10-31-2021

Analysis of marine plastic litter policies in Ghana

Perfect Ashai

WORLD MARITIME UNIVERSITY
Malmö, Sweden

Analysis of Marine Plastic Litter Policies in Ghana

by

PERFECT ASHAI
GHANA

A dissertation submitted to the World Maritime University in partial fulfilment of the requirements for the award of the degree of

MASTER OF SCIENCE
in
MARITIME AFFAIRS

MARITIME LAW AND POLICY

2021

Declaration

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

(Signature): 

(Date):

21/09/2021

Supervised by: Dr. Aref Fakhry

Supervisor's affiliation**:** Associate Professor, MLP Programme

Acknowledgements

"And he said unto me, My grace is sufficient for thee: for my strength is made perfect in weakness. Most gladly therefore will I rather glory in my infirmities, that the power of Christ may rest up on me". 2 Corinthians 12:9 (Holy Bible, King James Version)

First and foremost, I would like to thank Almighty God for his grace, mercies and protection throughout my study.

My sincere thanks go to my supervisor, Dr. Aref Fakhry, for his academic guidance and motivation towards successful completion of my dissertation.

My special thanks go to the Director General of the Ghana Maritime Authority, Mr. Thomas Kofi Alonsi, for granting me study leave to enable me to pursue my master degree programme. My profound gratitude also goes to the International Transport Workers' Federation (ITF) for its kind support in providing funding for my programme at WMU.

I further take this opportunity to express my heartfelt gratitude to my children (Lillian Aya Erskine and Lyanne Efua Erskine) for their patience, prayers and understanding. I will forever be grateful.

My deepest appreciation also goes to Ms. Mabel Kotey (Maa May) and Mr. Richard Safo for taking good care of my children to enable me have a sound mind to pursue the programme. Also to my parents Mr. Silvanus Nii Ashai Appoe and Madam Bernice Adjoa Yaaba Arthur for their love, inspiration and continuous support.

My sincere gratitude further goes to Ms. Janet Houghman-Addy, Dr. Alidu Gbensuglo, Ms. Lydia Tsotsoo Odai-Tettey, Mr. Marvin Bang-Gesina Ayoo, Mrs. Catherine Oppong-Adjei, Nii Lantei Kumi-Bruce, Mr. Satish Devdas Kamath, Mr. Daniel John Joseph Arulanthu, Mr. Christopher Nii Aflah Armah and to all my WMU S21 friends. I say God richly bless you all for your support and words of encouragement.

Abstract

Title of Dissertation : **Analysis of Marine Plastic Litter Policies in Ghana**

Degree : **Master of Science**

The dissertation is a study of marine plastic litter policies in Ghana. The purpose of the dissertation is to analyse marine plastic litter policy in Ghana and to provide recommendations in addressing the marine plastic litter menace. There is a need for institutional collaboration between governmental actors and non-governmental actors in addressing the marine plastic litter menace. Ghana has developed a National Plastic Management Policy (NPMP) led by the Ministry of Environment, Science, Technology and Innovation (MESTI) to address the plastic waste management in the country. The NPMP is a holistic approach in addressing the plastic waste menace that has engulfed the country as well as the coastline. On 1 October 2019, Ghana became the first African member to join the Global Plastic Action Partnership (GPAP) and subsequently formed the Ghana National Plastic Action Partnership (NPAP). During the launch of the NPAP, the President of the Republic of Ghana, Mr. Akufo-Addo, pledged his support to achieve a zero plastic leakage into Ghana's ocean and waterways. The GPAP has developed a national baseline model as a road map to combat plastic waste flow in Ghana, capacity building in waste management, recycling, raising awareness and behavioural change for the reduction of single-use plastic consumption. The NPAP provides key knowledgeable tools to drive plastic action. The GPAP and NPAP are expected to collaborate with the MESTI on the NPAP in Ghana. There is therefore a need for stakeholders, particularly those in the governmental sector, that is, the Environmental Protection Agency, the Ministry of Sanitation and the Ministry of Tourism, Art and Culture, to find effective ways of collaborating in dealing with the menace of marine plastic litter. In the same vein, an extensive support system can be extended to the NGO's that are active in plastic waste management. Lastly, legislation should include punitive measures on the public as well as private entities that manufacture plastics in Ghana.

KEYWORDS: Marine Plastics Litter, Marine Pollution, GPAP, NPMP, NPAP, Abidjan Convention

Table of Contents

List of Figures

List of Tables

Abbreviations

AGI	-	Association of Ghana Industries
AMA	-	Accra Metropolitan Assembly
CHF	-	Community Housing Foundation
DWMP	-	District Waste Management Plan
ECOWAS	-	Economic Community of West African States
EIA	-	Environmental Impact Assessment
EHSD	-	Environmental Health and Sanitation Directorate
EPA	-	Environmental Protection Agency
EMSA	-	European Maritime Safety Agency
GISIS	-	Global Integrated Shipping Information System
GRIPE	-	Ghana Recycling Initiative by Private Enterprises
GMA	-	Ghana Maritime Authority
GPA	-	Global Programme of Action
GPAP	-	Global Plastics Action Partnership
GPHA	-	Ghana Ports and Harbours Authority
ICARM	-	Integrated Coastal Area and River-Basin Management
IMO	-	International Maritime Organisation
IMDG	.	International Maritime Dangerous Goods Code
IUCN	-	International Union for the Conservation of Nature
NOAA	-	National Oceanic and Atmospheric Administration
KMA	-	Kumasi Metropolitan Assembly
MARPOL	-	International Convention for the Prevention of Pollution from Ships
MEPC	-	Marine Environment Protection Committee
MESTI	-	Ministry of Environment, Science, Technology and Innovation
MLGRD	-	Ministry of Local Government and Rural Development
MOU	-	Memorandum of Understanding
MTAC	-	Ministry of Tourism, Art and Culture
MRF	-	Material Recovery Facility
NESPOCC	-	National Environmental Sanitation Policy Coordinating Council

NGO	-	Non-governmental Organisation
NOAA	-	National Oceanic and Atmospheric Administration
NPA	-	National Programme of Action
NPAP	-	National Plastics Action Partnership
NPMP	-	National Plastics Management Policy
PE	-	Polyethylene
POPs	-	Persistent Organic Pollutants
PP	-	Polypropylene
PS	-	Polystyrene
PVC	-	Polyvinylchloride
REHO	-	Regional Environmental Health Offices
SSA	-	Sub-Sahara Africa
UNCLOS	-	United Nations Convention on the Law of the Sea
UN	-	United Nations
UNEP	-	United Nations Environment Programme
UNEA	-	United Nations Environment Assembly
UNICEF	-	United Nations International Children's Emergency Fund
UNSDG	-	United National Sustainable Development Goals
WHO	-	World Health Organization
WMU	-	World Maritime University

Chapter 1: Introduction

1.1 Background

The world's first plastics, based mainly on natural raw materials, were produced at the turn of the twentieth century (Chalmin, 2019; PlasticsEurope, 2012). Plastics come in various types and forms, which include but are not limited to Polyethylene (PE), Polypropylene (PP), Polystyrene (PS) and Polyvinylchloride (PVC) (EPA, 2009; Lachmann et al., 2017).

Plastics which form the main component of marine litter are now everywhere and constitute about 95% of waste accumulated on the shoreline, the seabed and the sea surface (Galgani et al., 2015).

Marine litter is defined as "any persistent, manufactured or processed solid material that is discarded, disposed of, or abandoned in the marine or coastal environment" (Van Dyck et al., 2016; Lachmann et al., 2017).

One of the challenges with plastic waste is that it stays in the marine environment for a very long period before it breaks down (Global Environment Facility [GEF], 2019). However, over time the plastic material breaks down into tiny particles commonly known as microplastics generally defined as less than 5mm in diameter. These tiny plastic particles may be consumed by marine mammals and can enter the food chain where they are eaten and transferred to apex predators (Ocean Unite, 2021).

In Ghana, only a small portion of plastic wastes are collected, re-used or recycled. However, the remaining plastics usually end up in uncontrolled landfills and are subsequently washed into the marine environment and water bodies when it rains. This threatens marine life, impacts livelihood as well as coastal tourism and fishing (Adam et al., 2020; GEF, 2019).

Some plastics are made up of toxic chemical additives such as persistent organic pollutants (POPs), which have been associated with health problems including cancer, reproductive, mental and developmental diseases (GEF, 2019). It has been estimated that mismanagement of plastic wastes from land-based sources accounts for 80% of plastic leakage into the ocean while 20% are from sea-based sources (Adam et al.,

2020; Van Dyck et al., 2016). Numerous industrial sectors have used plastics for packaging, agriculture, electronics, consumer goods and health care. Most plastics are single-use and are made to be used once before being disposed. Examples of single-use plastics are plastic bags, straw, cutlery, microbeads, polystyrene such as food containers, cups and sachet water wrappers. While most of these plastics are used mainly on land, their impact is seen on the marine environment as it serves as a major sink for these plastics (Adam et al., 2020; GEF, 2019).

Modern lifestyle and the use of plastic in all sectors of society have influenced the marine environment and until sustainability is attained in the use of materials, plastic waste will continue to flow into the seas (Lachmann et al., 2017).

Ghana is a country on the West African coast with Greater Accra as its capital. The country borders the Gulf of Guinea and has a coastline of about 550 km. Ghana is bordered to the east by Togo and to the west is Cote d'Ivoire (Afful, 1990; Van Dyck et al., 2016). Ghana has two ports, Tema and Takoradi (Hilmi, 2019; Amoabeng-Prah, 1999).

Ghana in her commitment to contributing to finding a lasting solution to plastic waste management has currently developed a National Plastic Management Policy (NPMP) led by the Ministry of Environment, Science, Technology and Innovation (MESTI) with a focus on four areas: Behavioural change; Strategic planning and cross-sectoral collaboration; Resource mobilization towards a Circular Economy and Good governance, inclusiveness and shared accountability (Government of Ghana [GoG], 2020).

It is estimated that Ghana generates about 1.1 million tons of plastic waste annually out of which only 5% is collected and recycled (Global Plastic Action Partnership [GPAP], 2020). This made the president of the Republic of Ghana, His Excellency Nana Addo Danquah Akufo Addo to address the public on plastic waste management on 1 October 2019 during the launch of the Ghana National Plastic Action Partnership (NPAP) spearheaded by the Global Plastic Action Partnership. The president in his keynote address pledged his support to "achieve zero plastic leakage into Ghana's ocean and waterways and urged the country to make the necessary efforts to be a model

for other countries in the region and on the continent on issues pertaining to plastic waste management" (GPAP, 2020).

Moreover, a study conducted along two beaches of the coast of Ghana in Accra namely; Korle beach and La beach revealed that a total number and weight of litter collected at Korle beach were 2691 and 43239g of which plastic materials dominated the total litter at 66% while that of La beach the total number and weight of litter collected were 2261 and 72695g of which plastic material dominated the total litter at 53% (Tsagbey et al., 2009). Such beaches not only affect the health of habitats but the tourism industry as well. Unattractiveness of the beaches reduces tourist participation and activities along the beaches. This is reflected in the 2005 report of the Ghana Tourist Board, the fourth largest source of foreign exchange earnings (Tsagbey et al., 2009). Some plastic waste scenes in the capital city, Accra in Ghana is presented in Figure 1.

Figure 1: Polluted Korle Lagoon in Accra.

Source: Muntaka Chasant, "Plastic Pollution in Ghana, causes, effects and solutions" 2019 https://www.atcmask.com/blogs/blog/plastic-pollution-in-ghana

Figure 1 shows that Ghana as a country is struggling with poor environmental sanitation particularly in the urban areas like Accra. This has existed because of inadequate waste management capacity and infrastructure such as collection, transportation and treatment. More importantly, the majority of non-biodegradable waste is made up of plastics along the coastal belt of Accra and Tema.

To ensure continuous preservation and sustainable use of the ocean for economic growth, policies can be developed to safeguard the ocean. Attempts to address this menace have been inadequate with lack of infrastructure and the necessary policies being a key reason (Tsagbey et al., 2009). This background underpins the relevance of this study.

1.2 Problem Statement

Ghana over the years has tried different ways to manage the menace of plastic pollution and to some extent marine plastic litter but the problem persists as plastic waste are mostly accumulated along the coastline. For instance, in 2013 the Plastic Waste Management Fund's (PWMF)/Environmental Tax was established by an Act of Parliament but the framework to ensure the disbursement of funds is yet to be set up. Similarly, in 2015 the Ministry of Environment, Science, Technology and Innovation (MESTI) came up with a directive to ban plastics of less than 20 microns and the use of biodegradable additives in plastics. (Government of Ghana [GoG], 2020; GEF, 2019). However, in 2019 the ban on plastics was overturned by MESTI (Muntaka, 2019). Notwithstanding the existence of the National Environmental Sanitation Policy (revised 2010) and the Environmental Sanitation Bye-laws (2003), both policies of the Government do not provide the necessary legal guidelines for marine plastic litter (GEF, 2019).

It has further been argued that efforts by the social organisations and associations who engage in regular clean-up exercises along the coastline of Ghana have not yielded any good results (Ghanaweb, 2019). These plastic litters are normally found around the beaches and the coastline due to human activities. The negative effect that these practices have on the tourism industry is enormous. Notable is the economic cost of organising resources for continuous clean up exercises (Walther et al., 2018).

Abalansa et al., (2018) put it that the issue with marine plastic litter is many-sided, sectoral and on-going in the absence of adequate management measures. Similarly, the author reiterates that marine plastic litter is a threat to the livelihood of more than three billion people who rely on the marine environment, the shipping sector, rescue mission, tourism, telecommunication cables, marine wildlife and the food chain.

There is a need to adopt an appropriate policy and suitable regulations to help curb this menace. In addition, there is a need for law enforcement agencies to enforce existing regulations to ensure compliance to address this menace (Van Dyck et al., 2016). There may be regulations in place, but the multifaceted nature of the marine plastic waste problem makes it difficult for one sector to pull a holistic control measure. The issue of which sector to superintend over or coordinate the activities of other sectors is a great challenge since all sectors concerned are mandated by law to perform certain roles in environmental protection.

Although many discussions exist on regulatory frameworks relating to marine plastic litter management in Ghana, relatively limited work has been conducted in respect of the inability of existing policy measures to address the plastics litter situation, the exponential increase in the use of plastics and polythene causing environmental hazards. Therefore, this research seeks to analyse the various legislative and policy frameworks that has been adopted by the country in dealing with the menace of marine plastic litter and identify lapses in the implementation of the policy.

1.3 Aims and Objectives

The aims and objectives of this study are:

1. To identify and explain the existing legislation on marine plastic litter in Ghana;
2. To examine the strategies adopted by the sector ministries in the implementation of Ghana's marine plastic litter policy;
3. To identify lapses in the implementation of the policy;

4. To make recommendations aimed at improving the legislative framework in implementing Ghana's marine plastic litter policy.

1.4 Research Questions

1. What is the existing legislation on marine plastic litter in Ghana?
2. What are the strategies adopted by the sector ministries in the implementation of Ghana's marine plastic policy?
3. What are the main policy lapses that affect effective implementation of policy?
4. What are the recommendations to improve the legislative framework in the implementation of Ghana's marine plastic litter policy?

1.5 Motivation for this research

The Ghana Maritime Authority (GMA) occasionally organises clean-up exercises at some selected beaches to reduce the quantities of plastic waste washed into the ocean when it rains (Modern Ghana, 2019). The Authority also uses the opportunity to interact with coastal dwellers to explain the reasons for maintaining a clean marine environment. Efforts of the GMA have not yielded the expected result as the marine environment continues to be littered with plastic waste.

The effect of marine plastic litter goes a long way to affect the country in so many negative ways. One of the long run effects that cannot be overlooked is the effect on the ecological and biological lives of marine fishes (Van Dyck et al., 2016). Fish stock is depleting already and the fishery sector is having challenges in managing the fisher folks. The Government of Ghana's 'closed season' policy was not well received by the fishing community. Even after reluctantly giving in, their expectation of increased fish stock was not met (Adom et al., 2019). If the plastic waste continues to enter the ocean there will be a time the country has to forget about fishing as a commercial venture. The motivation as an alumna of WMU is to bring changes in policies to enhance the country's prospects in leading African countries in achieving United Nations Sustainable Development Goal (UNSDG) 14 which is to ensure the conservation of life below water and Goal 14 Target 14.1 which is set to prevent and reduce significantly marine debris (SDG Tracker, 2018).

1.6 Scope and Limitation

This study is limited to discussing a regulating policy framework on marine plastic litter in Ghana. It discusses existing policies on plastic waste management and disposal along the coastline and beaches, the gaps in these policies and recommendations to bridge these gaps. The study falls short of valuable information from all stakeholders as the researcher was not be able to travel to Ghana to conduct interviews due to the Covid-19 pandemic. The research relied on a limited amount of information.

1.7 Significance of the Research

The significance of the study are:

1. To contribute significantly to the already existing literature on marine plastic litter in Ghana.
2. To recommend various strategies, means and ways of dealing with the menace of marine plastic litter in Ghana.
3. To identify the legal and institutional framework that can be adopted in dealing with the menace of marine plastic litter in Ghana.
4. To establish the various roles or functions played by government agencies, stakeholders and NGOs in dealing with the marine plastic litter menace in Ghana.

1.8 Methodology

This study employed desk-based research design, and this was complemented by a review of the literature on Ghana's policy documents on marine plastic litter and management, and administrative records of necessary policy documents on marine plastic litter from the Ghana's Environmental Protection Agency (EPA), Ministry of Environment, Science, Technology and Innovation (MESTI), Global Environment Facility (GEF), Accra Metropolitan Assembly (AMA), Ministry of Local Government and Rural Development (MLGRD), Ghana Ports and Harbours Authority (GPHA), and Ghana Maritime Authority (GMA).

The study began with the review of policy documents on marine plastic litter in Ghana. This was supported by the review of academic journals and papers, published books, Government of Ghana policy reports, and relevant documents explaining Ghana's policy on marine plastic litter. The aim of the review of the policy documents was to identify policy implementation strategies and gaps. The information gathered from the earlier works and the relevant documents was used to establish the policy implementation strategies and gaps.

1.9 Organisation of the Study

This study is organised into five chapters. The first chapter is the introduction to the study, and discusses the background to the study, the problem statement, the research objectives and questions. It also presents the scope of this study, relevance of the study and the study methodology. Chapter two contains a review of the analysis of the literature review bringing forth the conceptual policy frameworks. The literature provides elaborative background information explaining the phenomenon under investigation, and thus puts the whole study in an appropriate conceptual framework. Chapter three delineates the international legal framework on marine plastic litter. Chapter four presents and discusses Ghana's current plastic litter management, bringing out policy implementation strategies and gaps. The fifth chapter covers the key findings, conclusions and recommendations of the study.

Chapter 2: Literature Review

2.1 Introduction

This chapter reviews and discusses the existing literature on plastic litter and related issues. It provides a conceptual definition of marine plastics litter and an overview of empirical literature on the phenomenon. The chapter is divided into five sections. The first section presents the definition of key concepts of the study. Section two presents empirical literature on global marine plastics. Section three collates literature on Africa, and the fourth section presents literature from the perspective of Ghana. This is followed by the challenges of plastic litter on the marine environment. Review of the literature provides elaborate background information and the understanding of the phenomenon under investigation.

2.2 Key Concepts in Marine Plastic Litter

The key concepts in marine plastic litter discussed under this section includes marine litter, marine plastic litter, pollution, land-based pollution and marine pollution.

2.2.1 Marine Litter

Marine litter is defined as "any persistent, manufactured, or processed solid material (regardless of size) discarded, disposed of, or abandoned in the marine environment, including all materials discarded into the sea, on the shore as a result of human activity or brought indirectly to the sea by rivers, sewage, storm water, waves, or winds" (Deutsche Gesellschaft für Internationale Zusammenarbeit [GIZ], 2018; Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection [GESAMP], 2020; Akhir, 2018).

Accidental or intentional human behaviour has been attributed to be the major cause of marine litter and this occurs primarily through sea-based and land-based sources. It is estimated by the United Nations Environment Programme (UNEP) that land-based sources contribute to 80% of marine litter and this is through tourism, recreational use

of beaches, fishing activities, operations of ship breaking yards, waste from dumping sites near river banks and beaches (Chassignent et al., 2021).

According to GESAMP (2020) sea-based marine litter is "any form of man-made, synthetic (non-natural) debris deposited directly into seawater from a vessel, facility or activity that is situated in or on, or is taking place entirely on or within, the ocean, from the intertidal to pelagic zones, and encompassing open ocean-adjacent seawater bodies including harbours, bays, estuaries and lagoons". Marine litter from sea-based activities includes but is not limited to fishing, aquaculture, shipping, ocean dumping and other ocean-based activities.

2.2.1.1 Marine Plastic Litter

When plastic forms a part of marine litter it is termed as marine plastic litter. Plastic is an affordable, lightweight, malleable and strong synthetic organic polymer created from petroleum. Its properties make it ideal for diverse applications such as household equipment, vehicles, packaging, building and construction materials among many others (IUCN, 2018).

Table 1: Types of marine plastic litter and examples

Full Name	Short Form	Examples
Polyethylene terephthalate	PET (PETE)	soda bottles
Polyester	PES	polyester clothing
Polyethylene	PE	plastic bags
High-density polyethylene	HDPE	detergent bottles
Polyvinyl chloride	PVC	plumbing pipes
Polypropylene	PP	drinking straws
Polyamide (nylon)	PA	Toothbrushes
Polystyrene	PS	take-out food containers

Source: National Oceanic and Atmospheric Administration (NOAA): Marine Debris Program (2021). https://marinedebris.noaa.gov/discover-issue/types-and-source

2.2.2 Pollution

Good environmental sanitation encompasses maintenance of a safe and hygienic environment within which human beings live and work, and poor sanitation causes harm to the environment (Franceys & Gerlach, 2008). But the lack of sanitation causes marine pollution in urban coastal areas, particularly in Africa countries like Ghana. Mensah (2002) defines environmental pollution as:

> "*The state of an unclean environment of a place, a community or a people, and that it relates to the poor quality of life aspect of human health as determined by physical, biological, social and psychosocial factors of that environment."*

Mensah (2020) noted that the theory and practice of evaluating, managing and preventing those factors in the environment is crucial due to the crippling effect of environmental pollution. The author further reiterated that, the effect is enormous, as it does not negatively influence the health of the present generation but that of the future. It is in this regard that the author proposes to governments to provide improved sanitation facilities so as not to compromise on the economic progress of the nation.

2.2.2.1 Land based pollution

Pollution refers to a situation where the environment is made impure when waste is thrown to the air, rivers and seas (United Nations, 2016). An estimated 80% of marine pollution is considered to be from land-based sources, which includes marine litter, untreated sewage, agricultural run-off, and waste materials from mining and manufacturing (Delia, 2021). Additionally, large volumes of waste and dirty liquid products from textiles factories and breweries and other manufacturing industries are poured into nearby streams, rivers, lakes or seas (Pawar et al., 2016).

2.2.2.2 Marine Pollution

Growing human population concentrations and socio-economic activities, particularly industrial activities in the coastal areas and an increase in marine traffic in the open seas, pose a potential threat to the quality of the marine and coastal environments (Mouat et al., 2010).

Ocean-based activities such as commercial fishing, shipping, leisure industry, shipping and offshore oil and gas platform exploration accounts for 20% of marine litter into the sea (Mouat et al., 2010; EMSA n.d), however this varies between areas. The discharges ranges from galley waste as well as cargo container. This goes a long way to affect human health and death of marine life as non-degradable debris and plastics are mistakenly eaten by marine animals. Marine litter in a way affects the natural and economic value of the shoreline (EMSA n.d).

According to Delia (2021), an estimated 60% to 90% of marine litter is made up of plastics which range from consumer packaging such as bottles, straws, cling wrap and food containers. Similarly, Delia (2021) is of the view that the accumulation of plastics making its way to the ocean could be doubled by 2025. In Ghana for instance, the influx of single-use plastics such as pure water sachet, shopping bags, plastic fast-food containers, water bottles, straws and cups find its way into the ocean when it rains (Danquah et al., 2019; Muntaka, 2019).

2.3 Overview of Global Marine Plastic Litter

Plastic has played a significant role in the livelihood of humans over a very long time due to its multiple uses, and wide-range applications (Group of 20 [G20] Report, 2020). However, there is the general assumption that the majority of plastic waste that enters the world ocean is estimated at 275 million metric tons which has been attributed to 192 coastal nations in 2010 (GESAMP, 2020; Jambeck et al., 2015). This estimate has been reviewed that about 19-23 million metric tons of plastic waste generated globally in 2016 entered the marine environment as this is expected to reach 53 million metric tons annually by 2030 (Adam et al., 2021).

It has been estimated that, Europe spends an estimated €630 million per year to collect plastic debris from its coastline globally (UNEP, 2018) and about US$2.5 trillion is lost annually through marine plastic pollution (Beaumont et al., 2019).

In a recent conference hosted by the UNEP on plastic pollution in Geneva, the European Union has backed the call for the creation of a legally binding international agreement to help reduce the plastic pollution. The UNEP has said that the planet is

‘drowning in plastic pollution’ as a result of 300 million tons of plastic waste produced per year (EURACTIV, 2021).

The production of plastics continues to increase due to the global population increase and demand. Over the years, the amount of plastics in the world’s ocean has been reported to continually increase yearly, which poses threat to human health and the marine environment. Increased marine plastic litter is expected to worsen due to rapid population growth, urbanization with its accompanying resource consumption (G20 Report, 2020). It is estimated that by 2050 the ocean would contain more plastic than fish if appropriate measures are not taken to ensure immediate and sustainable action (World Economic Forum, as cited by G20 Report, 2020). Marine plastic litter has become a global concern as a result of exponentially increased plastic production globally (Walter et al., 2018). In the same vein, UNCTAD report revealed that the Covid-19 pandemic has led to the increased production of single-use personal protective equipment such as plastic face masks, plastic gloves and gowns and hand sanitizer (UNCTAD Report, as cited by G20 Report, 2020). The increase in demand for these materials to help combat the global Covid-19 pandemic has become an environmental pollution, marine littering and policy concern. The use of these plastics will add to the increased amount of plastic waste generated globally contributing to marine plastic littering thereby compounding the already marine plastic litter policy control challenge in recent times (G20 Report, 2020). Globally, nations have been beset by environmental problems that involve the use and management of oceans, atmosphere and other environmental resources. These natural resources have been overused without adequate concern for its effect on the environment and marine life.

Conversely, one of the ominous factors about human existence on the planet earth is that man often becomes a victim of nature and his own activities that impinge negatively on his life and property. The underlying structural processes which create and allocate material resources, wealth, influence and power in a society preconditions some sections of societies for disasters (Bukari, 2016). Therefore, supernatural forces are not absolutely held responsible for every calamity that befalls humanity. Disasters triggered by human activities are closely tied to the use of resources. Human activities which include those related to technological and industrial activities such as industrial

accidents, chemical spills, radioactive fallout and the like are not only hazardous to our health but may set in motion a chain of disastrous consequences (ibid, 2016).

This means that globally, marine pollution is basically related to human activity which includes inappropriate agricultural and farming practices, coastal mining and tourism activities, ports and harbour construction, fishing, industrial and other manufacturing activities, marine plastic litter, among others. This is evident in Ghana's capital Accra, where most of the populace depend on plastic bags and other plastic consumer goods for their day-to-day activities. These plastics accumulate in waterways that clog drains during heavy rains. It has been recorded that plastic waste caused a significant flooding event in which at least one hundred and fifty (150) people died and damage was caused to properties (Jambeck et al., 2018).

According to a study conducted by Adika et al., (2020) Ghana generates 3000 tons of plastic waste daily of which 250,000 tons of plastic waste generated are dumped into the Atlantic Ocean annually. Additionally, out of the 3000 tons of plastic waste generated only 5% of plastic are collected and recycled (GEF, 2019; GoG, 2020).

For instances, Wilcox et al., (2015) stated that by "2050 almost 99% of seabirds will have ingested plastics and that effective waste management can reduce this threat."

Poor sanitation has been identified as one contributory factor of marine pollution globally. It is also noted that half of the world's population live in urban areas with a higher urban growth occurring in Asia and Africa (Penrose et al., 2010).

However, the world's largest cities which are New York and Tokyo record urban growth of just 1%, but in some African cities like Nairobi, Lagos and Accra, the annual urban population growth is estimated at 6 % (Todaro & Smith, 2006). The effect of urban growth is that the growing lack good sanitation facilities and so they litter the environment and most of the pollutants drain into or are discharged directly into the water bodies and sea. Despite the poor nature of urban population globally, access to good sanitation facilities is still low. For instance, sanitation coverage of south-Eastern and Eastern Asia is about 17% between 1990 and 2006 (WHO/UNICEF, 2008).

In general, the global picture on plastic pollution is very alarming, and it is a big development challenge in developing countries in particular. This is because; it is

reported that more than 2.5 billion of the world population lack 'basic sanitation facilities.' Interestingly, 80% of the 2.5 billion people in the world with poor sanitation are in Asia and Sub-Saharan Africa (WHO, 2009). This has explained urban pollution, and particularly the coastal or marine pollution, still a big development challenge in most Asia and African countries such as Ghana and this explains the relevance of this study.

2.4 Marine Plastics Litter in Africa

Plastic debris causes great damage to Africa's coastal areas which destroys the survival of marine species (West Africa Coastal Area Management Programme, 2016). This harmful plastic debris, which forms 80% of all marine litter, are plastics (Chico-Ortiz et al., 2020). Yet, Africa's growing middle class continues to create more consumer markets for plastic goods than it used to be (Deloitte, 2014). Given that African population growth and urbanisation along the coastal zone is expected to increase by 2060. The African continent cannot be ignored on the issue of marine plastic waste (Jambeck et al., 2018).

Most plastic wastes in West Africa are not properly managed which ultimately end up in the marine environment as a result of human movement and behaviour (Adam, et al., 2020). A study conducted by the International Union for the Conservation of Nature (IUCN) Environmental Law Centre (n.d) revealed that lack of institutional coordination and harmonized legislation and policies are part of the problems of increased marine plastic litter. In order to have a sustainable plan, there is the need for further research to aid the development of an appropriate policy to tackle the plastic litter menace.

In Africa, the volume of waste generated in the urban and rural areas is rapidly increasing with the increasing proportion of people living in the urban centres. It is estimated that about 71% of urban settlements in Sub-Saharan Africa (SSA) live in poor environmental conditions. The uncontrolled discharge of domestic, urban and industrial and mining wastes and effluent in the absence of good sanitation facilities makes the problem very grave in Africa. Good environmental sanitation facilities keep the environment clean, but poor sanitation facilities encourage pollution. This is

because; people discriminately dispose of waste and pollute the environment. Despite this challenge, the coverage of good sanitation conditions in Sub-Saharan Africa is only 5% (WHO/UNICEF, 2008).

2.5 Marine Plastic litter and Pollution in Ghana

The growing population, especially urban population concentrations and socio-economic activities, particularly industrial activities in the coastal areas pose great danger to the quality of the marine and coastal environments particularly along the coastline (Armah, 1993).

There are approximately fifty different groups of plastics produced in Ghana, which come in different varieties, forms, and not all of these plastics are recyclable (GEF, 2019). Sorting which allows plastic waste to be controlled and managed is not well known and practised as part of the Ghanaian waste management culture. For instance, plastics industry establishments in other parts of the world have developed appropriate marking codes to ensure the identification and sorting of plastics waste by consumers, however this is less practised in Ghana (GEF, 2019; Ghana Team Policy Brief, 2018).

2.5.1 Types of Plastics Produced and Imported into Ghana

The most common type of plastics used in Ghana as presented in table 2.

Table 2: Types of plastics produced and used in Ghana

Types of Plastics	Uses
Low density polyethylene (LDPE)	Black/White Carrier bags and bin liners
Polyvinyl chloride (PVC)	Bottles for squash, mineral water, shampoo, food tray and cling film
High density polyethylene (HDPE)	Bottles for milk and washing-up liquid
Polyethylene terephthalate (PET)	Oven ready meal trays and carbonated drink bottle
Polystyrene (PS)	Plastic cutlery, protective packaging for electrical goods and toys, vending cups, yoghurt pots, foam meat or fish tray, hamburger boxes and egg carton
Polypropylene (PP)	Plastic woven sacks for salts, rice, sugar and plastic strip bags ("Ghana must Go") for travelling, margarine tubes and microwavable meal tray

Source: Global Environment Facility (2019)

In Ghana plastics waste is divided into two categories: primary and secondary plastic waste. The primary plastic waste is mostly generated by the plastic producing manufacturing industry and it is suitable for reprocessing. This is because it is usually homogeneous and recycling is easy and comparatively economical. Whereas the secondary plastic waste comes from sources other than the industries. It is a mixture of various forms of plastics due to the consumption and littering behaviour of people. It is difficult to directly process as it contains different types of plastic waste (GEF, 2019).

2.5.2 Sources of Plastic Waste in Ghana

The main sources of plastics waste in Ghana are from municipal, commercial, industrial and marine (GEF, 2019).

2.5.2.1 Municipal Plastic Waste

Municipal plastic waste that are collected from residential areas. Plastic waste has a destructive effect on the environment by polluting water bodies, choking drainage and

littering of the environment (GEF, 2019). These are plastic wastes generated in the urban areas. These are from street sweeping, general plastic wastes from parks, recreational centres and other plastic wastes disposed of by municipal bodies. They also include a mix of paper, plastics and other related wastes.

2.5.2.2 Commercial Plastic Waste

These are plastic wastes generated from shops, supermarkets, hotels and restaurants and packaging materials made from polyethylene (PE). Commercial plastic waste is more common in cities. In Ghana, the urban areas produce plastic wastes at a rate that outpaces their capacities to collect and dispose of them (GEF, 2019).

The plastic waste disposal menace has transcended Ghana's economy and all social classes in the country, in the same manner as the plastic substance. This workable molecular polymer has become an insignia not only in Ghana, but the entire world in this modern era. Inexpensive plastic materials which are gotten from virtually everything from automobiles to household equipment are littered all over the country, more so, in commercial centres where the toxic effects are extremely evident. Plastic substances which are made from petrochemicals or natural gas usually come in infinite shapes, of infinite uses, of infinite possibilities and time (Ghanaweb, 2016; Moro, 2017). The durability of these addictive substances which are not biodegradable has become the greatest worry when discarded. This characteristic of plastic substances enables them to remain in ecosystems for thousands of years, thereby posing serious risks to ecosystems and networks. Quite often, people have concluded that the easiest way of disposing of plastic waste is through burning. It is sad to note, however, that toxic fumes are released into the atmosphere once plastic materials are burnt, causing diseases (Weinaah, 2007). Within the commercial centres in the country which are the worst offenders of poor plastic waste disposal practices, plastics usually find their way into drains and clog sewage lines and marine environment, causing health risks such as cholera outbreaks as well as floods and fire outbreaks in shops and offices. Thus, the manufacturing of polythene bags and other plastics materials for commercial purposes largely contributes to marine plastic littering (Ghanaweb, 2016).

2.5.2.3 Industrial Plastic Waste

Amount of plastic waste generated by numerous industries in Ghana, for instance plastics that have been used to wrap factory products which are indiscriminately discarded and end up in municipal dump (GEF, 2019). More alarming is the fact that the use of plastic packs in Ghana as carriers is very extensive, a situation that has been encouraged by the quantum of plastic packs that is being produced in the country currently.

2.5.2.4 Marine Litter

Plastics are filling up the world's ocean, rivers and shoreline. This happens as a result of plastic waste generated by coastal populations which are not properly managed and travel a long distance with ocean currents and winds which are found in the marine and coastal environment (Moro, 2017). In very acute situations, such as the Odaw River and Korle Lagoon in Accra, these become lifeless to the disadvantage of being engulfed with plastic litter. In spite of plastic litter increasing along the coastline, the Government announced that plastics would not be banned, and that the growth of the country is dependent on plastic products (Armah, 1993; Ayee, 2003; EPA, 2009; GEF 2019; Muntaka, 2019; Songsore, 2005).

Holidaymakers leave a large amount of waste at the beach which is mainly plastic bottles, cigarette butts, packaging and plastic bags along the coastline. Access to most of the beaches in Ghana is free of charge. However, there are private operators who provide sunshade, chairs to visitors, and sometimes take care of the beach cleanliness. There are also not enough waste containers installed at most of the beaches to control plastic waste. Beach visitors use plastic bottles water and ‘pure water’ sachet to wash themselves due to absence of shower and they do not environmentally dispose these plastic wastes properly (GIZ, 2018; Moro, 2017).

Figure 2 depicts the nature of marine plastic litter at Jamestown beach in Accra, Ghana.

Figure 2: Jamestown beach, Accra.

Source: Muntaka Chasant, "Marine Plastic Litter in Ghana" 2018.
https://www.atcmask.com/blogs/blog/plastic-pollution-in-ghana

Given the plastic pollution situation in the Greater Accra region, it remains a mystery why there is still the persistence of relatively high marine pollution in the capital city of Ghana. This could be attributed to urban population growth without corresponding access to proper waste management facilities. There is a continuous challenge to seek and drive information based on research evidence that can potentially be engaged to address marine plastic litter in Ghana. This has underpins the relevance and of this study.

2.6 Drivers of Marine Plastic Litter

In literature, social-ecological framework has been used to explain the interaction between man and his environment, and analysis of social-economic environmental issues like marine pollution (Beaumont et al., 2019; Binder et al., 2013). The model identified the following factors as the causes of marine plastic pollution.

2.6.1 Drivers of marine pollution

The driving factors of marine pollution are related to the fundamental needs of the people, and these include movement of goods and services, safety needs, food security, shelter, hygiene, and wellbeing (Elliott et al., 2017).

2.6.2 Economic sector activities

In order to meet human needs, there is the need to carry out economic activities and these include transportation (movement of persons, goods and services) to make some money or earn a living, agricultural activities or farming to (produce food), construction, manufacturing, mining, fishing and recreational activities, tourism (UNEP, 2016).

2.6.3 Pressures

Pressure refers to the consequences of inappropriate activities or actions that impinge negatively on the environment and these are land-based and sea-based activities. The land based-related activities include (construction, mining and farming). The sea-based activities that use beaches also include shipping, swimming, tourism and recreation (Boucher & Friot, 2017).

2.6.4 Impact (on Human Welfare)

The possible impacts of marine pollution on human welfare includes loss of life, increased public health issues, loss of income, loss of jobs, and social wellbeing (Welden, 2020).

The scholars in the literature reviewed above discuss the elements of the root causes of marine plastic litter into the sea. The scholars similarly stated that about 80% of marine plastic litter is from land-based sources while 20% is from sea sources. However, these scholars failed to underscore the impact of personal behaviour and habits in the disposal of marine plastic waste into the sea. Similarly, it is the considered opinion of the researcher that the scholars did not pay particular attention to the role played by humans on marine plastic litter and the expansion of infrastructure along the coast as one of the major causes of marine plastic litter.

This chapter dealt with review of literature and focused on key concepts of marine plastic litter, global overview of marine plastic litter, Africa and that of Ghana. The next chapter discusses general overview of international legal frameworks and instruments for the protection and preservation of the marine environment.

Chapter 3: General Overview of International Legal Framework for Marine Plastic Litter

3.1 Introduction

This chapter looks into the general overview of international legal framework and convention for the protection of the marine environment as well as focus on marine plastic litter. The frameworks includes UNCLOS, IMO Action Plan, MARPOL 73/78, Abidjan Convention, UNEP and Global Programme of Action (GPA). The chapter further discusses Ghana's obligation under the above-mentioned conventions and instruments.

3.2 United Nations Convention on Law of the Sea (UNCLOS)

The 1982 United Nations Convention on the Law of the Sea (UNCLOS), Part XII imparts a special mandate on States to protect and preserve the marine environment (John & Amedu, 2019). This is stated in the following selected UNCLOS Articles:

Article 192 "States have the obligation to protect and preserve the marine environment" (UNCLOS, 1982).

Article 194 stipulates that States are to take the necessary measures consistent with the Convention to prevent, reduce and control pollution of the marine environment from any source, by using the best practicable means at their disposal and harmonize their policies in that connection (UNCLOS, 1982).

Article 211(2) "States shall adopt laws and regulations for the prevention, reduction and control of pollution of the marine environment from vessels flying their flag or of their registry. Such laws and regulations shall at least have the same effect as that of generally accepted international rules and standards established through the competent international organization or general diplomatic conference" (UNCLOS, 1982).

Further, UNCLOS imposes an obligation and responsibility on State actors to adopt and formulate national legislation to ensure its implementation. Additionally, the

convention sets out overall principles and obligations regarding flag, port and coastal states rights and responsibility to protect and preserve the marine environment. Ghana ratified UNCLOS on 20 March 1983 and has the responsibility to take necessary measures to bring national laws into conformity with the convention (Beick-Baffour, 2000; Danso, 2016).

Having considered UNCLOS, it is worthwhile an example of formulation to turn to other more focused instruments. The next instrument to be considered is that of IMO Action plan on marine plastic litter from ships followed by MARPOL 73/78, then Abidjan convention, UNEP and GPA.

3.3 IMO Action Plan on Marine Plastic Litter

In October 2018**,** the International Maritime Organization (IMO) adopted the IMO Action Plan to address marine plastic litter from ships (Resolution MEPC 310 (73), 2018). The action plan complement existing policies and regulatory frameworks as well as introduce new measures to address marine plastic litter from ships. The action plan is set to: consider measures to enhance the implementation of MARPOL Annex V, enhance adequate port reception facilities and provide basic training on marine environment awareness oriented on marine plastic litter (Louka, 2020).

The IMO Action plan is in accordance with its support to meet the set target of United Nations 2030 Sustainable Development Goal (UNSDG) 14 on ocean (IMO, 2019). The IMO adopted a guideline recommending manufactures, port and terminal, ship-owners and operators, cargo owners and government to reduce the generation of all forms of garbage in relation to ship supplies, provisions and cargoes (Resolution MEPC. 295(71), 2017).

To ensure the advancement of the Action Plan, the IMO reminds parties to MARPOL Annex V of their obligation under regulation 8 of MARPOL Annex V for adequate provision of port reception facilities at ports and terminal to receive garbage including plastic waste (MEPC.1/Circ. 893 July 2021).

3.4 MARPOL 73/78

United Nations Convention on the Law of the Sea (UNCLOS) Part XII Article 192 and Article 211 paragraph 2 mandates states for the creation of the International Convention for Prevention of Pollution from ships (MARPOL) to deal with pollution from ships (UNCLOS, 1982).

On 2 November 1973, the MARPOL convention was adopted at the International Maritime Organization (IMO) but had not yet entered into force when the 1978 protocol was adopted. The 1978 protocol was adopted as a result of series of tanker accidents in 1976-1977, since the 1973 MARPOL convention did not enter into force the protocol of 1978 absorbed the 1973 convention. Both conventions entered into force on 2 October 1983. On 19 May 2005, the convention was amended by the adoption of a protocol of which a new Annex VI was added. The MARPOL Convention has constantly been updated over the years (IMO, 2019).

MARPOL 73/78 provides the platform for the control of both accidental and operational pollution as well as the protection of the marine environment from harmful substances discharged at sea. The convention regulates various sources of ship-generated pollution which are contained in the six technical Annexes. While annexes I and II are mandatory for States that have ratified the convention, annexes III, IV, V and VI are optional (IMO, 2019; John & Amedu, 2019; Lloyd's Register, 2021; Marine Insight, 2021; MARPOL 73/78 & 2017).

3.4.1 Functions and Applicability of various Annexes of MARPOL 73/78

1. **Annex I – Regulations for the prevention of pollution by oil:** the annex entered into force on 2 October 1983. This annex provides measures for the prevention of oil pollution from both operational and accidental discharges. The annex makes it mandatory for new oil tankers to have double hulls and existing tankers to fit a double hull (IMO, 2019; TOCPRO, 2015).
2. **Annex II – Regulations for the control of pollution by Noxious Liquid Substances in Bulk:** the annex entered into force on 6 April 1987. It provides detailed criteria and measures for the discharge of noxious liquid substances in

bulk. Under this annex, ports and terminals are obliged to have adequate reception facilities for cargo residues (IMO, 2019; Metonwaho, 2018).

3. **Annex III – Prevention of pollution by Harmful Substances carried in Package Form** entered into force on 1 July 1992. The annex provides general detailed requirements for ships on the standard of labelling, marking, packing, documentation, stowage, quality limitations, exceptions and notification. It specifies harmful substances that are pollutants as described in the International Maritime Dangerous Goods Code (IMDG Code) (IMO, 2019).
4. **Annex IV – Prevention of pollution by sewage from ships** entered into force on 27 September 2003. The annex prohibits the discharge of all sewage into the sea except where the ship has an approved sewage treatment plant for discharging sewage into the sea or the discharge at a distance of more than 12 nautical miles from the nearest land (John & Amedu 2019; IMO, 2019).
5. **Annex V – Prevention of Pollution by Garbage from ships**: the annex entered into force on 31 December 1988. The provisions as contained in this annex deal with the prohibition of all garbage into the sea except provided under certain conditions. The annex regulates a ship above 400 gross tonnage and more than 15 persons and imposes ban on the disposal of all forms of plastics into the sea (John & Amedu 2019; IMO, 2019; TOCPRO, 2015). State parties are under the obligation to undertake the necessary measures to have adequate port reception facilities to receive garbage from ships to avoid undue delays to ships (Metonwaho, 2018).

6. **Annex VI – Prevention of Air Pollution from Ships:** the annex entered into force on 19 May 2005. The annex prohibits the deliberate emission of ozone depletion and sets limits for sulphur oxide and nitrogen oxide emitted from exhaust and sets more stringent standards for SOx and NOx (IMO, 2019).

MARPOL 73/78 & 2017 applies to all ships as contained in the various annexes. The regulations in the annexes are obligatory which requires Contracting States to transpose these regulations into their national laws to ensure compliance (MARPOL Consolidated, 2017).

In 1994, MARPOL Annex V a provision to allow port state control to cover operational requirements was adopted and entered into force on 3 March 1996. The provision obligates port states control officers to inspect foreign-flagged ships at port or an offshore terminal of its States. It is required under the provision that where the port state control officers have a clear ground to believe that the master or the crew are not knowledgeable with essential shipboard procedures in the prevention of pollution by garbage the officers are mandated to inspect that ship (IMO, 2019).

State parties particularly, port states are under obligation to ensure that there are adequate provisions of reception facilities at ports and terminals for the reception of garbage as well as meet the needs of the ships using the ports to avoid undue delay to ships. The Marine Environment Protection Committee (MEPC) in its quest to tackle the problem of inadequacy of port reception facilities adopted at its fifty-fifth session (October 2009) the "Action Plan on Tackling the Inadequacy of Port Reception Facilities." In March 2018, the MEPC further adopted a revised consolidated guidance as a practical guide for users and ship crew. The guidance is to prevent any barrier to efficient delivery of MARPOL waste/residue at shore (Resolution MEPC 83 (44), 2018). The aim of the port reception facilities manual and guidance is to ensure adequacy of port waste reception facilities.

It is requested that flag states makes available to ship-owners and masters the revised consolidated guidance as well as to the attention of all parties concerned the relevant data on IMO's Global Integrated Shipping Information System (GISIS) to promote dissemination of information (1:\CIRC\MEPC\01\MEPC 834, Rev.1; MEPC.1/Circ.834; IMO, 2019).

Ghana being party to the convention is under the general obligation to ensure the implementation of the provisions under MARPOL 73/78. The Ghana Maritime Authority (GMA) being the lead authority is tasked with the responsibility to ensure the implementation of the convention (Ghana Maritime Act, 2002 (Act 630) as amended; Tullow Ghana Limited, n.d).

The GMA was established under the Maritime Authority Act (Act 630 of 2002) tasked with the responsibility for monitoring, regulation and coordination of all maritime activities for the Republic of Ghana. The purpose of the GMA is to ensure the

provision of safe, secure, efficient shipping operations and the protection of the marine environment from ship source pollution (Tullow Ghana Limited, n.d.). The GMA as a flag state, port state as well as coastal state is to ensure that ships complied with the provisions as contained in the convention to prevent pollution of the marine environment and to sanction offenders for non-compliance (Hilmi, 2019).

The major causes of deterioration suffered in the marine environment are waste ranging from plastics, rubbish and cargo waste. To achieve a complete elimination of these marine environmental pollution and other harmful substances discharged into the sea, MARPOL 73/78 requests ports to have a reception facilities for the treatment of waste from vessels (Bilbaoport, 2021).

The Ghana Ports and Harbours Authority (GPHA) is responsible for the planning, managing, building and operating of Ghana's seaports with its two ports in Tema and Takoradi. GPHA functions with regards to their operations are to regulate the use of the port and of the port facilities (Tullow Ghana Limited, n.d).

GPHA is mandated to establish adequate port reception facilities to receive waste from ships. The GPHA under its Estate and Environment department have instituted compulsory fees at the Tema and Takoradi port for the disposal of waste at the port reception facilities for all vessels calling at the port regardless whether the vessel has any waste to discharge or not (Lawer et al., 2019).

The two ports in establishing port reception facilities in compliance with MARPOL Annex V to promote good environmental standards and practices have given licenses to different private operators to receive waste at the ports (Euroshore, 2019). The following private operators at the two ports as shown in Table 3:

Table 3: Private Operators at the Two Ports in Ghana

Port Waste Reception Facility	Location of Terminal	Scope (Work Area)	Capacities (Annexes)
Jokjim Company Ltd	Tema Industrial Area	Quayside	I, IV, V
Tilbury Environmental Group	Kpone Kokompe	Quayside	I, V
Ecostar Environmental Service Ltd	Tema Industrial Area	Quayside	I, IV, V
Bluefone Marine Ltd	Kpone Industrial Area	Anchorage	I, V
Ri-God Ventures Ltd	Kpone Industrial Area	Anchorage	I, V
Western Marine Services Ltd	Tema Industrial Area	Quayside	I, V
Wavoc Unique Company Ltd	Tema Industrial Area	Quayside	I, V
Marine Waste Management Company Ltd	Kpone Industrial Area	Quayside	I, V
Christian Nyamodor Oil Company Ltd	Tema Industrial Area	Anchorage	I, V
UCL Ghana Ltd	Kpone Industrial Area	Quayside	I, V
Dexter Cleaning Services Ltd	Kpone Industrial Area	Quayside	I, V
Manuel Environmental Services	Kpone Industrial Area	Quayside	I, V
Kpabulga Energy Ltd	Kpone Industrial Area	Anchorage	I, V
Zup Oil Ltd	Kpone Industrial Area	Anchorage	I, V
Zenith Marine Services Ltd	Kpone Industrial Area	Anchorage	I, V

Source: GPHA (2021)

In order to make it possible for the private operators to operate, they are to obtain a permit from Ghana's EPA detailing the measures they are to adopt to prevent and reduce environmental impacts or pollution (Lawer et al., 2019).

3.5 Abidjan Convention

The Convention for the Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central Africa Region (Abidjan Convention) was adopted on 23 March 1981 in Abidjan, Côte d'Ivoire which is a treaty adopted under the auspices of the United Nation Environment Programme (UNEP) and entered

into force on 5 August 1984 (Metonwaho, 2018; Abidjan Convention Secretariat, 2014).

The Abidjan Convention Article 4, 5 and 7 establishes a general requirement for States parties to:
Article 4(1) emphasizes that, contracting parties to the convention are under the obligation to take all necessary measures to prevent, reduce, combat and control pollution and enhance sound management of the marine environment in the convention area (Abidjan Convention, 1981).

Whereas Article 5 addresses pollution from ships and mandate contracting parties to take appropriate measures in conformity with international law to prevent, reduce, combat and control pollution in the Convention area caused by normal or accidental discharges from ships, and ensure that necessary application internationally recognized rules and standards relating to the control are being adhered to (Abidjan Convention, 1981).

In addition, Article 7 which addresses pollution from land-based obligates contracting parties to take all appropriate measures to prevent, reduce, combat and control pollution of the Convention area caused by discharges from rivers, estuaries, coastal establishments and outfalls, coastal dumping or emanating from any other sources on their territories (Abidjan Convention, 1981).

The responsibility is on the Contracting parties to cooperate with relevant international, regional and sub-regional organizations to establish and adopt standards, practices and procedures and appropriate measures to fight pollution. It is of utmost importance that these initiatives have to be supported by the national laws (International Waters Governance, n.d.).

Similarly, Abidjan convention Article 4, 5 & 7 and UNCLOS, Article 197 mandates States to ensure the protection and the preservation of the marine environment. The States can operate single-handed or through regional co-operation. Ghana has the responsibility to co-operate with neighbouring countries such as Togo, Benin, Côte d'Ivoire, Nigeria, Liberia and above all the whole region of West Africa as well as the

global community as a whole in the protecting and preserving the marine environment. By doing so, the Government of Ghana can achieve its obligation under the Abidjan Convention as well as UNCLOS (Danso, 2019).

3.6 United Nations Environment Programme (UNEP)

UNEP was established in 1972 to address environmental issues. UNEP uses its expertise to provide environmental standards and practices as well as helps countries to implement their environmental obligations at the global and regional levels. UNEP mission is to assess environmental conditions and trends at global, regional and national level, development of agreement and national environmental institutions and strengthen institutions for prudent environmental management (United States Environmental Protection Agency [EPA], 2021).

UNEP with the help of Nations Expert Panel engages countries in the educational campaign to raise awareness on plastic pollution and encourages the reuse and recycling of plastics. UNEP has established other international cooperative programmes to help address marine waste as well as microplastic pollution (Roger, 2020).

In Ghana, to achieve a high quality of environmental development and standards, the government adopted a national environmental policy and action plan with the aim of ensuring sound management of the environment. The government subsequently established the Ministry of Environment, Science and Technology in 1992 as a tool for maintaining the integrity of the country's environment (UNEP Press Released GA/EF 2731, 1996). Currently, the aforementioned ministry has been transformed to MESTI and tasked with the responsibility to ensure the implementation of National Plastics Management Policy (GoG, 2020).

3.7 Global Programme of Action

The Global Programme of Action (GPA) is a special mechanism created to tackle issues of land-based pollution. The GPA has been in operation since 1997/1998 in Hague and coordinates the UNEP Regional Sea Programme through its regional

offices. The document used by GPA is the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities and the Washington Declaration (1995). The GPA uses soft law instruments, which has no binding effects on state parties. GPA aim is to develop a conceptual and practical guidance for decision-makers at the national and regional level to deal with elimination of marine degradation from land-based activities. Additionally, GPA supports states to identify sufficient policies and measures with the aim of protecting the marine environment (GPA/UNEP, n.d).

Governments are requested to implement the GPA in partnership with its stakeholders, national and public organizations, local communities, non-governmental organizations and private sectors (UNEP, n.d). The parties set a common goal to deal with all land-based pollution on the marine environment especially from sewage, persistent organic pollutants, radioactive substances, oil (hydrocarbons), heavy metals, nutrients, marine litter and wastewater (GPA, 2019).

The GPA has over the years simplified its focus to three areas such as sewage, nutrient management and marine litter specifically on plastics (Delia, 2021).

The GPA, among its tasks in conjunction with the UNEP office, provides assistance to states in their duty to preserve and protect the marine environment from land-based activities. This is done through various capacity building and by providing technical programmes, which includes National Programme of Action or the Integrated Coastal Area and River-Basin Management (ICARM). Countries are requested to implement the GPA through their own National Programme of Action (NPAs) (Meier-Wehren, 2021).

In Ghana, the EPA has been empowered to ensure the effective development of the National Environmental Action Plan for a sound and sustainable environment. The EPA accordingly undertook the review of its existing legislation on environment with the aim of making the necessary modifications to ensure effective enforcement and application. EPA has provided guidelines for Environmental Impact Assessment (EIA) as well as measures being taken by all relevant agencies such as District Assemblies and government agencies in the prevention, control and elimination where possible sources of pollution. EPA have instituted appropriate means for disposal of waste. In

the case of pollution, the “polluter-pay” principle is applied where possible (UNEP, 1999).

Having looked at general overview of some international legal framework and instruments for the protection of the marine environment in this chapter the next chapter which is chapter four discusses Ghana’s legal framework in managing marine plastic litter as well as marine plastic litter situation in Ghana.

Chapter 4: Ghana's Legal Framework in Managing Marine Plastic Litter

4.1 Introduction

This chapter examines the marine plastic litter situation in Ghana, various plastic management policies in Ghana, the extended producer responsible as a tool to cover plastic waste collection and the role of ministries and agencies responsible for the implementation of the national plastic management policy.

4.2 Ghana's Marine Plastic Litter Situation

Plastic waste management is affected by inadequate waste management infrastructure like the collection, transportation and treatment of waste in the country. It is estimated that Ghana generates solid waste ranging from 13,000 to 30,000 metric tons daily (which is an average of 0.47kg per person per day in the household) (GEF, 2019) . Out of the waste generated only 14% is collected, 38% is dumped in open spaces, 9% is dumped indiscriminately and 11% is burned (GEF, 2019). Additionally, about 120 companies manufacture a variety of over 52,000 tons of plastic products per year (GoG, 2020). It is generally assumed that more than one million tons of plastic waste are generated every year, and this means that approximately there are over 3,000 metric tons of plastic waste generated across the country everyday which forms 14% of the entire municipal solid waste (GoG, 2020; GEF, 2019; EPA, 2009). Studies show that the situation is similar throughout major cities in Ghana. Thus, the urban areas of Ghana produce plastic waste at a rate that outpaces their capacities to collect and dispose of them. Table 4 depicts a plastic waste generation in Ghana

Table 4: Plastic Waste Generation in Ghana

	Plastic Distribution by Grade (%)	**Daily Tons**	**Annual Tons**
Plastic Generation	14% of municipal solid waste	3,000	1,095,000
LDPE (film)	25.31	760	277,147
PET	23.00	690	251,850
HDPE	19.19	576	210,131
PP (rigid)	10.61	318	116,180
PS	03.75	113	41,066
PVC	04.31	129	47,195
Others	13.83	415	151,439

Source: Global Environment Facility (2019)

4.3 An Overview of the National Plastic Management Policies Ghana Adopted for Addressing Marine Plastic Litter

The problem of marine plastic litter has been in existence for decades and has gained recognition globally in recent times due to education and awareness of its impact on the marine environment. This has made countries put in place measures and policies to address this problem (UNEP, 2021). Although Ghana has put in place some policies and intervention to address the of plastic litter waste management over the years, the majority of plastic waste generated in the country is often discharged into the coastal and marine environment (GoG, 2020; GEF, 2019). One major reason for the widespread occurrence of marine plastic litter in our oceans is the deficiencies and lapses in public policies, regulations and enforcement measures. In addressing this issue many countries are making the necessary efforts to develop and implement regulations, strategies, national and regional programmes to protect; prevent and reduce marine plastic litter pollution (UNEP, 2021).

Article 36(9) of the 1992 constitution of the Republic of Ghana provides a broad framework for the state institutions and citizens' responsibility for the protection, maintenance of a clean and healthy environment in promoting human wellbeing and national development (Ghana's 1992 Constitution, 2021). Ghana in fulfilling this responsibility has ratified a number of international agreements, treaties and enacted a series of national legal frameworks to safeguard and protect the marine environment (Health and Pollution Plan, 2019).

Consequently, the government of Ghana through the MESTI has developed a comprehensive National Plastics Management Policy (NPMP) in addition to existing plastic litter laws for the management and sustainable use of the environment and subsequently for the reduction and possibly elimination of marine plastic litter. The NPMP focuses on the following four areas to ensure effective plastic management and also to contribute to socio-economic development (GoG, 2020). Appendix 1 shows the four NPMP structure.

(1) Behavioural change;
(2) Strategic planning and cross-sectoral collaboration;
(3) Resource mobilization towards a Circular Economy, and
(4) Good governance, inclusiveness and shared accountability.

The NPMP for the reduction and elimination of marine plastic litter is based on the United Nations Environment Assembly (UNEA) Resolution 1/6 on Marine Plastics Debris and Micro Plastics, which was adopted by delegates from 160 countries in June 2014 including Ghana (GoG, 2020). The MESTI is to lead the implementation of the NPMP and tasked to work closely with key stakeholders, ministries, business community and civil society (GEF, 2019).

On 1 October 2019, Ghana became the first African member to formally join the Global Plastic Action Partnership (GPAP). The GPAP is a public-private platform with the aim of bringing State Parties together to combat the plastic litter crisis including marine plastic litter (GPAP, 2020). The Ghana National Plastic Action Partnership (NPAP) is also to work closely with the MESTI to develop a national framework to sustainably manage plastic and reduce the plastic waste challenge that has engulfed the country.

Ghana is a Party to the international obligations in the protection of the marine environment (GoG, 2020). Some of the conventions include:

- Convention for Cooperation in the Protection and Development of the Marine and Coastal Environment of the West, Central and Southern Africa Region (Abidjan convention), 2017;
- Bamako Convention, 1998,
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1992, and
- The Stockholm Convention on Persistent Organic Pollutants

4.3.1 Plastic Revolution Foundation and Extended Producer Responsibility

The Plastic Revolution Foundation (PRF) has been established to help combat mismanagement of plastic waste in Ghana. The PRF vision is to eliminate plastic waste in the cities, the environment as well as improve sanitary conditions with support from Metropolitan, Municipal, District Assemblies as well as the general public. The PRF is to adopt the Extended Producer Responsibility (EPR) as a waste policy tool to mobilise funds to cater for the cost of plastic waste collection and is promoted by an increased awareness of the challenges of marine plastic litter (Plastic Revolution Foundation [PRF], 2021).

4.4 Existing National Policies and other Regulations on Marine Plastic Litter

The Government of Ghana over the years has put in place some policy measures to address plastics wastes in the country. The Government's past efforts of managing plastic wastes and engaging a wide range of solutions to improve plastic waste through various Government agencies and ministries, civil society and actors in the private sector has not been fruitful. The ineffective implementation of past and current plastic waste management interventions has been attributed to weak enforcement of existing legislation and appropriate policy (GEF, 2019).

In Ghana, there are some existing policy measures to deal with waste in the country. For instance, there exists a waste regulation policy promulgated by the Ministry of

Local Government and Rural Development, the MESTI in conjunction with the EPA in 1996. In addition, in 1999, the Ministry of Local Government and Rural Development came up with the National Environmental Sanitation Policy to develop and maintain a clean and safe physical environment for human settlements. The local government authorities in the country are also enjoined to develop strategic environmental plans to implement programmes to deal with waste in the country (Addo, 2013).

The EPA has also designed solid waste as well as plastic waste management guidelines for Municipalities, to protect health and environment. The EPA ensures the District Waste Management Plan (DWMP) addresses all aspects of solid waste management in the district namely: Health care waste; Hazardous waste (including industrial waste); public cleansing and Promotion of recycling (Addo, 2013; MLGRD, 2009).

The table below depicts some policy interventions by the Government of Ghana over the years to deal with the plastic waste management in the country from 1990 to 2015

Table 5: Intervention of Plastic Waste Management from 1990 to 2015

Year	Intervention
1990	Committee set up by the Ministry of Trade and Industry to ban sachet sale and distribution
2004	Committee metamorphoses to the plastic waste management task force
2006	Formation of plastic waste collectors association
2007	Formation of plastic waste management project
2008	Report on the ban of plastics/committee came out with recommendations
2009	CHF's Youth Engagement service programme started
2010	Cash your trash AMA integrated solid waste management strategy report tackling plastics
2011	Environmental tax first imposed
2012	Zoomlion's Material Recovery Facility (MRF) started operation
2013	Plastic to cash programme
2015	Evolve programme

Source: GoG (2020)

4.5 Roles and Responsible for the Implementation of the NPMP

In Ghana, the institutions concerned with implementation of environmental sanitation policies are divided into two. These are principal sector agencies and allied sector agencies.

The principal sector institutions are:

1) Ministry of Local Government and Rural Development (MLGRD)

The roles of MLGRD in addressing environmental issues are as follows:

- Coordinate and formulate of environmental sanitation policy including monitoring and evaluation;
- Develop and provide technical guidelines on environmental sanitation services and their management;
- Promulgation of national legislation and model bye-laws;
- Direction and supervision of the national environmental sanitation policy coordinating council and facilitating the mobilisation of funds for sector plans and programmes (Addo, 2013; MLGRD, 2009).

2) The National Environmental Sanitation Policy Coordinating Council (NESPOCC)

This council has representatives from government agencies, Non-Governmental Organizations (NGO's) and private sector groups. Its functions include:

- Coordinating policies and ensuring effective communication and cooperation between the many different agencies involved in environmental sanitation within the context of a coherent national programme;
- Expediting implementation of national environmental sanitation policy including overseeing the preparation of a national strategy and its related financing plan for investments at Metropolitan, Municipal and District Assemblies level (Addo, 2013).

3) Environmental Health and Sanitation Directorate (EHSD)

This directorate, in collaboration with Regional Environmental Health Offices (REHOs), plays leading roles in supporting environmental sanitation problems. The functions of EHSD are identified as follows:

- Provision of guidance to MLGRD on environmental sanitation sector planning, policy and legislation;
- Provision of technical assistance to district assemblies and service providers;
- Coordinating and disseminating the result of research in the field of environmental sanitation and regulation of all service providers, both public and private (Addo, 2013; MLGRD, 2010).

Some of the allied sector institutions that deal with environmental problems in Ghana includes but not limited to:

1) Ministry of Environment, Science, Technology and Innovation (MESTI)

The MESTI is mandated to facilitate and promote the integration of environmental issues as well as formulation of policies and regulatory framework to enhance environmentally friendly, scientific and technological practices. The MESTI is to collaborate with other ministries to ensure improvement and protection of the environment from all impacts of improper plastic waste management (GoG, 2020).

2) Ministry of Sanitation and Water Resources

The Ministry is responsible for the formulation and coordination of policies in relation to water supply and sanitation. The Ministry is specifically tasked with the creation of programmes to monitor plastic waste management, promote, and uphold recycling targets at national and local level and to ensure that portable water supply is not packaged in single-use plastics (GoG, 2020).

3) Ministry of Education

The Ministry has the objective to educate Ghanaian youth to reshape their behaviour about plastic littering. The Ministry's aim is also to revise the curriculum to cover

topics of sustainable plastic management for more sustainable management of plastics in society (GoG, 2020).

4) Ministry of Tourism, Arts and Culture (MTAC)

The MTAC through its legislative Instrument (E.I, 2013) has been mandated to ensure stable and firm environmental policy for effective adherence to Ghanaian culture in all aspects of national life and ensure the improvement and advancement for the tourism industry. MTAC is to ensure that plastic waste is properly managed such that it will not to affect environmentally friendly tourism particularly in communities (GoG, 2020).

5) Parliament of Ghana

The Parliament is to ensure that agreements related to the management of plastics and plastic waste are appropriately ratified and should be in line with the objectives of NPMP (GoG, 2020).

6) EPA

The EPA was established in 1994, and tasked with the responsibility for the execution of environmental related policy. As part of its responsibilities, EPA is to sets national policies, norms, standards and guidelines related to pollution of water, land, air as well as other forms of environmental pollution which includes the discharge of waste and the control of toxic substances. The EPA is to cooperate with MESTI to facilitate the execution for the policy on plastic waste management as well as support national training conducted under the policy (GEF, 2019; EPA, 2021).

7) NPAP and Global Plastic Action Partnership (GPAP)

The NPAP and GPAP are to facilitate collaboration with MESTI on the NPAP in Ghana. The GPAP uses science and data driven evidence to establish a national baseline based on a model developed by GPAP and thus creates an action plan to combat plastic waste flow in Ghana. GPAP priorities includes building capacity in waste management and recycling as well as raising awareness and changing behaviours to reduce the consumption of single-use plastics (GPAP, 2020).

8) Ministry of Finance

The ministry is to provide financial support for plastic waste management projects. It undertakes this by resource mobilization and introducing action plans for the collection of levies on imported plastics products at entry point (GEF, 2019).

9) Ministry of Trade and Industry

This Ministry is responsible for driving the industrial development and trade in Ghana. The Ministry in the management of plastic waste supports the establishment of recycling facilities and collection centres to provide incentives to encourage plastic recycling through business regulatory reforms. Additionally, facilitates and supports the Small Medium Enterprises (SMEs) in the plastic collection and recycling activities (GEF, 2019).

10) Private Sector Institutions

In Ghana, Zoomlion Ghana and other private institutions such as SGS Renovo Ghana Programme, Association of Ghana Industries (AGI), Ghana Recycling Initiative by Private Enterprises (GRIPE), Environment 360, Nelplast Industry, and Climate Innovation Centre Ghana support the Government of Ghana initiatives and policy on plastics and other environmental related issues and problems in the country (GEF, 2019).

4.6 The Existing Policy Gaps and Lapses in the Marine Plastic Litter Management in Ghana

In Ghana, there is currently no specific policy on the marine plastic littering management in the country. The existing policy measures are also unable to address the plastics situation, and this has led to the use of plastics increasing exponentially (GoG, 2020). The increased use and disposal of polythene and other related plastics is causing environmental hazards and marine littering in the country. Ghana is also beset with some many challenges contributing to the environmental management lapses

compounding the marine plastic littering mostly in the country. Some of the identified lapses include:

i. Weak legal framework and enforcement, and inadequate policy incentives; High Cost of waste management and lack of national appropriate business model; Lack of formality of the current waste collection and disposal system;
ii. Lack of environmentally comprehensive national capacity, investment and infrastructure;
iii. Inadequate collection and recycling equipment and limited separation of plastic waste equipment at disposal sites;
iv. Lack of education and awareness of the effects of erroneous plastic wastes in the country (GEF, 2019).

This chapter discussed Ghana's legal framework in managing marine plastic litter, the roles and the responsibilities of the various agencies in the implementation of plastic litter policy as well as lapses in the policy implementation. The next chapter presents the summary of the key finding, conclusions and recommendations.

Chapter 5: Summary of Key Findings, Conclusion and Recommendations

5.1 Introduction

This study sets out to examine why the existing policy measures have failed to address the marine plastics litter situation in Ghana. It discusses general policy measures for the management of plastic waste in Ghana with a focus on aspects related to marine plastic litter and thereafter seeks to deduce possible recommendations to address these failed measures. The analysis is based on desk-based study design, and is complemented by review of the appropriate literature on marine plastic litter. This chapter summarises the key findings of the study, draws conclusions from the findings and makes some recommendations.

5.2 Key Findings

As per the study of marine plastic litter in the above chapters and discussions therein a set of findings are enumerated below:

1. Results of the review of analysis show the existence of many policy interventions in Ghana to deal with plastic waste management. Ghana is also a signatory to most of the portentous Conventions on environmental protection as aforementioned. However, the analysis indicates that all the institutions at national and local government levels of governmental authority are mandated to partly look into marine plastic litter although it is not their core duty.
2. There is no specific agency mandated to manage and prevent marine plastic litter in Ghana.
3. Generally, there are many agencies tackling plastic litter waste management in the country.

4. The existing measures to address marine plastic littering in Ghana are inadequate.
5. Numerous environmental problems are associated with plastic materials in the country, and particularly the pollution of the Ghanaian coastline.
6. The lack of specific policy to regulate plastics in the country has made their use prevalent in the country. An example is the use of plastic carrier bags in packaging during most commercial transactions in the country. These plastics when disposed wrongly are easily washed into the sea after heavy downpour of rain causing marine pollution.
7. Ghana lacks other alternatives like the use of paper bags and bio-degradable means of packaging and bagging.
8. The recycling of plastic waste in Ghana is a rare endeavour carried out on a very limited scale. There is currently only one company, 'Trashy Bags' (Ghanaweb, 2016), which is into the business of recycling plastic waste into reusable fashionable bags, laptop bags, backpacks, hats and wallets.
9. The analysis also revealed that a major lapse in dealing with the marine plastic litter in the country is the weak institutions, and the general lack of enforcement drive as well as specific law dealing with marine plastics litter in Ghana.
10. The systems for enforcing laws on marine plastic waste disposal are weak in Ghana. There is hence no compulsion on individuals to properly dispose of plastic wastes especially close to the coastline.

5.3 Conclusion

In this study, policies on the marine plastic litter in Ghana have been discussed. The analysis was done within the framework of international conventions and national policies on marine plastic litter. The study discussed the situation of marine plastic litter in Ghana. The study furthermore identified some state institutions and the roles they play in environmental sanitation in general. These state institutions are divided into two categories. These are the principal sector institutions and allied sector agencies. The analysis concluded with a discussion on the policy implementation arrangements and lapses with respect to Ghana's marine plastic litter management.

The conclusion from the review of analysis is that there is no specific policy and institution to deal with marine plastic litter in Ghana. Marine plastic litter wastes

management is part of the general environmental policy framework of Ghana. In addition, the existing measures to address waste management in general are inadequate, and they are not marine plastic litter specific measures in the country.

5.4 Recommendations

Based on the findings and conclusion of the study, the following have been recommended for action by the Government of Ghana and other stakeholders in the area of plastic waste management in the country.

1. There is the need for the Government of Ghana to have a specific policy primarily to deal with the marine plastics litter in the country. In this regard, the MLGRD and the Local Authorities should be the main agencies to oversee the implementation of the marine plastic litter policy in the country. Thus, in order to ensure that the national policy on marine plastic litter management successfully translates into action, there is the need for EPA in consultation with the MESTI and the National Development Planning Commission and other relevant institutions, to develop a new National Environmental Action Policy in Ghana with a detailed strategy including an action plan, set targets and time frames for the medium and long term on marine plastic litter management.
2. There is the need to establish an institutional framework with specific responsibilities to deal with marine plastics litter along the coast of Ghana. The institution or agency purposely to deal with marine plastic litter in general and coordinate the activities of stakeholders is very important. This institutional framework will give political and grassroots support to the sustainable use of Ghana's natural, human-made and cultural resources and management of plastics waste to ensure good life-styles for every Ghanaian. It will also ensure that the MESTI and EPA and other coordinating and management institutions like GMA and GPHA from the national down to the local levels perform their mandates as defined by the Act. A successful marine plastic litter management will then be assured through the maximum use of existing institutional structures. In order to avoid conflict of interest, the policy should assign responsibilities to separate institutions for plastic waste management in general and marine plastic litter in particular in Ghana. How, under the arrangement, the general environmental

protection, regulation and monitoring should be vested in the lead agency such as EPA in Ghana.

3. The existing legal framework should be enhanced to encourage the participation of all Ghanaians in the management of the plastic wastes. The framework should ensure that all aspects of the legal system are in agreement with the supreme law of the country and the prevailing political, socio-cultural and economic policies, and to harmonise these with the principles of sustainable development under international Conventions.
4. To reduce plastic litter at the beaches, the coasts and along the canals, there is need for education and awareness on marine plastic litter and its adverse effect on human health, marine life and the marine environment. This is to enable coastal dwellers and the public to know how to handle waste and the need to have proper waste collection and treatment centres. The need to intensify information and interaction with people on separating, reducing, reusing, recycling and disposing off plastic waste. Implementation of educational programmes on marine plastic litter and the environment on all school levels, information materials on the negative effect of plastic be distributed among the general public in the form of posters, leaflets, fliers on billboards, advertisement and on television.
5. A major factor required to ensure the success of implementation is the timely availability of adequate funding required for the programme and project implementation. Due to the cross-sectorial nature of the environment, financing arrangement for the sector has implications for all stakeholders such as district assemblies, ministers, individuals and communities.
6. The study also revealed that there are numerous opportunities for recycling plastics in Ghana. The Government must therefore be committed to assist the private sector to build more recycling plants to deal with the marine plastic litter situation in Ghana. The Government must also be willing to commit resources into building plastic recycling plants in Ghana.
7. A stringent enforcement mechanism would be needed to help ensure a good management of plastic waste in Ghana with specific attention on marine plastics litter.
8. Plastic waste disposal sites are usually difficult to come by. An efficient disposal mechanism would address this problem.

9. There is the need for collaboration by all stakeholders and to get international support, possibly an ECOWAS Convention on marine plastic litter as well as have a bilateral/multilateral agreement with neighbouring countries along the coast, Togo, Ghana and Côte d'Ivoire. Additionally, there should be some form of Memorandum of Understanding (MOU) in terms of how to deal with the marine plastic litter. For example, Ghana, Togo and Côte d'Ivoire can contribute money and machines together, policing the coast, mobilise and bring resources together both capital and human.
10. In the absence of an alternative to ban plastics, prices of plastic products could be increased to deter people from buying. In addition, the extended producer responsibility policy on plastics be effectively implemented.

5.5 Areas for further Research

The key limitation of this work is that the methodology is on desk-based study design. It is also a single study involving only the Ghana coastal belt. The study did not have the benefit of comparative based analysis. It did not also benefit from empirical data and information to validate claims based on the available literature on limitation of specific policy and institutional framework on marine plastic litter management in Ghana. There is therefore the need for empirical study on the same topic to validate the claims of this research paper. Also, further study can be undertaken to compare marine plastic litter situation in Ghana and that of other countries, particularly neighbouring Togo and Côte d'Ivoire.

References

Abalansa, S., El Mahrad, B., Vondolia, G. K., Icely, J., & Newton, A. (2020). The marine plastic litter issue: a social-economic analysis. *Sustainability*, *12*(20), 8677. https://doi.org/10.3390/su12208677

Abidjan Convention Secretariat. (2014). Developing best practice action plans for management of plastic waste in Africa https://www.biodiversitya-z.org/content/convention-for-the-co-operation-in-the-protection-and-development-of-the-marine-and-coastal-environment-of-the-west-and-central-african-region-abidjan-convention

Adam, I., Walker, T. R., Clayton, A., & Bezerra, J. C. (2021). Attitudinal and behavioural segments on single-use plastics in Ghana: Implications for reducing marine plastic pollution. *Environmental Challenges*, 100185. https://doi.org/10.1016/j.envc.2021.100185

Adam, I., Walker, T. R., Bezerra, J. C., & Clayton, A. (2020). Policies to reduce single-use plastic marine pollution in West Africa. *Marine Policy*, *116*, 103928. https://doi.org/10.1016/j.marpol.2020.103928

Addo, K. (2013). Solid waste management in Ghana: A case study of Effiduase and Asokore in the Sekyere east district. Kwame Nkrumah University of Science and Technology https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.941.4421&rep=rep1&type=pdf

Adika, S. A., Mahu, E., Crane, R., Marchant, R., Montford, J., Folorunsho, R., & Gordon, C. (2020). Microplastic ingestion by pelagic and demersal fish species from the Eastern Central Atlantic Ocean, off the Coast of Ghana. *Marine pollution bulletin*, *153*, 110998. https://doi.org/10.1016/j.marpolbul.2020.110998

Adom, D., Sekyere, P. A., & Yarney, L. (2019). A Return to the Ghanaian Cultural Values of Closed Fishing Season in Ghana's Artisanal Marine Fishing: An Essential Means of Restoring Small Pelagic Fish Stocks. *Transylvanian Review of Systematical and Ecological Research*, *21*(3), 95-110. https://sciendo.com/article/10.2478/trser-2019-0020

Afful, K. D. (1990). Marine oil pollution on the coast of Ghana. https://commons.wmu.se/cgi/viewcontent.cgi?article=2012&context=all_dissertations

Akhir, K. (2018). A critical analysis of technological interventions towards the national action plan for marine litter management 2018-2025: recommendations for addressing marine plastic litter in the 'new balis' of Indonesia sustainably. https://commons.wmu.se/all_dissertations/661/

Amoabeng-Prah, P. (1999). Recruitment of Ghanaian seafarers on foreign ships: An opportunity for Ghana's participation in maritime labour supply. https://commons.wmu.se/cgi/viewcontent.cgi?article=1372&context=all_dissertations

Armah, N.A. (1993). Waste Management. The Future of Our Cities. Proceedings of the Ghana Academy of Arts and Sciences. Volume XXVIII. Pp78-83. Accra. GAAS

Aryee, J. & Crook, R. (2003). Toilet Wars: Urban Sanitation Services and the Politics of Public- Private Participation in Ghana. IDS Working Paper 213,

December 2003. Institute of Development Studies, Brighton, Sussex. https://opendocs.ids.ac.uk/opendocs/handle/20.500.12413/4008

Beaumont, N. J., Aanesen M., Austen, M. C., Börger, T., Clark, J. R., Cole, M., Hooper, T., Lindeque, P. K., Pascoe, C., & Wyles, K. J. (2019). Global ecological, social and economic impacts of marine plastic.

Beick-Baffour, M. K. (2000). Maritime safety and pollution prevention in Ghana: a review of implementation and enforcement of international conventions. https://commons.wmu.se/cgi/viewcontent.cgi?article=1298&context=all_dissertations

Bilbaoport. (2021). Corporate Social Responsibility (CSR). Waste MARPOL 73/78 https://www.bilbaoport.eus/en/corporate-social-responsibility-csr/green-commitment/waste-marpol-7378/

Binder, C.R., Hinkel, J., Bots, P.W.G. & Pahl-wostl, C. (2013). Comparison of frameworks for analyzing social-ecological systems. Ecol. Soc. 18, 26.

Boucher, J.; Friot, D. (2017). Primary Microplastics in the Oceans: A Global Evaluation of Sources; IUCN Gland: Gland, Switzerland. ISBN 2831718279.

Bukari, G. A. (2016). When Natural Disasters are No Longer, a Freak Of Nature but Imposed by Supernatural Forces imposed By Supernatural Forces**.** Policy Brief. The Economy of Ghana Network.

Chassignet, E. P., Xu, X., & Zavala-Romero, O. (2021). Tracking marine litter with a global ocean model: Where does it go? Where does it come from?. Frontiers in Marine Science, 8, 414. https://doi.org/10.3389/fmars.2021.667591

Chico-Ortiz, N., Mahu, E., Crane, R., Gordon, C., & Marchant, R. (2020). Microplastics in Ghanaian coastal lagoon sediments: Their occurrence and spatial distribution. *Regional Studies in Marine Science*, *40*, 101509. https://doi.org/10.1016/j.rsma.2020.101509

Chalmin, P. (2019). The history of plastics: from the Capitol to the Tarpeian Rock

Consolidated guidance for port reception facility providers and users (2018). https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/MEPC1-Circ.834-Rev.1.pdf.

Convention for the co-operation in the protection of the marine and coastal environment of the west and central Africa region (Abidjan Convention), March 23, 1981, https://www.informea.org/en/node/289/text

Danso, C. (2016). The international obligations to prevent pollution from exploitation and exploration of hydrocarbon on Ghanaian continental shelf. Ghana's obligations under international and national laws to protect the marine environment (Master's thesis, UiT Norges arktiske universitet). https://munin.uit.no/handle/10037/12496

Danquah, M., Amankwaa, E., Amoyaw, E-N., & Obeng J. (2019). Dealing with single-use plastics: Examining the economic effect of a ban in Ghana. https://www.theigc.org/project/dealing-with-single-use-plastics-examining-the-economic-effect-of-a-ban-in-ghana/

Delia, P. (2021). Protecting the marine environment from land-based activities. https://www.iisd.org/articles/protecting-marine-environment-land-based-activities.

Deloitte. (2014). the Deloitte Consumer Review. Africa: A 21st century View. https://www2.deloitte.com/content/dam/Deloitte/ng/Documents/consumer-business/the-deloitte-consumer-review-africa-a-21st-century-view.pdf

Deutsche Gesellschaft für Internationale Zusammenarbeit. (2018). Marine litter prevention. https://www.giz.de/de/downloads/giz2018_marine-litter-prevention_web.pdf

Elliott, M. Burdon, D., Atkins, J.P., Borja, A., Cormier, R.; De Jonge, V.N &; Turner, R.K. (2017). A unifying framework for marine environmental management. Mar. Pollution.Bull.118, 27-40.

Euroshore. (2019). providing port reception facilities in African Ports: A new and increasing role for private business actors. https://euroshore.com/blog/news/2019-12-11/providing-port-reception-facilities-african-ports.

European Maritime Safety Agency. (n.d). http://emsa.europa.eu/we-do/sustainability/environment/port-waste-reception-facilities.html

EURACTIV. (2021). Countries eye UN deal to rein in plastic pollution https://www.euractiv.com/section/energy-environment/news/countries-eye-un-deal-to-rein-in-plastic-pollution/

Franceys, R., & Gerlach E. (Eds). (2008). Regulating water and sanitation for the poor, Economic regulation for public and private partnerships, Earthscan, London, UK

Galgani, F., Hanke, G., & Maes, T. (2015). Global distribution, composition and abundance of marine litter. In *Marine anthropogenic litter* (pp. 29-56). Springer, Cham. https://link.springer.com/chapter/10.1007/978-3-319-16510-3_2

Ghana's Constitution, 1992. (2021). https://www.constituteproject.org/constitution/Ghana_1996.pdf

Ghana's Environmental Protection Agency. (2009). Newsletter. Vol. 5 no. 2 July-December. Accra.

Ghana's Environmental Protection Agency. (2021). http://epaoilandgas.org/history%20Of%20EPA/index.html

Ghana Maritime Authority Act, 2002 (act 630) as amended https://www.bcp.gov.gh/acc/registry/docs/GHANA%20MARITIME%20AUTHORITY%20ACT,%202002%20(ACT%20630).pdf

Ghana Team Policy Brief. (2018). https://results4america.org/wp-content/uploads/2018/07/Ghana-Team-Policy-Brief.pdf

Ghanaweb. (2019). Program to clean the coast of all beaches launched. https://www.ghanaweb.com/GhanaHomePage/NewsArchive/Program-to-clean-the-coast-of-all-beaches-launched-787684

Ghanaweb. (2016). Plastic waste management: A global issue that needs local awareness. https://www.ghanaweb.com/GhanaHomePage/features/Plastic-waste-management-A-global-issue-that-needs-local-awareness-458386

Global Environment Facility. (2019). Establishing a circular economy framework for the plastics sector in Ghana. https://www.thegef.org/sites/default/files/web-documents/10401_MFA_PIF_Review.pdf

Global Programme of Action for the Protection of Marine Environment from land-based Activities (2019). https://pipap.sprep.org/content/global-programme-action-protection-marine-environment-land-based-activities.

Global Programme of Action for the Protection of Marine Environment. (n.d). (GPA/UNEP). https://actionguide.info/m/orgs/209/

Global Plastic Action Partnership. (2020). Ghana setting a regional model for sustainably managing plastics and transitioning to a circular economy. https://globalplasticaction.org/countries/ghana/

Global Plastic Action Partnership. (2020). Turning plastic pollution commitments into action. Annual Report https://globalplasticaction.org/blog/gpap-annual-impact-report-2020/

Government of Ghana. (2020). National Plastics Management Policy https://mesti.gov.gh/wp-content/uploads/2021/02/Revised-National-Plastics-Management-Policy_-FINAL.pdf

Group of Experts on the Scientific Aspects of Marine Environmental Protection. (2020). Sea-based sources of marine litter – a review of current knowledge and assessment of data gaps (second interim report of GESAMP working group 43,

Group of 20 Report. (2020). Report on action against marine plastic litter. Second information sharing based on the G20 implementation framework https://www.iges.or.jp/en/pub/g20mpl2020/en

Health and Pollution Action Plan. (2019). Ghana. https://gahp.net/hpap-ghana/

Hilmi, K. M. A. (2019). The state of maritime safety and marine environment protection in Ghana. https://www.academia.edu/39926808/The_state_of_Maritime_Safety_and_Marine_Environment_Protection_in_Ghana

International Maritime Organization. (2019). Carriage of chemicals by ship https://www.imo.org/en/OurWork/Environment/Pages/ChemicalPollution-Default.aspx

International Maritime Organization. (2019). MARPOL 1973/78 https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx

International Maritime Organization. (2019) International convention for the prevention of pollution from ships https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx.

International convention for the prevention of pollution from ships. (2017). Consolidated Edition.

International Maritime Organization. (2019). Prevention of Pollution by Garbage from Ships. https://www.imo.org/en/OurWork/Environment/Pages/Garbage-Default.aspx

International Maritime Organization. (2019). Reception Facilities https://www.imo.org/en/OurWork/Environment/Pages/Port-Reception-facilities.aspx.

International Maritime Organization. (2018). Addressing marine plastic litter from ships – action plan adopted. https://www.imo.org/en/MediaCentre/HotTopics/Pages/marinelitter-default.aspx

International Union for the conservation of Nature. (n.d.). Environmental Law Centre https://www.iucn.org/theme/environmental-law/our-work/oceans-and-coasts/marine-plastics

International Union for Conservation of Nature. (2018). Marine Plastics https://www.iucn.org/sites/dev/files/marine_plastics_issues_brief_final_0.pdf

International Waters Governance (n.d) http://www.internationalwatersgovernance.com/abidjan-convention.html.

Jambeck, J., Hardesty, B. D., Brooks, A. L., Friend, T., Teleki, K., Fabres, J., & Wilcox, C. (2018). Challenges and emerging solutions to the land-based plastic waste issue in Africa. *Marine Policy*, *96*, 256-263. https://doi.org/10.1016/j.marpol.2017.10.041

Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., & Law, K. L. (2015). Plastic waste inputs from land into the ocean. *Science*, *347*(6223), 768-771. https://www.science.org/doi/abs/10.1126/science.1260352

John, K. P., & Amedu, N. M. (2019). Assessment of port reception facilities and waste management control in Nigeria: case study: (Tin Can Island Port). https://commons.wmu.se/cgi/viewcontent.cgi?article=2213&context=all_dissertations

Lachmann, F., Almroth, B. C., Baumann, H., Broström, G., Corvellec, H., Gipperth, L., & Nilsson, P. (2017). Marine plastic litter on small island developing states (SIDS): Impacts and measures. https://havsmiljoinstitutet.se/digitalAssets/1641/1641020_sime-2017-4-marine-plastic-litter.pdf

Lawer, E. T., Herbeck, J., & Flitner, M. (2019). Selective adoption: How port authorities in Europe and West Africa Engage with the globalizing 'Green Port' idea. *Sustainability*, *11*(18), 5119. https://www.mdpi.com/2071-1050/11/18/5119

Lloyd's Register. (2021). International Convention for the prevention of pollution from ships. https://www.lr.org/en/marpol-international-convention-for-the-prevention-of-pollution/

Loukas, K. (2020). Marine Plastic litter. MARPOL Annex V and the Action Plan to address marine plastic litter from ships https://ec.europa.eu/environment/international_issues/pdf/02-01%20-%20Loukas%20Kontogiannis.pdf

Marine Insight. (2021). The International convention for prevention of marine pollution from ships: The ultimate guide https://www.marineinsight.com/maritime-law/marpol-convention-shipping/

Meier-Wehren, B. (2021). Global Programme of Action for the Protection of Marine Environment from land-based. https://search.informit.org/doi/10.3316/INFORMIT.143558227179038.

Mensah, M. (2002). *Report on Sanitation in the city of Accra*, Ghana, Center for Democratic Development, Accra.

MEPC.1/Circular 893, Provision of adequate facilities at ports and terminals for the reception of plastic waste from ships, July 9, 2021, http://shippingregs.org/Portals/2/SecuredDoc/Circulars/MEPC.1-Circ.893.pdf?ver=2021-07-15-102945-013

Metonwaho, Y. T. F. (2018). Investigation to support the implementation of efficient port reception facilities (in relation to MARPOL) in port of Cotonou, Republic of Benin. https://commons.wmu.se/cgi/viewcontent.cgi?article=1612&context=all_dissertations

Ministry of Local Government and Rural Development. (2009). National report for waste management, 18th session of United Nations commission on sustainable development. https://sustainabledevelopment.un.org/content/documents/dsd/dsd_aofw_ni/ni_pdfs/NationalReports/ghana/Anku_SCD_Waste%20Mgt[1].pdf

Ministry of Local Government and Rural Development. (2010). Environmental Sanitation Policy (Revised 2009). https://www.ircwash.org/sites/default/files/MLGRD-2010-Environmental.pdf

Modern Ghana. (2019) Maritime Authority Cleans Independence Square Beach to Mark World Maritime Day https://www.modernghana.com/news/957022/maritime-authority-cleans-independence-square-beac.html

Moro, A. (2017). Life cycle analysis of the plastic bottle-PET https://www.academia.edu/35728244/Life_Cycle_Analysis_of_the_Pastic_bottle_PET

Mouat, J., Lozano, R. L., & Bateson, H. (2010). Economic impacts of marine litter https://www.kimointernational.org/wp/wp-content/uploads/2017/09/KIMO_Economic-Impacts-of-Marine-Litter.pdf

Muntaka, C. (2019). Plastic pollution in Ghana: causes, effects and solutions https://www.atcmask.com/blogs/blog/plastic-pollution-in-ghana

Ocean Unite. (2021). Marine plastic pollution https://www.oceanunite.org/issues/marine-plastic-pollution-2/

Penrose, K., Castro M.C.D., Werema, J., & Ryan E.T. (2010). Informal Urban Settlements and Cholera Risk in Dar es Salaam, Tanzania, *PLoS Neglected Tropical Diseases* 4(3) 631. https://doi.org/10.1371/journal.pntd.0000631

Pawar, P. R., Shirgaonkar, S. S., & Patil, R. B. (2016). Plastic marine debris: Sources, distribution and impacts on coastal and ocean biodiversity. *PENCIL Publication of Biological Sciences*, *3*(1), 40-54. https://www.researchgate.net/publication/295919494_Plastic_marine_debris_Sources_distribution_and_impacts_on_coastal_and_ocean_biodiversity

Plastic Revolution Foundation. (2021). Developing extended producer responsibility for packaging in Ghana: A brief introduction and status report https://www.revocean.org/wp-content/uploads/2021/03/PRF-Report-Extended-Producer-Responsibility.pdf

PlasticsEurope. (2021). Plastics: a story of more than 100 years of innovation https://www.plasticseurope.org/en/about-plastics/what-are-plastics/history

Resolution MEPC 310 (73). Action plan to address marine plastic litter from ships, October 26, 2018, https://www.mlit.go.jp/common/001312164.pdf

Resolution MEPC 295(71). Guidelines for the implementation of MARPOL Annex V, July 7, 2017, http://rise.odessa.ua/texts/MEPC295_71e.php3

Resolution MEPC 83 (44). Consolidated guidance for port reception facility providers and users, March 1, 2018, https://www.classnk.or.jp/hp/pdf/activities/statutory/ism/imo/mepc1_cir834_rev1.pdf

Rogers, Kara. "Microplastics". *Encyclopedia Britannica*, 8 Sep. 2020, https://www.britannica.com/technology/microplastic

SDG Tracker. (2018). https://sdg-tracker.org/oceans

Songsore, J. (2005). State of Environmental Health: Report of the Greater Accra Metropolitan Area. Accra, Ghana Universities Press.

TOCPRO. (2015) International convention for the prevention of pollution from ships. (MARPOL 73/78). Practical Guide https://maddenmaritime.files.wordpress.com/2015/08/marpol-practical-guide.pdf

Tullow Ghana Limited. (n.d.). Legal and policy framework https://www.bcp.gov.gh/acc/registry/docs/GHANA%20MARITIME%20AUTHORITY%20ACT,%202002%20(ACT%20630).pdf

Todaro, M. & Smith S. (2009) *Economic Development*, Ashford Colour Press Ltd, Gosport, Hampshire.

Tsagbey, S. A., Mensah, A. M., & Nunoo, F. K. E. (2009). Influence of Tourist Pressure on Beach Litter and Microbial Quality-Case Study of Two Beach Resorts in Ghana. *West African Journal of Applied Ecology*, *15*(1). https://www.ajol.info/index.php/wajae/article/view/49423

United Nations Environment Programme. (n.d). https://www.unep.org/explore-topics/oceans-seas/what-we-do/addressing-land-based-pollution/governing-global-programme.

United Nations Environment Programme. (1999). Overview of Land-based Sources and Activities Affecting the Marine, Coastal and Associated Freshwater Environment in the West and Central African Region. https://aquadocs.org/bitstream/handle/1834/312/UNEP171.pdf;jsessionid=7C5 73585857D44512AFC9AF34BC3397F? sequence=1.

United Nations Environment Programme. (2016). The State of Plastics. World Environment Day Outlook; Klosko, G., Ed.; Oxford University Press: Oxford, UK, Volume 1, ISBN 9780199238804.

United Nations Environment Programme. (2021). https://abidjanconvention.org/

United Nations Environment Programme. (2021). policies, regulations and strategies in Latin America and the Caribbean to prevent marine litter and plastic waste https://wedocs.unep.org/bitstream/handle/20.500.11822/34931/Marine_EN.pdf?sequence=1&isAllowed=y

United Nations Environment Programme. (1996). Press Release

GA/EF/2731. Responsibilities of UNEP, commission on sustainable development remain distinct, second committee told. https://www.un.org/press/en/1996/19961023.gaef2731.html

United Nations Environment Programme. (2018). Single-use plastics: a roadmap for sustainability.

United Nations. (2016).*The First Global Integrated Marine Assessment: World Ocean Assessment I*, by the Group of Experts of the Regular Process, New York;

United Nations Convention on the Law of the sea, December 10, 1982, https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf

United States Environmental Protection Agency. (2021). https://www.epa.gov/international-cooperation/epas-role-united-nations environment-programme-unep

Van Dyck, I. P., Nunoo, F. K., & Lawson, E. T. (2016). An empirical assessment of marine debris, seawater quality and littering in Ghana. *Journal of Geoscience and Environment Protection*, *4*(5), 21-36. https://www.scirp.org/journal/paperinformation.aspx?paperid=66273

Walther, B. A., Kunz, A., & Hu, C. S. (2018). Type and quantity of coastal debris pollution in Taiwan: A 12-year nationwide assessment using citizen science

data. *Marine pollution bulletin*, *135*, 862-872. https://doi.org/10.1016/j.marpolbul.2018.08.025

Welden, N.A. (2020). The Environmental Impacts of Plastic Pollution. Elsevier Inc.: Amsterdam, the Netherlands, ISBN 9780128178805. https://eprints.gla.ac.uk/246958/

West Africa Coastal Area Management Programme. (2016). Reducing Marine and Coastal Pollution. http://documents1.worldbank.org/curated/en/397931467989463615/pdf/101187-REVISED-PUBLIC-WACA-KS5-Reducing-Marine-Coastal-Pollution-April-2016.pdf

Wienaah, M. M. (2007). Sustainable plastic management: A case of Accra, Ghana

World Health Organization/United Nations Children's Fund. (2008). *Progress on Drinking Water and Sanitation with Special Focus on Sanitation.* Office of Publications, World Health Organization, Geneva. https://www.who.int/water_sanitation_health/monitoring/jmp2008.pdf

World Health Organization/United Nations Children's Fund. (2009). *Diarrhoea: Why Children are Still Dying and What Can be Done*, Office of Publications, World Health Organization, Geneva. https://www.unicef.org/media/media_51407.html

Wilcox, C., Van Sebille, E., & Hardesty, B. D. (2015). Threat of plastic pollution to seabirds is global, pervasive, and increasing. *Proceedings of the national academy of sciences*, *112*(38), 11899-11904. https://doi.org/10.1073/pnas.1502108112

Appendices

Appendix 1: The four NPMP Structure

Focus Area 1: Behavioural Change

Strategic Actions

1.1. Development of a National Communications, Education and Mainstreaming Strategy

1.2. Development of School Curriculum & School Related Infrastructure

1.3. Promotion of Alternative Materials

Focus Area 2: Strategic Planning & Cross-sectorial Collaboration

Strategic Actions

2.1. Establishment of Collection, Recovery, Recycling and Re-Manufacturing Targets

2.2. Development of National, Regional, District and Local Action Plans.

2.3. Build capacity (logistics and Infrastructure) for Plastics Collection, Recovery, Recycling and Re-Manufacturing.

2.4. Development of Industry and Institutional Plans

2.5. Promotion of local research and development (R&D) in plastic management.

2.6. Establishment of a Plastics Trading Platform & Resource Locator.

Focus Area 3: Innovative Resource Mobilization towards a Circular Economy

Strategic Actions

3.1. Development and implementation of a Resource Mobilization Strategy

3.2. Establishment of a Certification System and Database

3.3. Establishment of an Extended Producer Responsibility Scheme

3.4. Operationalization of the Environmental Tax Regime (Act 863)

Focus Area 4: Good Governance, Inclusiveness & Shared Accountability

Strategic Actions

4.1. Establishment of Green Public Procurement Standards

4.2. Establishment and Operationalization of the Resource Recovery Secretariat

4.3. Development of a robust regulatory framework

4.4. Establishment of a mechanism for phasing out most hazardous plastics grades and product applications

Source: GoG (2020)