with plastic pollution. Not only were some residents unconcerned, but the concerned ones were insulted and as a result have grown silent over the years on such issues. Participant R2-2 shared that insults were rained on the concerned residents when attention is being drawn to the actions of the deviants.

Some people leave their homes within the town to dump refuse here, if you complain they will verbally abuse you... Recently, someone was dumping refuse

at the shore and my sibling questioned this action. The person in the act insulted her (Participant R2-2).

This poor attitude of the environment coupled with an increasing population and poor implementation of policies and regulations has led to an increase in ocean plastic pollution in the community. The participant R2-1 upon reflection of the causes of the ocean plastic pollution in the communities provided a response that sums up this observation. She said that,

A pit was dug close to the cemetery to be used as a refuse dump, but some people do not use it. Sometimes, I blame our people for our sanitation problems. (R2-2)

This “mind your own business” and deviance attitude was noted from the responses from the participants as a cause of the ocean plastic pollution in the community.

4.4.5 Unsustainable interventions

There have been some interventions to deal with the problem of ocean plastic pollution at Old Ningo. These interventions have been from the government through the local assembly, fish mongers and individuals who have volunteered to clean the shores. These interventions, having the right intentions as the participant shared, have been short of nothing but for a period.

Two fishermen belonging to cohort F1 explained that there were janitors employed by the government to clean the shores, but they do that occasionally. They further added that the fish traders along the shores do clean their waste closer to the spots of business and the regular clean-up exercises by the boat owner have been inactive for a while.

Quite recently, the government brought janitors to help tidy up the shore. The janitors, however, are unable to clean continuously. They come occasionally. Aside from these janitors sent by the government, barely anyone from the community helps clean the coast (Participant F1-1).

The women who buy fish from the fishermen clean their spots for business daily, but they take care of only their spaces for business. Owners of the boats and canoes

used to organize regular clean up, but it has been a while since they last organized a clean-up along the beach (Participant F1-2).

Apart from the interventions from the government, boat owners' association and the fish traders, another fisherman shared that some individuals have also been helping clean the shores. He mentioned that these individuals can clean the shores occasionally, and as I observed this individual's clean-up will not be enough to deal with the ocean plastic waste.

“There is a native man who comes to gather plastic waste occasionally, digs a pit and buries the collected plastic waste.” (Participant F2-1).

These responses from the participants revealed that the community have some ocean plastic pollution interventions, but they exist on smaller scales and some are not entirely sustainable. For example, if there are no skips or community dumpsters, where will the collected waste be sent after people in the community have swept.

4.5 Sustainable Interventions

As part of the research objectives to solicit ideas from the local people on some of the sustainable practices that can reduce plastic pollution in the community, the participants recommended sustainable implementation of regulation and policies, waste management infrastructures and biodegradable products for commercial activities.

4.5.1 Sustainable implementation of regulation and policies

During the interview with the traditional leader of the sea, he suggested that the best possible solution to the ocean plastic pollution would require government intervention. He opined that the government should designate a site for proper plastic waste disposal.

“What the government can do is allocate a big portion of land that will serve as a landfill site in the community. When that is done, the habit of dumping refuse into the sea will stop.” (Participant C1-1)

The local government representative hinted at collaborative efforts of government institutions in dealing with the pollution.

Sometimes the Environmental Protection Agency assists in communal labour. There is an environmental office that can help with environmental issues and maybe get the public bins (Participant G1-1).

The environmental protection agency serves as a governmental agency that regulates the environmental policies and programs with the aim of preventing and mitigating pollution and activities in Ghana. According to participant G1-1, their collaboration with the local government in forming strategies specific to the community needs will be important to achieve sustainable waste disposal.

Whilst the above participants reflected on the interventions by the government, participant H1-1 was of the view that the traditional authorities should implement policies that punish those that dispose of plastic improperly in the community. She shared:

Some initiatives to control the situation will be announced through the information centre, sanction those that flout the rules, employ people to watch the place and spread the word. Some people will fear such consequences, and it may be better (Participant H1-1).

This proves that even though government initiatives are necessary for eradicating the plastic pollution in Old Ningo, some of the residents still believe in the authority of the traditional system to implement local policies and strategies that will ensure a sustainable waste disposal in the community.

Some participants further hinted that some new policies and regulations would have to be considered. They were of the view that volunteers should be appointed as coastal guards, and their responsibility should be to protect the sea and bring offenders to the chief of the sea to be punished. This they believed can help reduce ocean plastic pollution. These were some of the thoughts of the participants:

Individuals among the fisherfolks can be appointed to ensure plastic waste is disposed waste properly. This will work to ensure that rules made to protect the sea

are followed, and the offenders are taken to the “wolaatse” to be sanctioned (Participant F2-2)

A way to prevent the shore from being littered again after it is cleaned is to find people to watch the place. If this initiative is implemented, offenders can be sent to the traditional authority to be fined. This can be a deterrent for other potential offenders (Participant R2-2).

Some other participants added that the volunteers should be paid to motivate them to work efficiently. If the volunteers are paid, some participants reasoned, they are to be put under supervisors so that they work effectively and laid off if they are not. The participants in the focus group discussions suggested that a salary range from four hundred (400) to six hundred (600) Ghana cedis would be enough.

To reduce the issue of plastic waste at the beach, someone must be employed to watch over the beach for a salary. This will be the job of the person, without a salary or payment as an incentive, it will be difficult to get a volunteer to do this. (Participant R2-1).

To make this initiative sustainable, the volunteers to watch the sea must be taken care of. Are we going to ask owners of canoes to contribute some amount of money that will be used as allowance for these volunteers? (Participant F2-3).

“... we can form a committee to guard the sea and ensure no one dumps refuse at the beach. There must be some monetary incentive for the members of this committee... I suggest 600 cedis as the salary to be given to those that guard the sea... I suggest 400 cedis as salary for those that guard the sea” (Participants R1-R2)

The responses from the participant provided clues that with government intervention through policies, strengthening of traditional systems of ocean management and recruiting and

providing incentives for the beach guard volunteers can help reduce ocean plastic pollution at Old Ningo.

4.5.2 Waste management infrastructures

Besides ensuring the effective implementation of policies and regulations, the participants added that the community needed the basic infrastructure to manage plastic waste. To begin with, the participants claimed that if they put big refuse bins in the community, the pollution of the ocean would drastically reduce. Not only should the bins be provided, but it should be made accessible to the residents, and they should not have to travel long distances to access them. They shared the following thoughts during the interview.

“Plastic pollution is a problem for us, when we get huge bins, it can be helpful”
(Participant R2-2)

“Having huge public bins on our beach can help us, but for now, we don’t have such bins here and I don’t know where to get them ... There is an environmental office that can help with the environmental issues a maybe get the public bins.”
(Participant G1-1)

“... if dustbins will be provided along the shore, all litter will be put in them and carried away for proper disposal” (Participant F1-1)

“If the government can provide the community with public bins along the beaches... Provide us with public bins so plastic waste can be disposed into them.”
(Participant FG)

The participants were quick to add that the provision of the bins would not necessarily yield a reduction in ocean plastic pollution. However, additional efforts to regularly empty the bins and use the information centers in the community to inform the residents to use the bins to dispose of their waste would be needed. The concern of irregular emptying of the bins was echoed by a participant in the focus group discussions who shared:

“One cannot be sure if public bins will be emptied regularly”.

Howbeit the concerns of irregular pick up of plastic bins, the participants R1-1 were of the view that the bins need to be emptied in two-weeks interval to ensure that the ocean is clean.

“If the public bins will be provided that will be emptied in two weeks intervals, it will be helpful”.

A participant in the focus group discussion shared that there were three information centers in the community and if all are used to make announcements and reminders for the residents to use the bins, it can create environmental awareness and change the attitude of the residents towards ocean plastic pollution.

“Another action to consider is for the information centers to announce to the community to use the public bins provided. There are three information centers in the town so when the announcement is made at all the three centers, almost everyone in the community will hear us” (Participant FG)

In addition to the provision of public bins and the efforts to regularly empty them, participant C1-1 mentioned that the community needed a big landfill site to dispose of their waste. This landfill site he proposed should be provided by the government, and he argued that if that is provided, the people’s habit of dumping refuse in the ocean will change. He shared:

What the government can do is to allocate a big portion of land that will serve as a landfill site in the community. When this is done, the habit of dumping refuse into the sea will stop.

The landfill will serve as a dumping ground for the wastes that are collected in the big public bins and the bins along the shores.

4.5.3 Biodegradable products

Some participants suggested that alternative products for plastics should be used by the food vendors in the community. A participant of the focus group discussion shared plastics should be replaced with paper bags and clay trays. The paper bags and clay trays are biodegradable products, and they will decay after a while even if they are improperly disposed. This, they suggested as not to be an excuse to carry on with their bad attitude toward the environment, but rather to help reduce the number of plastics produced and used in the community.

“I agree with the suggestion that plastics should be replaced by paper bags, glasses and clay trays. The plastics are good, except they make the community dirty”
(Participant FG)

A fisherman revealed that paper bags were used in the past for commercial activities and they should be brought back into the system. He argued that the use of paper plastics drastically reduced the ocean plastic pollution when he was a youth since they decayed from the earth after a while. He shared that:

“When I was younger, paper bags were used for all commercial activities. I recommend that paper bags and wrappers are reintroduced because they are degradable.” (Participant F2-2)

The responses of the participants emphasized the need for alternative food packaging in the community to be explored. Specifically, paper products and clay trays could be explored.

4.6 Agents of Sustainable changes

As part of the objectives of this study, we also investigated the agents in the community that could be stewards of change or agents of sustainable changes in the Old Ningo community. The responses from the respondents revealed five agents and agencies of change in the community. These are: (i) the government, (ii) traditional council, (iii) boat owners’ association, (iv) residents, (v) beach committee and (vi) the information centers. In this section, we discuss how the participants ascertain the various agents or agencies could be agents of change.

4.6.1 Traditional council

The participants expressed high regard for their traditional system. The participants shared that every action on the ocean needed to go through the chief of the ocean (called “wolaatse” in the local dialect), who is also known as the chief fisherman. The chief fisherman the participants shared is the representative of the traditional council in charge of the ocean. A participant in the focus group discussion stated that the chief fisherman takes note of the grievances of the residents concerning the sea and addresses them on behalf of the traditional council in the community. The participant shared:

“The beach committee of Old Ningo have met with the chief fisherman on this issue among others. We were informed our concerns have been taken to the traditional council, however, they will attend to it after the sea defence project has been completed” (Participant FG).

This assertion was also reiterated by the hotel industry representation (H1-1). She mentioned that they had been to the chief to discuss the ocean pollution issues with him, but they had not yet received positive feedback. She said:

We went to the chief to inform him about the condition of the place but over a period, nothing has been done about it.

Not only was he a liaison between the people and the traditional council, but no policy on the ocean can be implemented without his consent. A participant of the focus group discussion and a fisherman I interviewed shared that the chief fisherman should be involved in the implementation of every initiative on the ocean and that all actions on the sea must go through him. They explained that:

Every initiative that can be implemented will work effectively if it goes through the chief fisherman. (Participant FG)

“All actions around the sea must go through the chief and the “wolaats3”” (Participant F1-1)

One participant, in providing sustainable interventions to deal with ocean plastic pollution, mentioned that the chief fisherman could assign people to protect the sea if he is let in on your intention. He stated;

“I suggest you see the chief in charge of the ocean. He can assign someone or people to guard the sea if you tell him your intentions to protect the sea” (Participant R2-1).

From the responses of the participant, the chief fisherman is a major steward for sustainable ocean plastic pollution.

4.6.2 Government

The participants also affirmed their recognition of the government as an active steward of change at Old Ningo. Although a participant claimed that he did not trust their local government representation, the participants acknowledge that the government’s intervention through policy formation and provision of waste management infrastructure. The chief fisherman, who was the custodian of the sea and the frontliner in the implementation of policies on the ocean, shared a sincere concern that the community could do nothing about the ocean plastic pollution, except the government intervenes by the provision of infrastructure. He clearly acknowledged the government as a steward for sustainable change in ocean plastic pollution. He said:

“Plastic waste is a challenge for all fishermen, fisherfolk and everyone. We cannot do anything about it entirely except for the government helps us” (Participant C1-1).

Other participants expressed similar opinions on the government intervening through the provision of initiatives to solve the ocean plastic pollution issues like the provision of bins. They stated that:

In connection with plastic pollution, we need the government to bring out initiative to solve the issue if we submit our concerns (Participant F1-1)

The waste is overtaking some of us living close to the sea. Recently, some representatives of the government came to write our names to bring us bins (Participant R2-1)

To stress on the contribution of the local government, some participants added that the payment of the people who employed to guard the sea should be from the government though the district assembly. That is, the residents were not only looking up to the government to provide waste management infrastructure, but to also provide finances for the implementation of their suggested sustainable intervention. The participant stated:

When people are employed to guard the sea, I think their terms of payment must come from the district assembly, thus, the government as this town is a district capital (Participant FG).

4.6.3 Boat owner's association

The owners of the boats are seen as the wealthy people in the community. Fishermen use their boats to fish, and they receive quota of the money the fishermen make out of their sale of their harvested fishes. Participants F1-2 and F2-3 were of the view that the boat owners were stewards of change since their resources could be used to provide allowances for the volunteers, organize clean-ups and provide refreshments during the clean-up sessions. They explained:

Owners of the boats and canoes used to organize regular clean up, but it has been a while since they last organized a clean-up along the beach...The owners of the canoes can support them with some refreshments. (Participant F1-2)

To make this initiative sustainable, the volunteers to watch the sea must be taken care of, are we going to ask owners of the canoes to contribute some amount of money that will be used as allowance for these volunteers (Participant F2-3).

4.6.4 Residents

The sustainable interventions in the Old Ningo community will need everyone to come on board. The interventions cannot be sustained by the government, traditional authorities and the boat owner' association only. Participant H1-1 passionately mentioned during her interview that the ocean plastic pollution was beyond an individual capacity; it required a united effort for every resident in the community. She shared:

“The situation is beyond one person; it needs a lot of people to come on board”.

Her response revealed the essence of the residents as stewards of the sustainable interventions aimed at reducing ocean plastic pollution. The residents can provide help through suggestions, as the local government representative I interviewed mentioned. He said:

As we try to do our best, some people assist through suggestions (Participant C1-1)

Apart from providing suggestions, the residents act as stewards by collecting plastic waste and volunteering to guard the sea. During the focus group discussions, the participants shared that some of the residents collected empty plastic bottles and sachets and sold them to some companies outside the community. They further added that some residents were ready to volunteer to guard the sea whenever they were called on to assist. They shared that:

“People collect empty sachets of water and water bottles to sell. Those who buy these come from Tema and Ashaiman ... Finding people to guard the sea is not a difficult task, you can get such people right here in this meeting”.

The responses of the participants places emphasis on the residents as an important steward in sustaining interventions geared towards reducing ocean plastic pollution.

4.6.5 Beach committee

In the Old Ningo community, they have a beach committee. This committee is responsible for reporting matters concerning the ocean to traditional authorities and advocating for a healthy ocean in the community. In the focus group discussion, which was aimed at finding sustainable intervention for the ocean plastic pollution, a participant revealed that the beach committee had met with the traditional authority and raised concerns about the plastic pollution around the sea. They were assured by the traditional authorities that their concerns would be addressed once the ongoing sea defence project had been completed. He shared that:

The beach committee of Old Ningo have met the Chief Fisherman on this issue among others. We were informed that our concerns have been taken to the traditional council, however, they will attend to it after the sea defense project has been completed” (Participant FG).

Although none of the other participants interviewed mentioned this committee, the response from the focus group discussion shed light of the advocacy group in the community that raises ocean plastic concerns to the traditional authorities.

4.6.6 Information centers

Aside from the local and the various authorities at play in the community, another agency that can serve as a steward of sustainable interventions is the information centers. Through the focus group discussions, it was revealed that there were three information centers in the community. Together with other participants interviewed, they mentioned that the information centers were used to make announcements and when all the three information centers were used, all the residents in the community could hear the information given.

Another action to consider is for the information centers to announce to the community to use the public bins provided. There are three information centers in the town, so when the announcement is made at all three centers, almost everyone in the community will hear us (Participant FG).

There is an information center that can announce measures to safeguard the sea to the hearing of the entire community... Some initiatives to control the situation will be announced through the information center, sanction those who flout the rules, employ people to watch the place and spread the word (Participant H1-1).

“Several announcements have been made for those involved to desist from such acts, but they failed. The announcements was given by the information centers”
– Participant R2-2

The responses of the participants suggest that the information centers can be used to announce sustainable interventions. Continuous repetition of these announcements can make the residents environmentally conscious and possibly reduce ocean pollution drastically.

Chapter summary

The chapter on findings present an overview of the outcome gained from the fieldwork. It accounts for the various methods used to access participants and the total number of participants involved in the study. It provides a breakdown of what method produced which results with details and the cohorts that participants belonged. With a major communal challenge on poor waste management, traditional authorities, information centers and fishermen committee were identified as agencies for transforming ocean plastic pollution in the community along local government agencies. Possible collaborative efforts among these groups and other individuals in the area were also encouraged. The chapter records some individual interventions against the problem but considers them inadequate or not sustainable and provides recommendations to this effect.

CHAPTER FIVE

5. DISCUSSION AND CONCLUSION

Introduction

This chapter

The focus of this chapter is to ascertain the local perspective of ocean plastic pollution in Old Ningo. To do justice to this, it is important for one to consider their understanding of ocean plastic pollution, its causes and effects and put in perspective their interventions to deal with the situation while acknowledging potential stewards of this change. This chapter discusses the extent to which the ocean plastic pollution has been understood by the residents and the ways they deal with it along with some recommendations.

5.1 Understanding of ocean plastic pollution.

Through this study, the ocean literacy of the residents in Old Ningo was assessed. Ocean plastic pollution has been a topic discussed across the world for the past half century (Carpenter & Smith Jr, 1972). Though most participants of this study had not attained higher levels of education, they understand that ocean plastic pollution is a problem for them. They identified some sources of plastic pollution and the effects the ocean plastic pollution had on them.

Participants of the study also communicated the importance of the ocean to them. They expressed that it provided economic, recreational and cultural benefits to them. In light of their understanding of the benefits, participants also demonstrated a great deal of how their actions, whether positive or negative, affect the ocean. According to (Santoro et al., 2017)'s definition of ocean literacy as having an understanding of the ocean's influence on us and our influence on the ocean, one may conclude that there was a high ocean literacy rate in the Old Ningo community. However, (Cannady et al., 2018) and (María C & Borja, 2016) provided three factors to judge ocean literacy: knowledge, communication and decision making. The community is endowed with some knowledge about the ocean, and almost everyone I approached in the study could engage in a conversation on the ocean and share some sort of knowledge about it. However, a greater part of the knowledge shared was not reflected in their decisions and consequently their behaviour. The

people of Old Ningo therefore must translate their knowledge of the ocean into practices to be labelled as an ocean literate community, according to the factors listed by (Cannady et al., 2018).

There is a strong social system in Old Ningo, with various groups formed to tackle various issues in the community. For example, I was always directed to see the “chief fisherman” once I introduced my purpose for engaging any person or group of people. From the data gathered, the understanding of the people in Old Ningo on the ocean plastic pollution is constructed by their everyday interactions with others in the community and the ocean. Society has established a set of interactions with the ocean through their daily lives over a long period. By this, they are familiar with some characteristics of the sea and can identify patterns that are unusual.

The social constructionism theory posits that knowledge is obtained through interactions with other people in the community. In Old Ningo, there was no formal ocean education for the residents; their understanding of the ocean and its effect on them has been through the meetings organized by various interest groups in the community and the informal education through superstitions. As a result of this active knowledge construction process, the understanding of the ocean plastic pollution by the Old Ningo residents cannot be separated from their social norms and practices, a point well noted in the literature (Woolfolk, 1998).

5.2 Causes and Effects

As noted in literature there are various causes of ocean plastic pollution. In Old Ningo, the sources of ocean plastic pollution are plastics carried by ocean currents, poor waste management infrastructure, population growth with poor environmental behavior, poor implementation of policies and regulations and unsustainable interventions. These causes of ocean plastic pollution will be discussed in Kollmuss and Agyeman’s factors that affect pro-environmental behavior: internal (the attitude of the locals), external (infrastructure, political and socio-cultural factors) and demographic (population growth). This section discusses the causes and effects of the ocean plastic pollution in the Old Ningo community.

5.2.1 Causes of ocean plastic pollution

The Kollmuss and Agyeman pro-environmental behavior model (Kollmuss & Agyeman, 2002) describes the complex nature of people’s attitude towards the environment. According to (Kollmuss & Agyeman, 2002), a person’s knowledge, values and habits can affect his or her

behavior towards the environment. The people of Old Ningo, as discussed in our findings in Chapter four, have some understanding of the surrounding environment, but have a poor attitude towards the environment. This attitude ranges from acting indifferent towards the deteriorating state of the environment to raining insults on the concerned residents. This poor attitude towards the coastal environment exhibited by some residents may be what Kollmuss and Agyeman call non-conscious or unconscious responses to a given situation on the environment, and the Kollmuss and Agyeman model does not capture this non-conscious behavior as identified by (Courtenay-Hall & Rogers, 2002). Such non-conscious behaviours include but are not limited to actions enacted by the habits of the people such as defecating in plastic bags and dumping them in the sea, throwing plastic packages into the ocean when the fishermen are at sea; and some attitudes that are enacted deep in the daily values and norms rather than their conscious minds. This adds another dimension to be considered in developing sustainable interventions to deal with ocean plastic pollutions, as it is not easy to change the unconscious patterns of residents that have been deeply rooted in their habits and everyday practices (Agbemabiese, 2020; Heidbreder et al., 2019; Loftus, 2015).

Overpopulation has been identified as a source of different challenges for developing countries and this resonates with the increase in plastic production (Ashai, 2021a). Ghana has an annual population growth rate of about 2.4 percent, with projections showing that the population of about twenty-four million people will double in the next twenty years (Codjoe, 2007). The population in 2021 had increased to thirty- million. This issue of overpopulation in Old Ningo was mentioned by a participant. This rapid growing population, if coupled with a constant demand for plastic products will still yield an increase in plastic consumption. There are indications from literature that there is an increase in the production of plastic product about 32 million tonnes (Ashai, 2021a), however it is not clear whether this is due to an increase in demand for plastic products or the demand has been constant over the years, but the growing population has automatically led to an increase in the production and usage of plastic products. This is a very important factor to consider if the government needs to make policies aimed at reducing the production of plastic products. For example, if the increased production is because of increase in demand of the plastic products from the increasing populations, then the government can create policies to restrict the production of plastic products but encourage the production of biodegradable products through tariffs on imported and exported plastic goods. According to the Kollmuss and

Agyeman's pro-environmental model, this rapid population growth as a demographic factor affects how the locals act towards the ocean. For example, if 15 empty plastic bottles are found as litter at a beach that hosted 5 people, the number of empty plastic bottles may increase when 10 people are hosted with all things being equal.

Plastics carried from the ocean currents is another disturbing barrier to interventions for ocean plastic pollution. Participants in Old Ningo stated that, plastics are carried from other coastal cities such as Accra, Tema, Sakumono, New Ningo and other places outside Ghana. This cause of ocean plastic pollution has been noted by some researchers to significantly yield to increased plastic pollution (Ashai, 2021a; Cole et al., 2011). It is possible that the efforts of the residents in the community to clean up their shores would be felt wasted if they wake up to plastic wastes on their shores from other places regularly. This, as Kollmuss and Agyeman observed in their model of pro-environmental behavior (Kollmuss & Agyeman, 2002), could hinder the local's positive attitude towards the ocean. The problem of plastic wastes being washed downstream by the ocean currents and the residents feeling discouraged to wake up to plastic wastes at their shores is very disturbing in the Old Ningo community, since the local government representative and the chief fisherman were all overwhelmed about the situation.

A key takeaway the field work highlighted was that the lack of waste management infrastructure affects the residents behavior towards the ocean. According to Kollmuss and Agyeman's pro-environmental behavior model, this lack of infrastructure makes people return to their old behavior of dumping plastic wastes in the ocean, leading to an increase in ocean plastic pollution. The problem of lack of waste management infrastructure is still a growing concern for many developing countries (Oteng-Ababio, 2011; Oteng-Ababio et al., 2013). The Old Ningo community is not exempt from this challenge. The residents reported that they lacked basic waste management infrastructure such as bins or skips to collect the waste. With the intuitive desire of the residents to keep their surroundings clean (their homes, shops, food vendor stands, hotels), they literally explore waste disposal avenues. Some of the residents, unfortunately, deem the ocean as their waste dumping sites, as some studies have shown that residents use floods, drainage canals and the ocean as their waste dumping sites (Aglanu & Appiah, 2014; Boadi & Kuitunen, 2003; Karley, 2009).

In addition to the two external factors mentioned above (ocean currents and lack of waste management infrastructure), poor implementation of government policies and rules and

regulations from the traditional system can affect people's behavior towards the ocean. This is categorized under the political factors that affect the pro-environmental behavior in Kollmus and Agyeman's model (Kollmuss & Agyeman, 2002). Traditional governance in African communities has been governed by a set of regulations developed from taboos and superstitions (Dosu, 2017; Ntiamoah- Baidu, 1991; Nyoni & Dodo, 2015). According to (Abeku Essel, 2018), these taboos provide the basis for the traditional rulers to expect some behavioral habits from the people. This places responsibility on these authorities that the residents can expect. He further adds that these taboos are passed on to the children by their parents and grandparents in their daily activities. In recent years, however, these taboos have been watered down by the introduction of foreign religions such as Christianity and Islamic religion, western education and science and technology (modernization) (Abeku Essel, 2018). The ripple effect of this is the disregard for taboos by the current generation which translates to their disregard for the traditional rules that protect the sea and coastal environment. For instance, some of the participants in the study shared that there were taboos that prevented people from fishing with lights at night. This taboo was associated with superstitious beliefs of what will happen to the perpetrators of that taboo. Influenced by changing technological conditions and the influx of social norms and expectations from elsewhere, the residents have increasingly disregarded the taboos and now take with them light to fish. This leads to changes in harvesting patterns and the harvesting of smaller fishes, which can negatively impact fish populations and possibly even lead to extinction if not checked.

In addition to the disregard for the taboos, the government policies intended to protect the ocean from plastic wastes have not been adequately communicated nor implemented. According to Kollmuss and Agyeman's model (Kollmuss & Agyeman, 2002), government policies are external factors that affect a person's behavior towards the ocean. Participants of this study mentioned they are not aware of what the policies are or the sanctions applicable to perpetrators, an assertion also made by (Mahamah, 2019) on a similar study in another coastal region in Ghana. Still on poor implementation of policies, Old Ningo is a tight knit of dependent extended families (Appeaning Addo, 2013) and the arrest of one person can cause unrest in the entire community. To avoid potential damages from such unrest, the local authorities normally settle for leniency on the defiant of government policy. This leniency only leads to an encouragement of more deviant behaviors towards the ocean and coastal environment which can increase ocean plastic pollution in the community.

5.2.2 Effects of ocean plastic pollution

As was discussed in the literature review, the effects of ocean plastic pollution have been noted globally. Residents of Old Ningo are aware of some effects of ocean plastic pollution on their health, economic and socio-economic well-being.

The residents expressed that there is low fish harvest due to plastic pollution of the ocean. The ocean plastics could have hindered the reproduction capacity of the fishes and affected their ability to run from predators, as noted by (Thushari & Senevirathna, 2020). As a result, the fish in the ocean may reduce (Gall & Thompson, 2015), leading to a low fish harvest from the fishermen. Moreover, the low fish harvest could be because the fishermen use lights to catch the smaller fishes in the ocean. If the smaller fishes are caught instead of the older ones whose reproduction capacity may diminish with time, the abundance of the fishes in the ocean will reduce over the period because the younger species would not be available to continue reproducing the fishes. Furthermore, plastics are lighter in weight, and they cover the ocean surface. In the attempt by fishermen to harvest the fishes with their nets, they are more likely to harvest plastics than the fishes, who are below the plastic coverage. This can also lead to the poor harvest by the fishermen.

In addition to the low fish harvest, the data suggest that the natural beauty and aesthetics of the area are also being destroyed. The hospitality industry in the community is a lucrative business for the residents and other hospitality franchises. Tourists travel from within and outside the country to visit the community and enjoy nature. However, these tourists are welcomed to the community with the view of heaps of plastics on the ocean and on the shores. This is not pleasant for the hospitality business. With the hospitality industry being affected by the low patronage of tourists to the community, residents lose their jobs and that can lead to high crime rates in the community, as some researchers have already noted (Hardesty et al., 2015; Jang et al., 2014; Thevenon et al., 2014).

The Old Ningo community does not have ports, so their shores are not busied with ships. However, the community has two salt mining companies: Modern Salt Industries and Annapurna Company Limited. These companies use huge pumps to extract water from the ocean into ponds where the salt will be further extracted from the sea water. The pumps, however, get choked by the ocean plastics, and that inhibits the production process of the salt in the community and also increases the production cost for the salt due to high maintenance costs on their pumps. As a result

of this, the revenue of the salt mining companies is reduced, and this can affect their revenue to the government and their social responsibility in the community. This effect has been noted by some scholars in their work, especially for the shipping industry (Ten Brink et al., 2009; Thushari & Senevirathna, 2020).

A direct effect of the low fish harvest, poor patronage of tourists to the community and the high cost of salt production, as I have already discussed, is the effect on the income of the residents in Old Ningo. The community heavily depends on fishing activities to generate their income. The fishermen, boat owners and the fish traders all rely on the fish harvest to sustain themselves. With low-income generation, some fishermen would lose their jobs and the fish traders would have to settle for other menial jobs to sustain themselves. This in the long run, affects the government generated incomes from taxes imposed on the fishermen, fish traders, hospitality industry and salt mining industries.

5.3 Sustainable Interventions

From the above discussed causes and effects of ocean plastic pollution in the Old Ningo community, the need for sustainable interventions cannot be overemphasized. These interventions should be aimed at increasing the resident's conscious behaviour to minimize ocean plastic pollution. With this aim, the Kollmuss and Agyeman model of pro-environmental behavior (Kollmuss & Agyeman, 2002) will be the basis for discussing these sustainable interventions.

5.3.1 Sustainable government policies and traditional regulations

Every community in Ghana is governed by the national policies that are aimed at conserving the ocean. These policies are established through the constitution of Ghana (Ghana, 1969), and administered through the various agencies responsible for the ocean such as the Environmental Protection Agency (EPA) and the Ministry of Environment, Science and Technology and Innovation (MESTI). The policy framework from the government includes the legal backing for implementation of the national policies, and that includes the sanctioning of the deviants of the policies.

The policies designed by the government of Ghana are framed within the policy guidelines from the African and international partnerships of which Ghana is a part. The African partnership includes the Abidjan Convention, the Nairobi Convention, the Jeddah Convention and the

Barcelona Convention (Preston-Whyte & Maes, 2022); and the International partnership includes United Nations Convention on the Law of the seas (Thushari et al., 2017). Some of these conventions have regional and national centers that provide consultancy services to Ghana, of which it can benefit from in developing the framework.

Having developed the framework, the implementation of the policies becomes the responsibility of the district assemblies (Loftus, 2015). The district assemblies which are constituted by the local representatives or assembly men and chief within the district, are to ensure that the policy guidelines from the government are implemented in the community. The national interventions through providing legal backing for the policies through bills passed by the parliament is not enough, unless the local assemblymen and the chief pull their weight in ensuring that the policies are implemented.

The traditional system is highly regarded in Old Ningo, as it has been noted in my observations and the resident's feedback through the interviews and the focus group discussions. The traditional authorities have a set-up where there is a chief fisherman ("wolaatse" translated as chief of the ocean), whose primary responsibility is to take care of matters concerning the ocean. To ensure sustainable implementation of government policies, the regard for the traditional authority should be leveraged to ensure the full cooperation from the residents in the community. This is because the residents believe in their traditional leaders than their local government representation, and are more likely to listen to their traditional rulers than their local representatives, an observation which is also shared by other scholars (Abeku Essel, 2018). This will allow the younger generation who are growing with the modern trends to understand these reason behind these taboos and demonstrate a pro-environmental behavior, as posited by Kollmuss and Agyeman (Kollmuss & Agyeman, 2002). The lack of this understanding results in lack of internal incentives and environmental consciousness, and as Kollmuss & Agyeman argued can make the residents return to the old behaviors if that is couples with lack of internal incentives or motivation, and this will lead to a negative environmental behavior (Kollmuss & Agyeman, 2002).

5.3.2 Sustainable waste management infrastructures

Kollmuss and Agyeman further asserted that the provision of infrastructure results in pro-environmental behavior (Kollmuss & Agyeman, 2002). To begin with, residents in the community should be provided with domestic bins to collect their domestic waste, and bins should be provided

along the shores to collect the waste on the beaches and at the food vendors stations. The residents interviewed suggested that they needed bins and recycling plants to properly dispose off their waste. This effort of providing domestic and beach bins would not be sustainable if there are no accessible public bins available for the residents to dispose of the waste they have collected. Therefore, the local government in collaboration with the traditional authorities need to provide the residents with larger public bins, which will be emptied regularly, for the residents to utilize in disposing off their wastes. The traditional authorities look to the government for the provision of these bins, since the government has access to taxpayers' revenue, and the government should be responsible for that. However, the traditional authorities also generate some income from the sale of lands in the community and other levies they impose on the use of the sea by the fishermen. A field survey by (Kessey, 2006) showed that the traditional authorities retain forty-five (45) percent on the sale of stool lands, whilst fifty-five (55) percent is sent to the district assemblies. The traditional authorities and the district assemblies can therefore collaborate to provide the bins and empty them regularly.

The possibility of obtaining a landfill site to dispose of the waste in the big public bins should be explored. The landfill will reduce the transportation cost of emptying the solid waste, which will increase the regularity of the emptying of public bins. Many projects in Ghana have failed because of the lack of funds to sustain them (Damoah & Kumi, 2018). Therefore, the landfill option will help the community to sustain the collection of solid waste at a reduced cost.

Another sustainable waste infrastructure for plastic waste which was not identified by the residents would be to have a recycling plant in the community. The purpose of this recycling would be to convert the plastic waste into new products that can be used by the residents in the community and other parts of the nation. The residents can be recruited to collect the plastics (from the ocean, shores, and even their residences which can end up in the sea), and then sell them to the recycling plants to generate income. This provides utility to the residents and becomes an internal incentive to engage in measures to prevent ocean plastic pollution, according to Kollmuss and Agyeman model of pro-environmental behavior (Kollmuss & Agyeman, 2002). In addition to the reduction of plastic waste in the community, the recycling plants would also generate revenue for the community to fund any other policy aimed at reducing ocean plastic pollution. According to a study by the Center of Scientific and Industrial Research (CSIR), GH¢1,200,00 can be generated

in Ghana annually if recycling of plastic wastes is considered as a sustainable waste management infrastructure (Ampofo, 2015).

5.3.3. Use of Biodegradable products

Another sustainable intervention the government and other stakeholders can consider is the use of biodegradable products such as those made from paper for packaging. It can be argued that the change of packaging from plastics to paper would lead to an increase in deforestation since more trees would be needed to make the paper products. A study has reported that more than sixty-five million hectares of forest are lost in developing countries out of the 2,128 million hectares (Brown, 2001). This has raised the attention of the government to make policies that reduced deforestation in the country (Wiggins et al., 2004). However, these paper packages can be made from carpentry wastes and sawmill industry wastes, instead of cutting new trees for them, and this leads to an optimization in the use of the tree that are cut. The paper products will decay after a while if they are properly disposed of at the landfills, as compared to the plastics that will not. It must be admitted that it will be difficult to store some products such as frozen fish and drinking water in paper products, which I suggest can still have plastic packages that can be recycled, but there are many other products that can change their packages to paper products with the little push from the government to industries and various food vendors.

5.4 Stewards of sustainable interventions

Developing frameworks for sustainable interventions are not enough, however the proper coordination of the various stewards of the sustainable interventions can yield the maximum impact needed. In the Old Ningo community, this study identified some stewards of sustainable intervention of ocean plastic pollution. These agents are the traditional authorities, the local government representative, the boat owner's association, the beach committee, the information centers and the residents.

The basic stewards of sustainable intervention are the residents in the community. For the interventions to hold, the residents must be committed to changing their old habits and showing concern for the environment. With the knowledge they have about the ocean, the provision of the right incentives and motivation can propel the residents to make certain changes in their daily activities that can help them informed decisions in favor of the ocean, according to the Kollmuss

and Agyeman model of pro-environmental behavior (Kollmuss & Agyeman, 2002). Since the residents learn from their interaction with the environment and each other through their daily activities (under the social constructionist theory), other residents (especially the children and youth) will also gain the necessary knowledge to make informed decisions on the environment.

Another steward worth noting is the traditional authorities. The people of Ningo place high esteem on their chief fisherman in matters regarding the sea. The acknowledge that all matters concerning the sea, including the implementation of any policy, must go through chief fisherman. Moreover, he is also responsible for punishing any deviant who flouts the traditional authorities' regulations on the ocean.

Another very important steward of sustainable intervention is the government. As discussed in this study, the government is represented in the Old Ningo community through the local government representation (popularly known as the assembly man). The government provides policies to regulate activities on the ocean, together with the necessary waste management infrastructures and funding to implement them.

The boat owners are regarded as the members of the community that have the financial resources to support various clean-up exercises on the beach. Moreover, the beach committee is regarded as representatives from the community that advocate for the interest of the beach. These two groups are very important voices to channel sustainable intervention through.

The Old Ningo community is blessed to have three information centers. These centers can be used to announce any new policies on ocean plastic pollution in the community and encourage residents to promote pro-environmental behavior.

Kollmuss and Agyeman argued that we prioritize our responsibilities due to the authority we have been given and our perception about our ability to make changes simulates us to have a pro-environmental behavior (Kollmuss & Agyeman, 2002). If all these stewards are acknowledged and used in their domain of influence, interventions aimed at tacking ocean plastic pollution can be sustained.

5.5 Conclusions and recommendations for future research

The objective of this study was to find out what sustainable measures can be taken to protect the ocean and coastal resources against threat of the ocean plastic pollution in Old Ningo. The specific research objectives were to investigate how research participants understand Ocean Plastic Pollution, the existing practices that encourage plastic pollution and identify sustainable practices

that can reduce plastic pollution in the coastal environment at Old Ningo and the agents that can ensure the sustainability of the interventions. The research questions and objections were answered with data collected from interview and focus group discussion participants.

The issue of the local perspective on ocean plastic pollution is a significant topic of discussion for the residents in Old Ningo. The ocean plastic pollution has affected the health of the residents, their income and the ocean as well. The effect on the ocean has been through the imbalance the plastics causes to the ocean ecosystem.

The residents learn much about the ocean through their interaction with the environment through their daily activities. They understand what the ocean means to them, how their actions impact the ocean and how the ocean impacts them. Their value of the ocean is derived from the economic and cultural benefits the ocean has to them. As part of their understanding, the residents know that ocean plastic pollution is a menace in the community and can communicate the causes of the pollution as well as sustainable measures to deal with them.

Considering the findings made in this study, attempts at providing sustainable interventions should include a general overview of how the stewards identified in this study can contribute to their quota. Each of the stewards have their unique contributions which need to be properly integrated in the policy frameworks developed for implementation at the local assembly levels. These stewards are members of the community, and they can communicate these sustainable interventions to the residents. Moreover, the existing taboos need to be explained to the residents from the point of science and modernization instead of the usual superstitions.

Aside from the research findings and recommendations made from this study, there is room for further research studies. It is necessary to conduct a follow-up soon so interested stakeholders in the area will engage in identified possibilities. To begin with, further research can explore the tensions between the stewards of sustainable interventions. A qualitative research study using interview and focus group discussions that is aimed at finding out from each steward how their responsibilities are inhibited by the other stewards would be a great addition to this research. This would help in addressing the tensions between the agents of the sustainable interventions and ensure the sustainability of policies and projects towards the ocean plastic pollution.

Another interesting research question would be to ascertain how the population growth correlates with ocean plastic pollution in the community, municipal and national level. Further studies of this nature could make use of extended literature review to map out the effects studied

by other researchers, quantitative studies (possibly a time series) on various data collected from industries that produce and/or use plastic products over the years to ascertain how much the plastic production has changed over the years and then a qualitative study to ascertain how the citizen's demand for plastic products have changed over the years. The latter can explore interviewing citizens within different age groups to find out their preference for plastic products compared to other biodegradable products.

Finally, it would be of interest in further study to explore how the implementation of sustainable development can change the behavior of the residents. The study can be done through longitudinal study where the attitudes before and after a piloted sustainable intervention has been implemented can be measured and modelled. This will provide a convincing argument for the funding of sustainable interventions.

In conclusion, ocean plastic pollution has an adverse effect on the residents in Old Ningo. The residents have gained knowledge about the ocean and how it affects them, and their actions affect the ocean through the daily interactions with the ocean. Sustainable interventions aimed at tackling ocean plastic pollution should look at how the various stewards can be integrated by leveraging the influence of each steward.

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APPENDIX

Appendix A

PERSPECTIVE OF LOCAL PEOPLE ON OCEAN POLLUTION IN NINGO – GHANA”.

Section A

1. Gender
2. Age: a) 13 – 19 b) 20 – 35 c) 36 – 50 d) 51 and above
3. Occupation
4. Place of Residence

Section B (Ocean pollution)

5. Have you heard about “Ocean Pollution”?
6. What do you understand by ocean pollution?
.....
7. Do people/residents in the community contribute to Ocean Pollution?
8. How do they contribute to Ocean Pollution?

.....

9. Mention some impacts of ocean pollution on the local people.

.....

Section C (Existing Initiatives)

10. Do you know of any action to reduce ocean pollution by the government, municipal assembly, traditional leaders, local people or non-governmental organizations?
11. If yes, where did you hear about such an action/initiative?
12. Are these actions still being used to protect the sea?

Section 4 (Recommendation)

13. What can local people do to protect the Ocean aside from the government?
.....
14. Can these actions be maintained and used in the future?

15. Name one or more social institutions that can help promote ocean conservation.

.....

A). Guidelines for Interviews

1. What is your general view of the ocean?
2. How do you personally interact with the Sea?
3. What influence your interaction with the ocean?
4. Are there locally existing practices that aim at protecting the ocean?
5. Which individuals or groups are responsible for protecting or restoring the sea’s health?
6. What traditional methods keep the sea safe?

B).

1. What is your knowledge about plastic ocean pollution?
2. In your opinion, what is the root cause of the pollution, and can it be corrected?
3. What role can you play in this correction and which other people in the community can help?
4. How is the sea relevant to you, your needs, priority and social values (traditional ecological knowledge? In other words, how do you influence the ocean and how does it influence you?
5. How do we make the sea and its environment safe for people today and tomorrow?
6. What do you think about the natives of Ningo taking initiatives to protect the ocean?
7. Do you know about a national policy on plastic pollution in the ocean, if yes, do you play a role in its execution?

Appendix B

Consent form

Consent can be given in writing (including electronically) or orally. NB! You must be able to document/demonstrate that you have given information and gained consent from project participants.

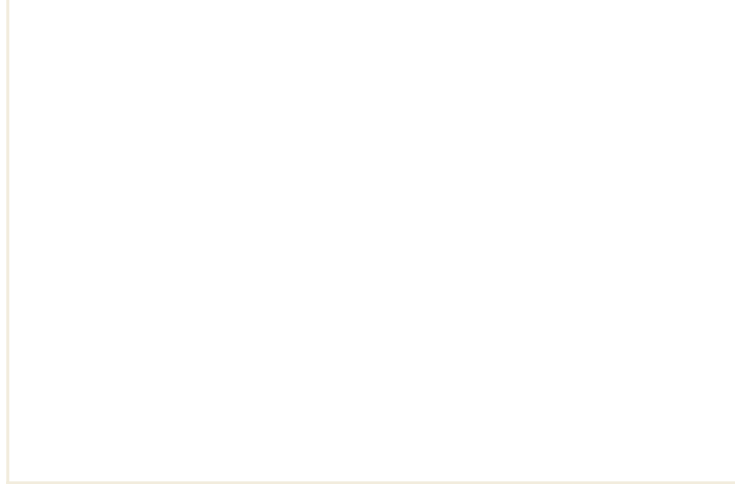
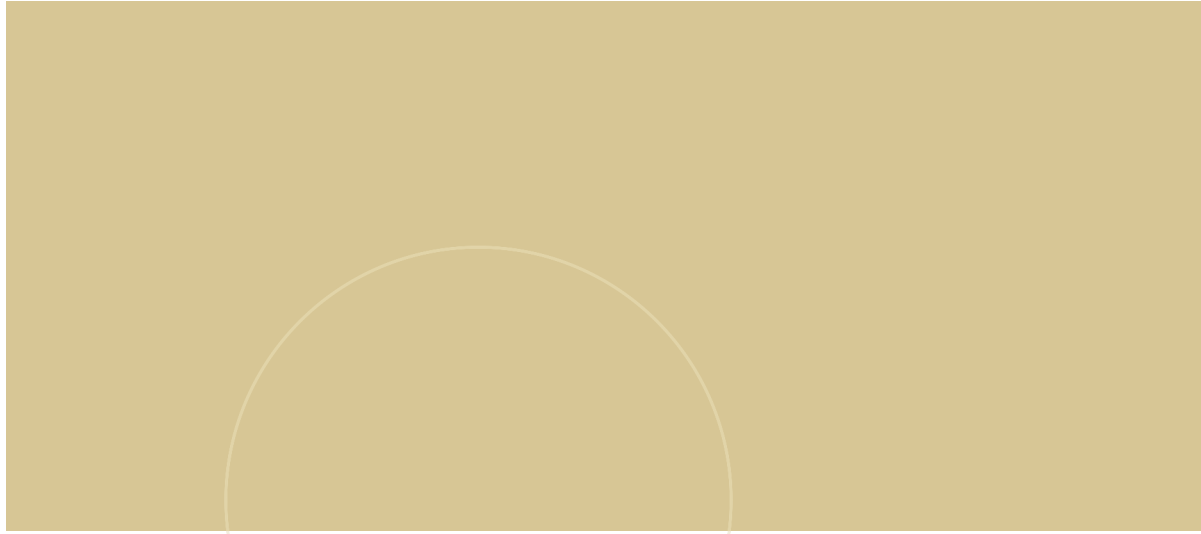
I have received and understood information about the project (Who Cares? The Locals’ Perspective on Ocean Pollution and Conservation. A case study of Ningo in Ghana)” and have been given the opportunity to ask questions. I give consent:

- to participate in an interview
- for my personal data to be processed in the EU/EEA.

- for information about me/myself to be published in a way that I can be recognised.
- for my personal data to be stored after the end of the project for follow-up studies.

I give consent for my personal data to be processed up to about four months after the end date of the project, which is August 2022.

(Signed by participant, date)



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