The impact of cruise and cargo shipping on the protection and preservation of coral reefs and mangroves in Jamaica

Marissa Georgette Ann Bailey

United Nations – The Nippon Foundation of Japan Fellowship Programme 2024

UN Office of Legal Affairs Division for Ocean Affairs and the Law of the Sea

THE NIPPON FOUNDATION

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ACADEMIC SUPERVISOR

Prof. Zhen Sun

Associate Professor (Research/Ocean Sustainability, Governance & Management)

World Maritime University, Sweden

CO-SUPERVISORS

Valentina Germani

Senior Legal Officer and Programme Advisor

Division for Ocean Affairs and the Law of the Sea, Office of Legal Affairs

United Nations, New York

Vanessa Arellano Rodriguez

Legal Officer

Division for Ocean Affairs and the Law of the Sea, Office of Legal Affairs

United Nations, New York

Abstract

The evolution of maritime transport, together with the impact that it has had on the marine environment, have not been linear. Both have been characterized by trade and globalization, where one has suffered great harm at the expense of the other, or seemingly so. Jamaica is renowned for its natural beauty comprising vibrant coral reefs and mangroves. These marine environment face the risk of degradation and depletion due to factors including the expansion of maritime transport, and in particular, cruise and cargo shipping. Maritime transport refers to the movement of goods, services and people, via the ocean, from one point to another. For centuries, it has been used as a means for trade on a global level and with an increase in maritime traffic traversing through Jamaican waters, this raises significant environmental concerns on the health and sustainability of these fragile ecosystems. Accordingly, this dissertation will explore the impact of cruise and cargo shipping on the protection and preservation of the coral reefs and mangroves in Jamaica. As a consequence, the marine environment faces a number of adverse effects from the shipping industry, not solely due to transportation by ships, but also in relation to the management and development of the ports where they make their calls. In certain instances, as ports are developed, maintained or newly constructed, coral reefs and mangroves in the relevant areas become threatened with depletion whether through removal or destruction. Furthermore, maritime transport contributes to greenhouse gas (GHG) emissions and ocean acidification that adversely affect the marine environment. Notwithstanding the adverse effects of maritime transport to the marine environment, it must be noted that it has major economic advantages in relation to trade, tourism and businesses relating to export and import in Jamaica. For this reason, it is imperative to conduct research with a view to identify the impacts of maritime transport on the marine environment and to propose sustainable management approaches to in dealing with the effects. The dissertation will first examine the historical development of maritime transport, globally and in Jamaica, and evaluate the environmental, social and economic implications on coral reefs and mangroves generally and in Jamaica. It will then examine the legal and regulatory frameworks governing shipping and the marine environment, such as the United Nations Convention on Law of the Sea (hereinafter referred to as “UNCLOS”) and the International Convention for the Prevention of Pollution from Ships (hereinafter referred to as “MARPOL”). It will be followed by an evaluation of the efforts undertaken by Jamaica under these instruments, including the enactment of national legislations. Finally, and based on the findings of the aforementioned, the

dissertation will develop recommendations and strategies that can mitigate threats associated with cruise and cargo shipping in order to promote the sustainable use of the oceans by protecting and preserving the coral reefs and mangroves in Jamaica.

Acknowledgments

I am indebted to God for His sustaining grace and favour in allowing me to be a part of the United Nations Nippon Foundation Fellowship Programme for 2024. I am humbled by the nomination of The Port Authority in Jamaica and grateful to the Division of Ocean Affairs and the Law of the Seas for awarding me this Fellowship. It has been a tremendous honour and privilege.

I extend my warmest gratitude to the wonderful team of United Nations' supervisors, Valentina Germani and Vanessa Arellano Rodriguez, and their team, for the unwavering guidance and support that they gave for the duration of the Fellowship. Special appreciation is given to my supervisor Prof. Zhen Sun, from World Maritime University, Sweden, for her relentless efforts in providing constructive feedback on this dissertation and to her team for assisting in making my transition in Sweden smooth and effortless.

I am greatly blessed by my supportive family and friends who remained my pillars of encouragement and strength. I am grateful for my mother who was my constant cheerleader and who assisted me with obtain local information from the various ministries, departments and agencies in Jamaica that I could not readily access in Jamaica. Gratitude is also expressed to Aunty Janice who patiently proofread the dissertation, and to the team at The Port Authority (especially Tovia Elliott) for their support and expert information provided throughout the Fellowship.

To grandma, who died before I was able to fulfil my United Nations dream, I dedicate this dissertation and Fellowship to you, as I know you would have been incredibly proud of your "star girl". For my nephew Tristan-Kai and my niece Annaliese, I hope you grow to know that the sky is the limit and "the future is looking good to [you]" as Tristan would joyfully sing.

List of Acronyms

BCA	The Beach Control Act, 1956
BWM	International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004
CMOU	Caribbean Memorandum of Understanding on Port State Control
CO_2	Carbon Dioxide
FSA	The Fisheries Act, 2018
FA	Forest Act
IMO	International Maritime Organization
ISPS	International Ship and Port Facility
MAA	Maritime Areas Act
MAJ	Maritime Authority of Jamaica
MARPOL	International Convention on the Prevention of Pollution from Ships
MPA	Marine Protected Areas
MPR	The Natural Resources (Marine Parks) Regulations, 1992 (Amended 2003)
NEPA	National Environment and Planning Agency
NRCA	The Natural Resources Conservation Authority Act, 1991
NSWMA	National Solid Waste Management Authority
OILPOL	International Convention for the Prevention of Pollution of the Sea by Oil
PAA	The Port Authority Act
PAJ	The Port Authority
PSC	Port State Control
RAMSAR	RAMSAR Convention on Wetlands of International Importance
SA	The Shipping Act
SDG	Sustainable Development Goals
SIDS	Small Island Developing State
SOLAS	International Convention for the Safety of Life at Sea
UNCLOS	United Nations Convention on the Law of the Sea
WPA	The Watersheds Protection Act,
WSR	The Natural Resources Conservation (Wastewater and Sludge) Regulations, 2013

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INTRODUCTION

The late American "King of Pop"[1], Michael Jackson, quite aptly sang "Heal the world, make it a better place for you and for me and the entire human race." He continued, with the recognition, that "there are people dying, if you care enough for the living, make a better place for you and for me." This song imputes a dream of a world, and essentially all parts of it including the ocean, being healed and made a better place. While the ocean might not have been the explicit inspiration behind this song, one can agree that being a part of the world, the ocean also requires a great level healing through protection and preservation. Although the ecosystems which comprise the ocean can hardly be considered as "people", they are dying as a result of varying factors to be explored in this dissertation, and highlight the need for the ocean to be made a better place for all concerned. With the ocean comprising approximately 71% of the planet,[2] it is typically viewed as a place of solace, freedom and enjoyment. Others may consider it as a means of trade, globalization and economic advancements. Regardless of what the views of the ocean are, it is clear that its importance and value to existence on earth are oftentimes neglected and overlooked. Therefore, it is critical that greater efforts are undertaken to study the different facets of the ocean and to ensure that all parts of it are protected and preserved, instead of degraded and destroyed. Afterall, the ocean and the people and sources which use it, are not intended to be binary opposites, but are to subsist in harmony in achieving sustainable development goals for all.

On the significance of the ocean, Costanza notes that its volume represents almost 99% of available living space on the earth.[3] He recognizes it to be one of the most natural resources for humans, serving as a source of food, transportation and recreation.[4] It is so essential that it produces more than half of the world's oxygen and absorbs fifty times more carbon dioxide than the atmosphere itself.[5] In fact, Bigg posits that the ocean provides 85% of the water vapour in the

[1] Rickey Vincent, "Michael Jackson" (Encyclopedia Britannica, last updated 13 November 2024). Available at https://www.britannica.com/biography/Michael-Jackson. (accessed on 14 November 2024).
[2] Senthil Kumar, P., and Yaashikaa, P. R., "Introduction—Water" in *Water in Textiles and Fashion Consumption, Footprint, and Life Cycle Assessment* (Woodhead Publishing, E-book 2019). Available at https://doi.org/10.1016/B978-0-08-102633-5.00001-4. (accessed on 21 August 2024), p. 1.
[3] Robert Costanza, "The ecological, economic and social importance of the oceans", Ecological Economics, vol. 31, issue 2, (1999). Available at https://doi.org/10.1016/S0921-8009(99)00079-8. (accessed on 21 August 2024), p. 200.
[4] Ibid at p. 199
[5] National Ocean Service | National Oceanic and Atmospheric Administration, "Our Ocean". Available at https://oceanservice.noaa.gov/news/june14/30days.html. (accessed on 25 August 2024)

atmosphere.[6] These statistics confirm that the ocean plays a critical role in the functioning and survival of society. As a result, more emphasis must be placed globally on the sustainable use of the ocean by creating innovative and practical ways to conserve, preserve and protect the marine environment, not just for those currently living, but also for future generations. A major use of the ocean is as a means of maritime transport which describes the movement of people, goods and services via the ocean from one port to another, with common examples being cruise and cargo ships. Many critics defer on the origin of maritime transport, but one of the early pieces of evidence of this was in 3,500 B.C, when the Vikings created ships as a means to carry their warriors, trade goods and possessions.[7] The benefits of maritime transport are substantial in relation to trade on the global level as it boosts gross domestic profits, provides for food security and employment opportunities.

Notwithstanding the great benefits, there are likely adverse effects which include ocean acidification, sea level rises, pollution of various kinds, and degradation of coral reefs and mangroves. As with these environmental impacts, the economic and social effects that maritime transport has on the ocean, the entire marine environment and society in general cannot be overlooked or ignored. According to UNCLOS, pollution of the marine environment is defined as "the introduction by man directly or indirectly of substances or energy into the marine environment, which is likely to result in living resources, hazards to human health, hindrance to marine activities including fishing and other legitimate use of the sea, impairment of quality for the uses of the sea water and reduction of amenities."[8] Simply put, marine pollution is damage caused to water by harmful substances or waste.[9] With maritime transport, the introduction of harmful or toxic contaminants is likely. This could be as a result of the type of transportation or from human and commercial activities relating to the use and operations of maritime transport. The United Nation's Sustainable Development Goals (SDG) and in particular Goal 14 (SDG 14), "Life below water", acknowledge that there is a significant need to conserve and sustainably use

[6] Grant Bigg and others, "The role of the oceans in climate", International Journal of Climatology vol. 23, issue 10, pp. 1127 - 1159. (August, 2003). Available at doi:10.1002/joc.926. (accessed on 15 August 2024). p. 1127
[7] Royal Museums Greenwich, "Viking Ships". Available at https://www.rmg.co.uk/stories/topics/viking-ships#. (accessed on 15 August 2024).
[8] *United Nations Convention on the Law of the Sea* (adopted 10 December 1982, entered into force 1 November 1994) 1833 UNTS 397 (henceforth known as 'UNCLOS'), Article 1(4)
[9] Cambridge Dictionary. "Pollution". Available at https://dictionary.cambridge.org/dictionary/english/pollution. (accessed on 15 August 2024)

the oceans, seas and marine resources for sustainable development.[10] It provides that the ocean must be protected by eliminating marine pollution, reducing ocean acidification and protecting and restoring the marine ecosystems. SDG 14 also seeks to ensure that laws and regulations relating to the oceans are enforced and implemented in accordance with UNCLOS. For this purpose, Jamaica's response to ocean affairs will be explored in conjunction with UNCLOS and other ocean related instruments.

Jamaica, the largest English-speaking Island in the Caribbean,[11] is situated in the Greater Antilles region, south of Cuba and west of Haiti and the Dominican Republic.[12] It has a total area of land territory of approximately 10,991 square kilometers, with a population of approximately 2.7 million people.[13] It has an extensive maritime exclusive economic zone in the Caribbean Sea. Its main economic activity is driven by tourism,[14] of which cruise shipping plays a critical role. Additionally, its economy is supported by bauxite and aluminum mining, as well as agricultural exports such as sugar, bananas and coffee.[15] Jamaica has demonstrated its commitment to the maritime industry and ocean governance through its ratification of the UNCLOS which was incidentally signed on home soil in 1982.[16] Additionally, it hosts the headquarters of the International Seabed Authority (ISA) which regulates deep seabed mining activities in international waters.[17] This underscores Jamaica's historical importance in international maritime legal development and its interest in protecting and preserving the marine environment. In order to limit the severity of the damage to the marine environment, it is there critical for all states, and in particular Jamaica to harmonize their policies and uphold the obligations under international regulations and instruments to reduce and control pollution from any and all sources. It is the responsibility of humankind to ensure that while the ocean is being used to advance the social and economic pillars of society that it strikes a reasonable balance in order to protect and preserve its

[10] United Nations, Department of Economic and Social Affairs Sustainable Development, "Goal 14". Available at https://sdgs.un.org/goals/goal14. (accessed on 28 April 2024).
[11] Jamaica Information Service. "Overview of Jamaica". Available at https://jis.gov.jm/information/parish-profiles/. (accessed on 26 November 2024).
[12] Ibid
[13] Ibid
[14] World Bank, "Overview", The World Bank in Jamaica database. Available at https://www.worldbank.org/en/country/jamaica/overview. (accessed on 15 August 2024).
[15] Ibid
[16] International Tribunal for the Law of the Sea, "UNCLOS". Available at https://www.itlos.org/en/main/the-tribunal/unclos/. (accessed on 15 August 2024).
[17] International Seabed Authority. "About ISA". Available at https://www.isa.org.jm/about-isa/. (accessed on 15 August 2024).

environmental counterpart.

With this understanding, this dissertation will assess the impact of maritime transport, namely cruise and cargo ships, on the protection and preservation of the marine environment, specifically coral reefs and mangroves in Jamaica. In attaining this objective, the dissertation will be structured in two parts, with each part consisting of two chapters, and each chapter having two sections. Part One, Chapter One will give an overview of the history, evolution and importance of maritime transport with specific references to cruise and cargo shipping and their operations generally and in Jamaica. Chapter Two will link their relationship to the marine environment, and examine the environmental, economic and social implications of cruise and cargo shipping on the coral reefs and mangroves with specific examples in Jamaica. Subsequently, Part Two will first explore, in its Chapter One, the international legal frameworks and instruments which govern the shipping industry and the marine environment, namely UNCLOS, the International Convention on the Prevention of Pollution from Ships (MARPOL), International Convention for the Safety of Life at Sea (SOLAS), International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM) and RAMSAR Convention on Wetlands (RAMSAR). Afterwards, it will look at the legal frameworks and instruments in Jamaica which relate to cruise and cargo shipping and the protection and preservation of coral reefs and mangroves., Chapter Two of this part will then consider the relevant sustainable development goals and their implications, and the steps being taken by Jamaica to fulfil these goals. Finally, and based on the findings of the aforementioned, the dissertation will conclude by proposing recommendations and strategies on how to fill any identifiable gaps and mitigate against threats associated with cruise and cargo shipping, to ensure Jamaica acts in accordance with internationally recognized laws and regulations for ocean affairs and law of the seas in order to promote the sustainable use of the oceans.

The relevance of this dissertation stems from association with The Port Authority, which is the principal maritime agency and a statutory body in Jamaica which is mandated through the Port Authority's Act to develop and regulate ports and the shipping industry. There are seventeen cargo ports and five cruise ports in Jamaica. Over the past few years, at least one cruise ship terminal has been developed and others maintained or refurbished, whether routinely or due to unforeseen and unfortunate circumstances. It is warranted that consideration be given as to the impact that the development and maintenance of the ports on the habitat of the ocean, and in

particular the coral reefs and mangroves. Undoubtedly, said development and maintenance are directly linked to maritime transportation, specifically cruise and cargo shipping, upon which this dissertation will revolve. By conducting this research, one would have the opportunity to understand the operations of The Port Authority relating to cruise and cargo and determine whether Jamaica in generally is sustainably using the ocean by protecting and preserving the marine environment. The literature for the purpose of this chapter will be established using articles from books, scholarly journals, case laws, legislations and interviews of environmental and maritime experts. Information will also be derived from the relevant Ministries, Departments and Agencies in Jamaica, case law, legislations and conventions, books as well as scholarly articles.

PART ONE: The history, evolution and importance of cruise and cargo shipping and their relationship to the marine environment

Maritime transport has been essential to trade and globalization for centuries. It started out as simple wooden canoes and has progressed into ships with sails, steam ships, containerized cargoes and cruise shipping. While vital to the global economy, maritime transport has a significant impact on the marine environment. Accordingly, this part will explore the evolution and importance of shipping as well as how it affects the marine environment, in particular coral reefs and mangroves. The relationship between the two will show the need to balance growth in the shipping industry and the sustainability of the marine environment, facets which will be explored in the subsequent sections of this dissertation.

CHAPTER ONE: The general history and evolution of maritime transport

Section A: The definition, origins and types of maritime transport

Maritime transport is regarded as the movement of goods and passengers from one point to the next via the ocean. Song argues that "maritime transport is clearly concerned with the transportation of goods and/or passengers between two seaports by sea."[18] By this nature, it is understood that maritime transport is critical to international trade and fosters the relationship between different countries and continents, all joined together by the sea. In considering maritime transport from a geographical realm, Rodrigue asserts that it is a unique combination of physical, strategic and commercial imperatives.[19] He expresses that for as long as there has been trade, transportation of different kinds has been there to support it.[20] Furthermore, he posits that both are mutually interdependent though one is the prerequisite for the other.[21] Maritime transport has been evolving in society because of the growing need for volume, capacity, speed and efficiency. These have led to an increase in the vessels traversing the ocean and formed a basis upon which maritime zones had to be established to encourage trade and commerce via sea. Notwithstanding this, the origins of maritime transport are necessary to explore.

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[18] Dong-Wook Song and Photis M Panayides, *Maritime Logistics: A Guide to contemporary shipping and port management*, 3rd ed. (London, Kogan Page Limited, 2022). p. 4.
[19] Jean-Paul Rodrigue, "Maritime Transport" in *The International Encyclopedia of Geography*, (March, 2017). Available at doi:10.1002/9781118786352.wbieg0155. (accessed on 11 August 2024). p. 1.
[20] Jean-Paul Rodrique, "Transportation and Globalization" in *The SAGE Handbook of Transport* Studies, (January, 2013). Available at doi:10.4135/9781446247655.n2. (accessed on 11 August 2024). p. 1.
[21] Ibid

The determination of how far back in history the ocean was used as a means of transportation, and the origins of maritime transport, have long been debated. In the pre-historic era, it was determined that it was only through watercraft and via the ocean that some areas of the planet could be "discovered, explored, settled, exploited, supplied and defended."[22] Several countries have claimed to be the inventors of maritime transport and to have first set sail on voyages across the waters for varying purposes. Some believe that maritime transport originated in Asia, with China crediting its development of boats with sails in 2,500 B.C..[23] Likewise, west of China, Kuwait was known to have created the Ancient Reed Boats which were the earliest remnants of a seafaring vessel.[24] Carter confirms this through the discovery of fragments of the outer caulking of this type of vessel at the site of H3, and notes that it likely represents the oldest known sea-going boat in the world.[25] Asia's western neighbours, Europe, maintain that maritime transport emerged in the 8th century when the Vikings developed ships that could navigate different bodies of water throughout the Scandinavian region.[26] These ships were known to be open, long and narrow with a shallow depth, propelled by sails and oars, and were frequently used in religious iconology and as a sign of power and wealth.[27] Additionally, the Vikings used ships as a key tool for trade, plunder activities and for organized military expeditions.[28] While Ovidiu-Sorin supports the view that the Vikings' domination of European seas included the 8th century period, he notes that it started from as early as the 5th Century and continued until 1,200 B.C..[29] Conversely, it is believed that boats with sails were first used in Egypt in 3200 B.C.. Anderson shares this view noting that the first known pictures of ships were found within their historical records.[30] It appears that Egypt was instrumental in the creation of ships due to its dependence on the Nile River and

[22] Alexis Catsambis, Ben Ford and Donny L. Hamilton, *The Oxford Handbook of Maritime Archaeology* (Oxford University Press, 2011). p. 3
[23] Algeria Marineros, "Sailing Through Time: The Fascinating History of the Sailing Boat". Available at https://alegriamarineros.com/en/sailing-through-time-the-fascinating-history-of-the-sailing-boat/. (accessed on 10 August 2024)
[24] Robert Carter, *Excavations and Ubaid-Period Boat Remains at H3, As-Sabiyah (Kuwait)*. (Archaeopress, 2008). p. 92.
[25] Ibid
[26] The fascinating history of Viking ships. Available at https://www.fjordtours.com/en/norway/people-and-culture/viking/vikings-history-seafaring-viking-ship-longship. (accessed on 10 August 2024)
[27] David Arnold, The Age of Discovery, 1400-1600, (EBSCO Publishing, E-book, 2002). p.2.
[28] Jan Bill, "Viking Age Ships and Seafaring in the West" in *Viking Trade and Settlement in Continental Western Europe*. 19-42. (Copenhagen, 2010).
[29] Cupșa Ovidiu-Sorin, "Aspects of the Maritime Transport Evolution During the Middle Ages". (Constanta Maritime University, vol. 16, 2011). p. 25.
[30] Romola Anderson and R. C. Anderson, *A short history of the sailing ship*. (Dover Publications, Inc., 2003). p.17.

the opportunities that sailing on same yielded.[31] Not to be outdone are the Australians who insist that they created maritime transport since its inhabitant would have had to come by sea in order to settle there.[32] To go further, there are likely some Christians who may even argue that the real and true maritime transport emerged in 7,500 B.C. when Noah built an ark in anticipation of a great flood.[33]

Notwithstanding the foregoing, it is clear that maritime transport is not a product of the 21st century. Instead, it has been in existence for over a number of centuries, as evidenced by the Pesse Canoe which was created over 10,000 years ago and which is known as the oldest boat in the world.[34] With time, other types of maritime transport materialized, as captured in Figure 1, such as dugouts, boats and ships operated via steam or sails, with each being distinguished based on the length of its voyages, its volume capacity and the purpose of its voyages. It is important to underscore that ships and boats were originally created to traverse the water from one riverbank to another. However, since the 20th century, maritime transport has become more modernized and much more expansive that it now includes yachts, cruise vessels and cargo ships which allow for voyages on larger bodies of water. These modernized versions of maritime transportation also allow for navigations for longer periods, and with the capacity for heavier loads.

[31] Ibid

[32] Robert Tonkinson and Ronald M. Berndt, "Australian Aboriginal peoples". Britannica. Available at https://www.britannica.com/topic/Australian-Aboriginal/additional-info#contributors. (accessed on 10 August, 2024).

[33] The Holy Bible, Genesis 6: 13-22

[34] Nautical Channel Organization, "The oldest canoe to date is 10,000 years old" (May, 2022). Available at https://nauticalchannel.com/new/the-oldest-canoe-to-date-is-10000-years-old. (accessed on 11 August 2024)

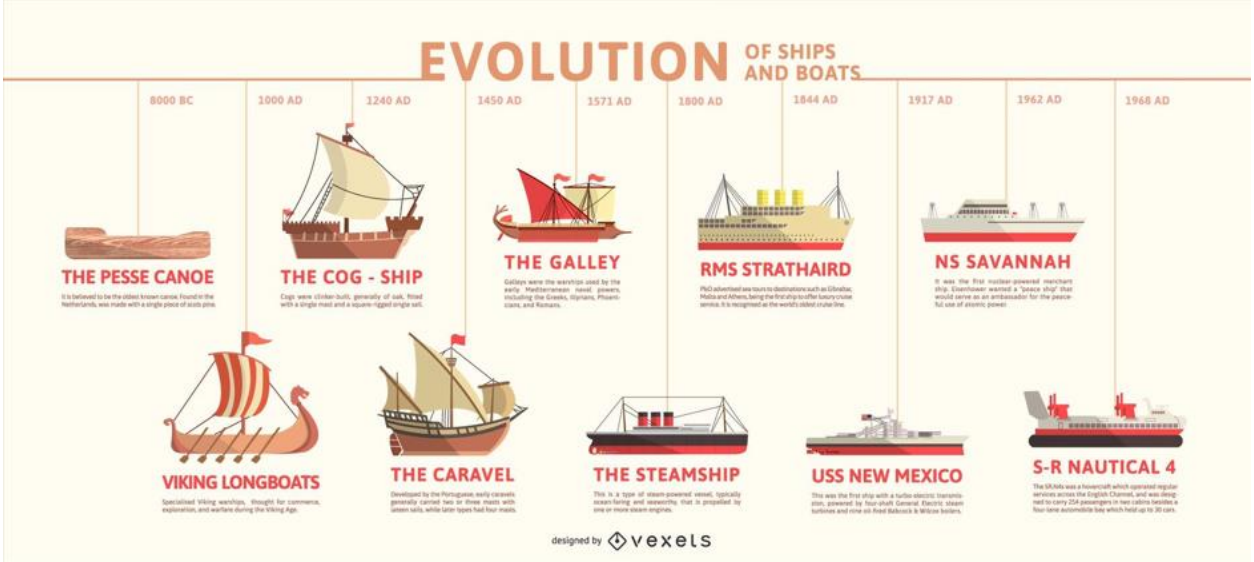

Figure 1. Evolution of ships and boats
Source: https://www.vexels.com/vectors/preview/198464/evolution-of-ships-timeline-infographic

Regardless of the viewpoint one may have on the origins of maritime transport, the general purpose is clear, and that is for it to be used as a means of protection, security, safety and transportation for people, animals, and by extension, goods and services. With its development from simple manual canoes, to sail ships which eventually led to ships being operated through steam, then to larger vessels, maritime transport serves as a major conduit for international trade, and domestic trade in certain respect.[35] Its history also demonstrates the progression from maritime transport being used as transportation for both goods and people simultaneously, to purpose-built vessels. Likewise, it shows the growth in maritime transport from solely being used for expedition and conquest to now being used for recreational, enjoyment and more commercialized purposes. Despite the advancements made with maritime transportation, there are challenges which have affected on the marine environment which will be explored in this dissertation.

Evolution of maritime zones and jurisdictions

It is noteworthy that although the earth's surface comprises approximately 71% ocean, maritime transport does not, and is not able to, pass through its entire volume, as there are limitations. In order to navigate across the ocean, maritime transportation have to follow prescribed

[35] Marielle Christiansen and others, "Maritime transportation" in *Handbooks in Operations Research and Management Science: Transportation*, vol. 14, Cynthia Barnhart and Gilbert Laporte, eds. (North Holland, 2004). p. 189.

maritime zones. Prior to maritime zones being established in the 21st Century, navigation of the ocean was largely unregulated with little restraint. In the 17th Century, Grotius introduced a new principle, *mare liberum*, signifying the freedom of the seas, and argued that the ocean was an international territory to be freely used by all for seafaring trade.[36] Soon after, an exception to this principle emerged, namely *mare clausum,* as it was realized that this freedom would result in serious challenges, particularly since States became desirous of wanting to protect their interests in the ocean.[37] This allowed powerful maritime nations to claim exclusive rights over the ocean.[38] For example, Venice would control the Adriatic Sea, while Denmark and Sweden shared the claim for the Baltic Sea.[39] Rodrigue explains that the restraints on the use of the ocean included specifications for navigational routes and itineraries. He avers that these function as obligatory points of passage, and which are strategic locations of physical constraints and of political borders.[40] This highlights the evolution of maritime transport into an organized and systematic regime, allowing for it to be regulated, not just on a national level, but on a global one as well. By the 20th century, there was an advent of modern maritime law and regimes for a restricted and more controlled use of the ocean aimed at ensuring, among other things, that the marine environment is protected and preserved.

It is important to also note that in 17th Century, the control over a state's territorial sea was settled through the cannon shot rule. This rule declared that a state was entitled to exercise its sovereignty over the maritime belt extending seawards from its shore up to the extreme range of a cannon shot, amounting to about 3 nautical miles.[41] This meant that waters which extended beyond these 3 nautical miles were then regarded as international waters, and as such allowed for freedom of the seas for which coastal states could not claim authority or jurisdiction. However, as time progressed, some States began to claim jurisdiction beyond the 3 nautical miles and this created much contention and confusion, thereby being dubbed a "chaotic situation".[42] Ultimately, and with

[36] Cara Nine, "Rights to the Oceans: Fundamental Arguments Reconsidered", Journal of Applied Philosophy, vol. 36, No. 4. (September, 2018). Available at doi: 10.1111/japp.12340. (accessed on 11 August 2024). p.627.
[37] Ibid
[38] Ibid
[39] Ibid
[40] Ibid
[41] Wyndham Legh Walker, "Territorial Waters: The Cannon Shot Rule" in *British Year Book of International Law, vol. 22,* (1945) p. 210.
[42] House of Lords. International Relations and Defence Committee, 2nd Report of Session 2021-2022 UNCLOS: the law of the sea in the 21st century. p. 7.

the First United Nations Conference on the Law of the Seas which was held in 1958,[43] States entered into negotiations to standardize maritime zones and jurisdictions. These negotiations continued for just over two decades, before the issues were resolved in 1982 at its Third Conference, through the establishment of UNCLOS, dubbed the "constitution of the oceans".[44]

Through UNCLOS, the use and management of the ocean, in conjunction with the operations of maritime transport, must take into account maritime zones and jurisdictions. On the landward side of a state's baseline are the internal waters,[45] while the territorial sea is determined to be up to 12 nautical miles from the baseline.[46] It also provides for a contiguous zone, being up to 24 nautical miles from the baseline.[47] Along with these zones within the jurisdiction of a coastal state, are archipelagic waters and exclusive economic zones which comprise approximately 36% of the world's waters. An archipelagic State, such as Jamaica, is constituted wholly by one or more archipelagos and may include other islands.[48] UNCLOS defines archipelago as a group of islands, including parts of islands, interconnecting waters and other natural features which are so closely interrelated that such islands, waters and other natural features form an intrinsic geographical, economic and political entity, or which historically have been regarded as such.[49] Such a State draws straight archipelagic baselines joining the outermost points of the outermost islands and drying reefs of the archipelago provided that within such baselines are included the main islands and an area in which the ratio of the area of the water to the area of the land, including atolls, is between 1 to 1 and 9 to 1.[50] UNCLOS stipulates that the length of such baselines shall not exceed 100 nautical miles, except that up to 3 per cent of the total number of baselines enclosing any archipelago may exceed that length, up to a maximum length of 125 nautical miles.[51] In relation to foreign ships, Article 53 prescribes that an archipelagic State may designate sea lanes and air routes there above, suitable for its continuous and expeditious passage through or over its

[43] Oceans and Law of the Sea United Nations "United Nations Convention on the Law of the Sea (A historical perspective)". Available at https://www.un.org/depts/los/convention_agreements/convention_historical_perspective.htm. (accessed on 22 August 2024)
[44] See remarks on 'A Constitution for the Oceans' by Tommy T. B. Koh, of Singapore, President of the Third United Nationals Conference on the Law of the Seas (10 December 1983)
[45] UNCLOS, (n. 8), Article 8(1)
[46] UNCLOS, (n. 8), Article 3
[47] UNCLOS, (n. 8), Article 33(2)
[48] UNCLOS, (n. 8), Article 46(a)
[49] UNCLOS, (n. 8), Article 46(b)
[50] UNCLOS, (n. 8), Article 47(1)
[51] UNCLOS, (n. 8), Article 47(2)

archipelagic waters and the adjacent territorial sea.[52] This allows for the rights of navigation and overflight in the normal mode solely for the purpose of continuous, expeditious and unobstructed transit between one part of the high seas or an exclusive economic zone and another part of the high seas or an exclusive economic zone.[53] As is the common exception, innocent passage is permissible[54] with the right to temporarily suspend for the protection of its security.[55]

The EEZ is the area adjacent to the territorial sea[56] and extends up to 200 nautical miles from the baseline of a State.[57] Within this maritime zone, the coastal state has sovereign rights to explore and exploit its natural resources,[58] and has jurisdiction over the protection and preservation of its marine environment.[59] In cases of arrest or detention of foreign vessels, the coastal State shall promptly notify the flag State, through appropriate channels, of the action taken and of any penalties subsequently imposed.[60] Likewise, the continental shelf is comprised of the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured where the outer edge of the continental margin does not extend up to that distance.[61]

Beyond these maritime zones lies the Area, or the High Seas, which is the Common Heritage of Mankind[62], shared by all states and represents approximately 64% of the world's oceans.[63]. UNCLOS provides that the high seas are open to all States, whether coastal or landlocked,[64] including for the purpose of freedom of navigation.[65] It is reserved for peaceful purposes,[66] and since this is a shared resource, it is incumbent on all states to manage these waters

[52] UNCLOS, (n. 8), Article 53(1)
[53] UNCLOS, (n. 8), Article 53(3)
[54] UNCLOS, (n. 8), Article 52(1)
[55] UNCLOS, (n. 8), Article 52(2)
[56] UNCLOS, (n. 8), Article 55
[57] UNCLOS, (n. 8), Article 57
[58] UNCLOS, (n. 8), Article 56(1)(a)
[59] UNCLOS, (n. 8), Article 56(1)(b)(iii)
[60] UNCLOS, (n. 8), Article 73(4)
[61] UNCLOS, (n. 8), Article 76(1)
[62] UNCLOS, (n. 8), Article 136
[63] Parliamentarians for Global Action, "Campaign for the protection of the oceans and implementation of SDG 14". Available at https://www.pgaction.org/pdf/2020/factsheet-high-seas-unregulated_en.pdf. (accessed on 22 August 2024)
[64] UNCLOS, (n. 8), Article 87(1)
[65] UNCLOS, (n. 8), Article 87(1)(a)
[66] UNCLOS, (n. 8), Article 88

in a way that is sustainable and beneficial to all. Specifically, 64% of the ocean is regarded as international waters and not predominantly owned or under the jurisdiction of any one state. However, while on the High Seas, a coastal state may engage in hot pursuit of a foreign ship if it has good reason to believe that the ship has violated the laws and regulations of that state.

By virtue of port state control, a coastal state has full and complete control and authority over its internal waters.[67] It is inferred that with this authority, maritime transport seeking to enter into the internal waters of a state needs to first obtain permission from the coastal state. In relation to territorial waters, the same level of authority is given to the coastal state though it must be stated that there are exceptions. For example, in cases such as the right of innocent passage, foreign vessels are permitted to enter and navigate through territorial waters without engaging in any harmful activities.[68] Foreign vessels must comply with the rules and regulations set forth by the coastal state in keeping with international laws.

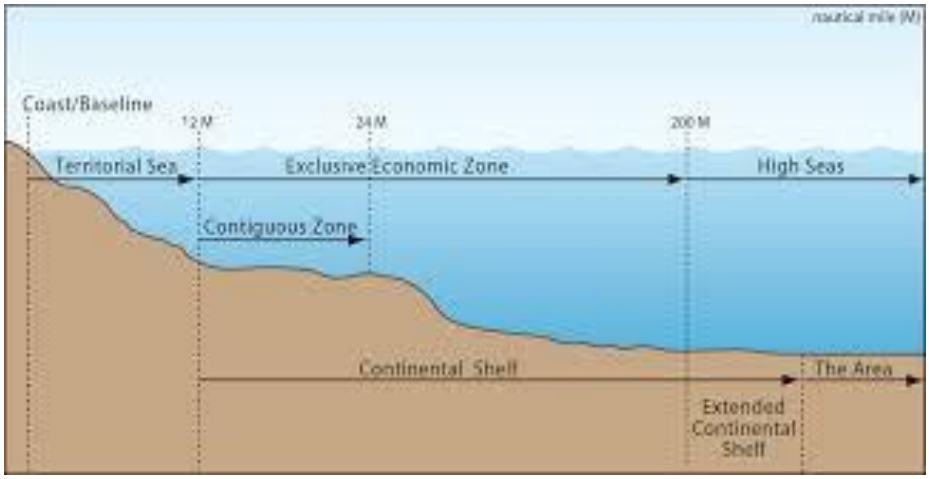

Figure 2. Maritime Zones
Source: https://www.noaa.gov/maritime-zones-and-boundaries

[67] UNCLOS, (n. 8), Article 2
[68] UNCLOS, (n. 8), Article 8

The emergence of maritime transport in Jamaica

In 1492, Christopher Columbus sailed across the Atlantic Ocean from Spain to the Caribbean.[69] His 1494 arrival into "Xaymaca"[70], now known as Jamaica, acts as ancient evidence of maritime transport on the island. His quest was for the discovery of wealth, spices and gold, not just for his benefit, but also for the benefit of King Ferdinand and Queen Isabel of Spain, both of whom believed in his dream, and financed his voyage.[71] This discovery seemingly enticed others with the idea of finding wealth and gold and ultimately formed a basis for the transatlantic trade. By the 17th Century, there was an increase in the Europeans wanting to obtain wealth from the newly found West Indies. This resulted in the expansion of trade in goods. Consequently, the Europeans engaged with the Africans, through trade, whereby ships would leave from Europe with manufactured goods heading towards West Africa.[72] Upon arrival in West Africa, the manufactured goods such as guns, alcohol and tobacco would be exchanged for human cargo.[73] The human cargo would then be taken to the Caribbean or the West Indies to be sold as slaves to provide cheap labour.[74] After the slaves were sold in Jamaica, the ships would then be reloaded with the agricultural goods to be sent back to Europe. This gave the Europeans the ability to get access to remote people and areas, such as Jamaica. and move them across continents and for long distances. While it would have been more affordable to use other Europeans as slaves, that was never considered an option as the Europeans preferred to enslave Africans because of their susceptibility to arduous working conditions.[75]

Eventually, the British colonized Jamaica after conquering the island from the Spaniards in the 1600s.[76] By then, sugar cane was recognized as a prized commodity and it began to boom

[69] History, "Christopher Colombus". Available at https://www.history.com/topics/exploration/christopher-columbus. (accessed on 15 August 2024)
[70] Jamaica Information Service, "History of Jamaica". Available at https://jis.gov.jm/information/jamaican-history/. (accessed on 15 August 2024)
[71] The Collector, "Christopher Colombus: Who funded his epic 1942 voyage?". Available at https://www.thecollector.com/who-funded-christopher-columbus-voyages/. (accessed on 15 August 2024
[72] David Eltis, "A Brief Overview of the Trans-Atlantic Slave Trade", Voyages: The trans-atlantic slave trade database. (Emory University, 2007). Available at https://www.slavevoyages.org/voyage/essays#interpretation/overview-trans-atlantic-slave-trade/introduction/0/en/. (accessed on 22 August 2024).
[73] Ibid
[74] Ibid
[75] Ibid
[76] Herbert S. Klein, *The Middle Passage: Comparative Studies in the Atlantic Slave Trade*. (Princeton University Press, 1978) p. 141

as the dominant crop. According to Klein, this transformed Jamaica into one of the world's largest plantation commercial crops regime.[77] This gave rise to the trade in slaves to work on the labour intensive sugar plantations which became part of the triangular slave trade. During the almost 200-year period, over 600,000 African slaves were transported to Jamaica.[78] It must be noted that the middle leg of the trade route from Africa across the Atlantic Ocean to the West Indies was referred to as the Middle Passage. Though the Middle Passage was a forced voyage of slaves or passengers via boats and slave ships, it shows how maritime transport evolved and expanded over the centuries. Figure 3 is a depiction of how the Triangular Trade worked.

Figure 3. Trans-Atlantic slave trade route
Source: https://howellworldhistory.wordpress.com/quarter-one/unit-3-european-global-interactions/the-atlantic-slave-trade-15-4/

Maritime transport for Small Island Developing States

Lastly, maritime transport has evolved in relation to Small Island Developing States (SIDS) or Large Ocean States. As the name suggests, SIDS are independent and sea locked countries that are small in size and population and have large maritime zones under their jurisdiction.[79] For these

[77] Ibid
[78] Ibid
[79] United Nations Conference on Trade and Development, "Review of Maritime Transport 2014". Available at https://unctad.org/system/files/official-document/rmt2014_en.pdf. (accessed on 22 August 2024)

SIDS, maritime transport is their lifeline as it supports economic performance, trade and productive sectors, such as tourism and fisheries, related impacts in these states are expected to be wider and potentially far more damaging than in other States, in particular as multiple crises or shocks could occur at the same time.

As one considers maritime transport, particular in relation to cargo shipping, the Panama Canal must be examined. The Panama Canal was created by in 1914 and has revolutionized maritime transport in the region by providing the shortest operative route connecting maritime trade between the Atlantic and Pacific oceans[80]. During the past decade, it has been undergoing significant changes by expanding to allow for larger vessels to traverse through the canal which has resulted in an increase in trade and the movements of people. This is a notable positive impact for cruise and cargo shipping as the likelihood of more people are wanting to go on cruises and more businesses wanting to do shipping within the region increases because of the flexibility that the canal has afforded. However, with larger and more vessels now traversing through the canal, there are also considerable adverse effects on the marine environment, and not just for Jamaica and the Caribbean. This is because it altered the natural water circulation patterns thereby affecting the distribution of nutrients, temperature gradients, and the dispersal of coral larvae.[81] Furthermore, due to the increased volume of ships using the Panama Canal as a route to pass through the Caribbean, there is a heightened risk of accidents, pollution and oil spills.

A great advantage of maritime transport is the ability to provide regular services, through continuity, despite its speed, or lack thereof. This is true particularly in relation to its capacity to handle large amounts of cargo and people. It is not to say that rail and road transportations are unable to achieve similar objectives, but that they are unable to support the level, scale and intensity of load and traffic that maritime transport is able to. Technical changes have transformed maritime transport as it relates to capacity and reliability since ships have become bigger. While this can lead to great economic benefits, a there is potential concern on whether and which ports would be able to facilitate the larger maritime transports. There are likely to be constraints on ship size for the capacity of ports, harbours and canals.

[80] Miller, Kahuina and Tetsuro Hyodo. "Impact of the Panama Canal expansion on Latin American and Caribbean ports: difference in difference (DID) method". *Journal of Shipping and Trade*, vol. 6, no. 8**.** (2021). Available at doi: https://jshippingandtrade.springeropen.com/articles/10.1186/s41072-021-00091-5. (accessed on 22 August 2024)
[81] Ibid

Another positive impact of maritime transport is that ships have become faster due to a marginal increase in their speed. This has the advantage of reducing the time frame to days. Maritime transport has become more specialized, for example, being designated to carry only one type of cargo. Ship designs have improved through the construction of larger and more energy efficient ships. Furthermore, ships have become more modernized and automated, allowing for them to be manned by smaller crews. This also enhances their safety and security features and standards. The adverse effects of maritime transport are explored in detail under Chapter 2.

Section B: Cruise and cargo shipping in Jamaica

Maritime transport plays a key role in facilitating trade and relationships with countries and continents connected by the seas. Despite Jamaica's history in relation to maritime transport, particularly the Transatlantic Slave Trade, it is an international hub for maritime transport especially with cruise shipping in which Jamaica has become one of the leading cruise destinations in the Caribbean. Similarly, with cargo shipping, Jamaica has boosted its economic standing and trade on a global level while working towards achieving its sustainable development goals. Indeed, maritime transport is more than just the movement of goods, people and services from one point to another via the ocean. It is also the epitome of trade, globalization and the interconnectedness of people and places. Two distinct yet noteworthy forms of maritime transport sailed into the global arena, namely cruise ship and cargo ship. Each will be discussed in this section with their advantages and disadvantages highlighted. The role that they play in Jamaica will also be explored together with the measures taken to regulate them.

Cruise shipping

Wang defines cruise shipping as the use of a cruise ship or a cruise liner to provide passengers with voyages for pleasure.[82] One of the first recognized evidence of this concept dates back to 1818, when the Black Ball Line became the first shipping company to offer a scheduled passenger service from the United States to England.[83] This line was initially a packet ship which offered mail and courier services.[84] It revolutionized the concept that people could have the option of travel to foreign places without flying. Since then, and propelled by technological and global advancements made in the maritime industry, cruise shipping has evolved into a multibillion-dollar industry with several fleets owned and operated by companies spanning Europe and the Americas. The cruise ship itself is equipped with onboard activities and amenities typically suited to entice passengers and enable them to have rich and beneficial experiences. The benefits are not limited

[82] Kai Wang and others, "Cruise Shipping Review: Operations planning and research opportunities", Maritime Business Review, vol. 1, 133-148. (2016). Available at doi:10.1108/MABR-04-2016-0007. (accessed on 27 August 2024). p. 133

[83] Company of Master Mariners of Australia, "The Black Ball Line". Available at https://www.mastermariners.org.au/stories-from-the-past/2715-the-black-ball-line. (accessed on 14 August 2024). See also Article posted on Pieces of the Past entitled 'Somewhere beyond the Sea' written by Dr. Rebecca Tortello and Dr. William Tatham in *The Jamaica Gleaner* Available at https://old.jamaica-gleaner.com/pages/history/story0076.html. (accessed on 13 November 2024)

[84] Ibid

to passengers, as the ports of call associated with the voyage also benefit.[85] It operates by picking up passengers from a specific port then traverse the ocean while making stops at predetermined ports of calls in between.[86] Wang points out that the cruise industry had developed dramatically that in 2014, there were 296 cruise ships for all cruise lines in the world.[87] This generated revenues upwards of over USD$37 billion with the passenger capacity amounting to approximately 22 million.[88] Today, there are 323 cruise ships operating globally with a projected revenue of USD$30 billion for 2024.[89] An average cruise ship can accommodate up to 2,500 passengers, with the largest cruise ship, Icon of the Seas, having the capacity for over 7,600 passengers.[90] Furthermore, there is a wide range of packages to suit the specific needs of passengers whether they prefer short voyages to Caribbean destinations or longer voyages across Europe.

Though the foregoing statistics are encouraging, it took some time for cruise ships to gain prominence in Jamaica. It was not until the late 19th century, that cruise tourism began to emerge in Jamaica, which has now become an ideal tourist destination. At that time, wealthy visitors would come to the island via steam ships.[91] Within the century that followed, banana boats became more prominent and were used not just to transport cargos, but also passengers. Thereafter, Jamaica commenced calls for cruise passengers after World War II, in ships that more closely resembled modern-day cruise ships.[92] One of the first passenger ships to arrive in Jamaica was the HMT Empire Windrush which facilitated the Windrush generation migration in 1948.[93] The ship transported approximately 1,027 passengers and two stowaways on a voyage from Jamaica to London.[94] Closer to the end of the 20th century, Jamaica experienced a significant milestone in 1968, when the cruise ship "Sunward" made its inaugural call to Ocho Rios. Though this was not the first cruise ship's arrival on the island, it marked the beginning of regular cruise ship visits to

[85] Ibid
[86] See note 87, p. 134
[87] Ibid
[88] Statista, "Cruise industry worldwide - statistics and facts", Available at https://www.statista.com/topics/1004/cruise-industry/#topicOverview. (accessed on 27 August 2024).
[89] Ibid
[90] Peter Nilson, "The top 10 biggest cruise ships in the world". Ship Technology, (March, 2024). Available at https://www.ship-technology.com/features/the-top-10-biggest-cruise-ships-in-the-world/. (accessed on 27 August, 2024).
[91]Rebecca Tortello and WilliamTatham, "Somewhere beyond the Sea" published in *The Jamaica Gleaner.* Available at https://old.jamaica-gleaner.com/pages/history/story0076.html. (accessed on 27 August 2024)
[92] Ibid
[93] Royal Museums Greenwich, "The story of the Windrush". Available at https://www.rmg.co.uk/stories/windrush-histories/story-of-windrush-ship. (accessed on 27 August, 2024).
[94] Ibid

that port.[95] In the 1970s and 1980s, the tourism sector and in particular the cruise shipping industry saw significant growth with more frequent calls and the development of purpose-built cruise ship facilities. It was at this time that cruise passengers and cruise shipping began to surge as a distinct feature for Jamaica, making it an ideal tourist destination.

The industry has developed significantly within the past thirty years, and according to Cruise Industry News, the total number of cruise ships operating worldwide as at 2023 amounted to approximately 445, with at least 145 entering operation since 2015.[96] The major cruise lines include Carnival Cruise Line which is operated by Carnival Corporation and PLC, Royal Caribbean Cruise Line which is operated by Royal Caribbean Cruises Limited and Norwegian Cruise Line which is operated by Norwegian Cruise Line Holdings Limited. It is worth noting that all three cruise lines do calls in at least one of the five cruise ports in Jamaica. The five cruise ports are Ocho Rios Cruise Ship Terminal (located in St. Ann), Montego Bay Cruise Ship Terminal (located in St. James), Falmouth Cruise Ship Terminal (located in Trelawny), Errol Flynn Marina and Boatyard (located in Portland), and in the capital city of Kingston, there is the Port Royal Cruise Ship Terminal also known as the Historic Naval Dockyard.[97] These ports are operated and regulated by The Port Authority (hereinafter referred to as "PAJ") which is the principal maritime authority in Jamaica, with its vision to be the western's hemisphere of maritime excellence.

The Ocho Rios Cruise Port, also referred to as the Port of Ocho Rios was built in the 1980s and houses two L-shaped piers designed specifically for cruise ships.[98] During the period 2015 to 2019, there were a total of over 2.6 million passengers who disembarked from cruise ships at this facility from a total of 840 calls.[99] Close by lies the Reynold's Pier which was originally built for cargo ships but has on occasions been used to welcome cruise ships.[100] Some of the cruise lines that call at this facility are Carnival Cruise Line, Costa Cruises, Holland America, MSC Cruise, Norwegian Cruise Line, Princess Cruise, and Regent Seven Cruises.[101] This is one of the most successful cruise terminals in Jamaica boosting a call of more than 190,000 passengers so far for

[95] n. 91
[96] Luca Antonellini, "The Cruise Industry in 2023", (Cruise Industry News, 2023). Available at 10.13140/RG.2.2.32645.83681. (accessed on 31 August 2024)
[97] "Cruise Ports, Your Gateway to Cruising Around Jamaica". Available at https://www.visitjamaica.com/cruises/ports/. (accessed on 31 August 2024)
[98] Ibid
[99] Ibid
[100] Ibid
[101] Ibid

2024.[102] The Falmouth Cruise Ship Terminal, (Figure 4), also referred to as the Port of Falmouth, opened for operation in 2011, and houses a themed retail shopping area alongside berths capable of hosting some of the world's most modern and largest cruise ships, including RCCL's Oasis of the Seas.[103] During the period 2015 to 2019, this terminal welcomed a total of over 3.6 million passengers from a total of 831 calls.[104] The other northern port in Jamaica is the Montego Bay Cruise Port, also referred to as the Port of Montego Bay . During the similar period, there were a total of over 2.1 million passengers that arrived on the island at this port from a total of 861 calls.[105]

Figure 4. Port of Falmouth
Source: The Port Authority

The Errol Flynn Marina and Boatyard has the smallest cruise ship operation in Jamaica. During the 5-year period of 2015 to 2019, only 6,329 passengers arrived on the island at this port facility from a total of 25 port calls.[106] It is important to point that though this facility engages in small-scale cruise operations compared to the other ports in Jamaica, it is believed to be the only port in Jamaica and the Caribbean that can accommodate some of the world's largest yachts.[107] Lastly, there is the Historical Noval Dockyard which is the most recently constructed cruise

[102] Ibid
[103] Historic Falmouth Jamaica "Welcome to Historic Falmouth Cruise Port". Available at http://www.portoffalmouth.com/. (accessed on 31 August 2024)
[104] The Port Authority, "Profiles of Port Facilities in Jamaica" (Jamaica, 2021)
[105] Ibid
[106] Ibid
[107] Port Antonio Jamaica, "Errol Flynn Marina". Available at http://www.portantonio.com/food-and-drink/restaurants/errol-flynn-marina.html. (accessed on 31 August 2024)

terminal and which commenced operations in January of 2020.[108] From a global perspective, the total number of cruise passengers amounted to 31.7 million in 2023.[109] For the corresponding period, the total number of cruise passenger arrivals in Jamaica amounted to approximately 1.3 million, which represents a 48% increase over the previous year where the number of cruise passenger arrivals amounted to 853,504.[110] For that same year, the GDP at current market prices for Jamaica amounted to close to 2994.3 billion Jamaican dollars.[111] Of this, 37.7% accounted for exports, while 51.1% represented imports.[112] As at July 31, 2024, the total number of passengers for the 7-month period amounted to 817,312.[113] This shows the strong demand for tourism and tourism related services of which cruise and cargo shipping play a significant role. Furthermore, as it relates to cruise shipping, Jamaica has welcomed over 1 million passengers since the start of 2024, contributing to more than USD$200 million to the local economy.[114]

[108] The Port Authority, "Profiles of Port Facilities in Jamaica" 2021
[109] Luca Antonellini, "The Cruise Industry in 2024", (Cruise Industry News, 2024). Available at 10.13140/RG.2.2.28285.78565. (accessed on 31 August 2024)
[110] n. 108. See Also Economic and Social Survey Jamaica 2023: Planning Institute of Jamaica, "Economic and Social Survey Jamaica 2023: Selected Indicators and Overview". Available at https://www.pioj.gov.jm/. (accessed on 25 October 2024)
[111] Planning Institute of Jamaica, "Economic and Social Survey Jamaica 2023: Selected Indicators and Overview". Available at https://www.pioj.gov.jm/. (accessed on 25 October 2024)
[112] Ibid
[113] n. 108
[114] Okoye Henry, "Jamaica Welcomes More Than One Million Cruise Passengers", Jamaica Information Service (November, 2024). Available at https://jis.gov.jm/jamaica-welcomes-more-than-one-million-cruise-passengers/. (accessed on 17 December 2024).

Cruise Visitors by Month CY 2023

Cruise Visitors by Month CY 2023			
	2023	2022	% change
Jan	155,772	21,110	637.9%
Feb	144,465	28,760	402.3%
Mar	177,265	49,145	260.7%
Apr	88,746	46,913	89.2%
May	72,026	65,198	10.5%
Jun	56,397	74,748	-24.6%
Jul	63,840	74,990	-14.9%
Aug	64,649	81,753	-20.9%
Sep	49,923	67,692	-26.2%
Oct	57,717	75,922	-24.0%
Nov	142,058	119,352	19.0%
Dec	192,728	147,921	30.3%
YTD	**1,265,586**	**853,504**	**48.3%**

Table 1. Cruise visitors by month, 2023
Source: Tourism Analytics, Jamaica: https://tourismanalytics.com/jamaica-statistics.html

Cargo Shipping

Cargo shipping involves the use of cargo ships to transport heavy goods and materials from one port to another.[115] These cargo ships range from general cargo, multi-purpose cargo, dry-bulk cargo and tankers. Jamaica's ideal geographical location in the Caribbean has made it a strategic point for shipping routes between North America, South America, and Europe. With this, global trade relating to cargo shipping has blossomed to be a significant part of Jamaica's economic development. However, this was not always the case, as early evidence of cargo shipping was seen in the Pre-Columbian era. At this time, the indigenous Taino people engaged in local maritime trade using canoes[116], but this was limited in scope and distance. During the Spanish colonial period, maritime transport, and in particular cargo shipping, became more predominant as the Spanish colonizers began using Jamaica as a stopover point for their ships travelling between Spain

[115] Hiteshk "What are cargo Ships?", Marine Insight, (January 2021). Available at https://www.marineinsight.com/types-of-ships/what-are-cargo-ships/. (accessed on 13 November 2024
[116] Ibid

and the Americas.[117] However, at that time, Jamaica did not have any major cargo shipping infrastructure. It was not until the British Colonial Period when the British captured Jamaica in 1655 that a shift began in the shipping industry in Jamaica.[118] This was evident through the sugar trade of which Jamaica was a major producer. The British used their ships as a means to transport sugar to Europe.[119] Similarly, though most unfortunate, this period was marked with the slave trade. During this time, Jamaica was key to the Transatlantic Slave Trade as the British would bring enslaved Africans there via cargo ships. Not long after this, the port of Port Royal was constructed and became one of the busiest and most important ports in the Caribbean until it was destroyed by an earthquake in 1692.[120]

As time marched on, slavery was abolished which marked a further shift in the cargo operations for Jamaica. Soon after, agricultural products such as banana and sugar were in high demand and by the late 19th century, it became a major export crop. After the abolition of slavery, there was a shift in cargo patterns. Bananas became a significant export crop in the late 19th century. This ultimately led to the establishment of the Jamaica Banana Producers Association in 1929, which operated its own fleet of ships for banana exports. Not long after, ushered the development of bauxite and alumina mining in the 1950s which led to increased bulk cargo shipping. Jamaica continues to import fuels, motor vehicles and consumer goods such as food, clothing and machinery.[121] It also resulted in the expansion and modernization of port facilities, particularly in Kingston. Today, there is continued development of port infrastructure. Furthermore, Jamaica has established free trade zones to encourage the manufacturing and exportation of our goods which increased cargo shipping in the country. In all, there are fifteen ports strategically located throughout the island which are instrumental in cargo shipping and handling, which includes Kingston Container Terminal which is one of the Caribbean's leading transshipment ports (Figure 5).[122] Located in the capital city of Jamaica, this port is primarily responsible for cargo shipping and handling and has made cargo shipping parallel to cruise shipping fostering growth and sustainable development. The Port Authority remains committed to

[117] Ibid
[118] James A. Delle, *The Colonial Caribbean: Landscapes of Power in Jamaica's Plantation System*. (Cambridge University Press, 2014)
[119] Ibid
[120] Ibid
[121] The Port Authority, "The Port Authority Annual Report 2021", (Jamaica, 2021)
[122] n. 108

the ongoing efforts to upgrade and expand port facilities to accommodate larger vessels and increase cargo handling capacity.

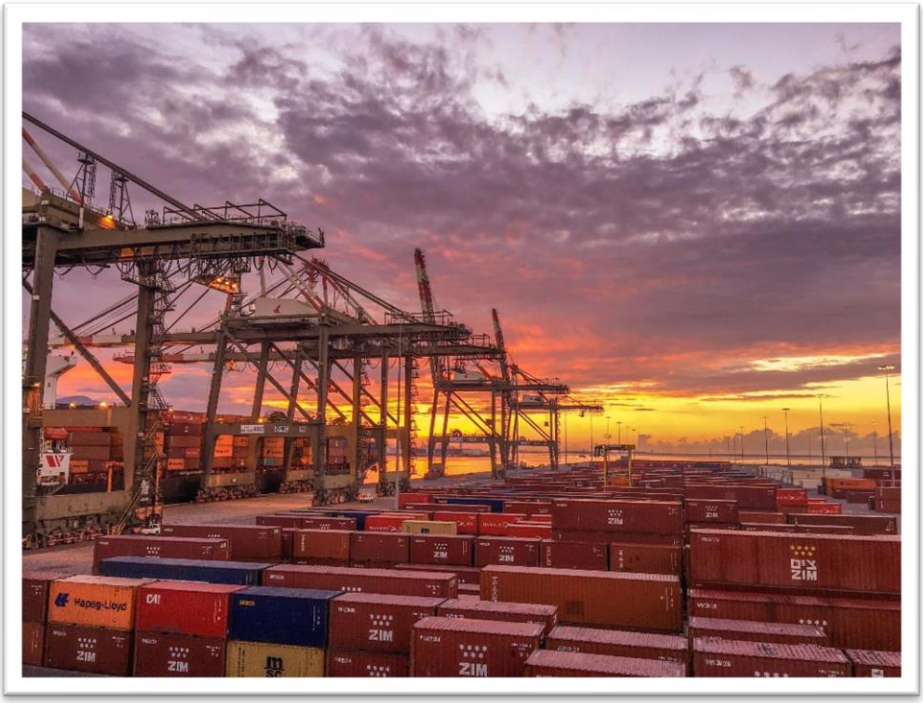

Figure. 5
Source: The Port Authority

CHAPTER TWO: The marine environment

Section A: The anatomy and importance of coral reefs and mangroves

The marine environment includes the oceans and all seas and adjacent coastal areas and forms an integrated whole that is an essential component of the global life-support system and a positive asset that presents opportunities for sustainable development.[123] Within this environment, lies coral reefs and mangroves which serve significant purposes, and like their marine counterparts, living and non-living, they are to be protected and preserved. Understanding coral reefs and mangroves, as well as their importance, is necessary in order to appreciate the marine environment on a whole. This will aid in analyzing the impact that factors such as maritime transport can have on their protection and preservation. Section A of this chapter explores the general definition of the marine environment and its composition to include coral reefs and mangroves, which are two critical features of the marine environment. This section will allude to their importance, not just to Jamaica, but also to the world at large. It will also briefly give the statistical information on coral reefs and mangroves locally and globally. In Section B, there will be an assessment of the relationship between coral reefs, mangroves and maritime transport and in particular, it will assess the adverse effects and threats that cruise and cargo ships have on these marine environment will be discussed.

The Marine Environment

As with every story, the ocean and its environs have a beginning. It is the hope of an evolving universe that this does not come to an end, especially as a result of actions that could have been avoided. The ocean has been in existence from around 6,000 years ago, when God created the heaven and the earth. At this time, it was said that the Spirit was hovering over the waters,[124] and that God created the sky and the seas.[125] It is reasonable to agree then that the marine environment would have existed from the time of the creation story in Genesis, and in particular, on day five when God created the sea creatures. Interestingly, these were created even before the existence of humankind who was created on the sixth day with dominion over the fish of the sea.[126]

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[123] United Nations, Report of the United Nations Conference on Environment and Development, (Rio de Janeiro, June 1992). Available at https://www.un.org/depts/los/consultative_process/documents/A21-Ch17.htm. (accessed on 31 October 2024)
[124] The Holy Bible: Genesis 1:6-7
[125] Ibid
[126]The Holy Bible: Genesis 1:28

Apart from what is captured biblically about the fishes of the sea, one's very presence on earth lends itself to the knowledge of the marine environment. Furthermore, with humankind's dominion over these fishes of the sea, the onus has been placed on them to protect and preserve the marine environment.

As the world evolved and studies of the oceans began to materialize, there became a more concentrated definition of the marine environment. Cornell Law School, for example, has defined marine environment as "the physical, atmospheric, and biological components, conditions, and factors which interactively determine the productivity, state, condition, and quality of the marine ecosystem, including the waters of the high seas, the contiguous zone, transitional and intertidal areas, salt marshes, and wetlands within the coastal zone and on the outer Continental Shelf."[127] It includes estuaries, coastal marine and nearshore zones, and open-ocean-deep-sea regions.[128] To make simpler, the marine environment encompasses all living and non-living resources that are found in and around the ocean and is covered under UNCLOS. Although UNCLOS has not specifically defined the marine environment, it makes provision for what is included within it and places an obligation on all states to protect and preserve the marine environment.

The marine environment is of grave significance to humankind because of the benefits that are derived and developed from it. It is said to have a high salt content and is filled with life and science.[129] Life, in the sense that it is populated with living organisms such as coral reefs and mangroves, and science because of the scientific effect it has on its environs and society on a whole. It is able to replenish almost half of the earth's oxygen demand.[130] This is one of the most widely recognized importance of the marine environment as it aids in the regulation of the climate and provides some of the air humankind breathes. Breitburg refers to the oxygen content from the ocean as being fundamental to life and notes that its depletion can result in the ocean losing its capacity to support high bio-mass and provide ecosystem services.[131] Much of this oxygen is

[127] Cornell Law School, "Marine environment". Available at https://www.law.cornell.edu/uscode/text/43/1331#g. (accessed on 25 October 2024)
[128] European Environment Agency, "Marine environment". Available at https://www.eea.europa.eu/help/glossary/eea-glossary/marine-environment. (accessed on 25 October 2024)
[129] Bruno Augusto Amato Borges, *Marine Ecosystem : Changing Scenario and Sustainability.* (Ashland: Delve Publishing, 2020). Available at https://research.ebsco.com/linkprocessor/plink?id=86313a94-0c0c-379c-9841-e6acd95eff13. (accessed on 19 August 2024), p. 3
[130] Ibid
[131] Denise Breitburg and others (2018) "Declining oxygen in the global ocean and coastal waters" Vol. 359 Available at DOI: 10.1126/science.aam7240. (accessed on 19 August 2024)

derived from coral reefs and mangroves in ways to be explained below. Throughout the dissertation, ecosystem and environment may be used interchangeably as both depict the definition of the living and non-living components of the marine environment. Though there are several categories within which the marine ecosystem is divided, for the purpose of this dissertation coral reefs and mangroves will be the focal point of the discussion.

Coral Reefs

Bright and beautiful are the colours of corals as depicted in the Figure 6. These are hard substances formed in the sea from masses of shells, or rocklike aggregations of certain sea animals and their skeletons[132]. According to Borges, coral reefs are small immobile animals which are closely related to jellyfish.[133] They are composed of calcium carbonate skeletons of corals which ultimately create reefs.[134] They come together to form a reef, which is a ridge of jagged rocks or corals. When the corals and the reef converge, they form an underwater ecosystem known as coral reefs. Its structure is formed biologically through the growth and death of immobile aquatic species, sponges and reef building corals.[135] They are formed by creating crevices, holes and even caves which make them a suitable habitat for marine animals such as crabs and shrimp.[136] It is noteworthy of mention that the impact of coral reefs on society is quite disproportionate to its size in the marine environment. Though they are small in size when compared to the ocean, they comprise 25% of marine species[137] or about .2% of the world's marine ecosystem.

[132] Word reference, "Coral". Available at https://www.wordreference.com/definition/coral?s=coral%20evergreen. (accessed on 22 October 2024)
[133] Borges, (n. 129) p. 12
[134] Ibid, p. 5
[135] Ibid
[136] Ibid
[137] Office for Coastal Management, "Coral Reefs." Available at https://coast.noaa.gov/states/fast-facts/coral-reefs.html. (accessed on 25 August 2024)

Figure 6: Coral reefs in Jamaica

Source*: CAPRI Sea of Opportunity: Developing Jamaica's Blue Economy. February 2024*

Coral reefs enhance the ocean not only with their glow, but also because of the significant benefits they have not just to the marine environment but to humankind generally. Souter refers to coral reefs as being some of the most productive and diverse ecosystems on earth.[138] This is because of the invaluable services that they provide relative to food security and oxygen. It still needs to be established what makes this type of marine ecosystem so special. Though they serve a multiplicity of purposes, Knowlton maintains that coral reefs have changed overtime and will continue to change because of effects that people, whether directly or indirectly, have on them.[139] Like mangroves their importance is not only because of the diversity that they provide, but also due to the millions of species, including humans that live primarily or exclusively in association with them. The unique features of the coral reefs are their hard or reef building properties which comprise thousands of individual polyps.[140] They are scientifically known as scleractinian.[141] It must be noted that coral reefs are not found in all areas where there is water. This is because of the specific requirements that are needed for them to flourish, such as clear, shallow and warm water

[138] David W. Souter and Olof Linden "The Health and Future of Coral Reefs systems". Ocean and Coastal Management 43, 657-688, (2000). Available at https://doi.org/10.1016/S0964-5691(00)00053-3. (accessed on 23 October 2024). p. 657.
[139] Nancy Knowlton, "The future of coral reefs." PNAS vol. 98(10), 5419-5425, (2001). Available at https://doi.org/10.1073/pnas.091092998. (accessed on 25 October 2024). p. 5419.
[140] Souter, (n. 138). p.657.
[141] Ibid

that ranges between 18 to 30°C.[142] However, this is not to say that they cannot thrive in other temperatures. Furthermore, with these specific set of physiological and environmental requirements, coral reefs are predominantly limited to the tropics[143]. This supports the rationale behind most major coral reefs being formed between the Tropic of Cancer and the Tropic of Capricorn. An additional requirement is that of light and for that reason, coral reefs are generally distributed to depths shallower than 100m.[144]

Coral reefs are classified according to their growth and location. For example, reefs that grow along coastlines are referred to as fringing reefs, while those that are parted from the coastline by a lagoon are called barrier reefs.[145] A well-known reef is that of The Great Barrier Reef located in Australia. Despite the fact that coral reefs can virtually survive devoid of nutrients, they are essential to our life support systems. They provide benefits for food, production, health, and other aspects of human survival and sustainable development. Almost 400 million people depend on coral reefs for food and economic opportunity.[146] It is also used for tourism to attract tourist towards isolated regions of the world. Regrettably, despite its far-reaching impact and advantages, coral reefs encounter a number of threats and their chances of survival are declining.

Coral bleaching has become an increasing threat to coral reefs. This is the whitening of corals as a result of the loss of their symbiotic algae and or pigments.[147] Rocha de Souza argues that coral reefs are among the most iconic examples of climate-driven ecosystem decline.[148] This is as a result of coral bleaching which is a loss of color in response to thermal stress.[149] The bleaching causes the corals to become pale by means of the breakdown of the symbiosis.[150]This has increased the mortality rate in coral reefs due to their decline and depletion caused by elevated temperatures associated with climate change. In 2023, the average coral reef health index score

[142] Ibid
[143] Ibid
[144] Ibid
[145] Borges, (n. 128). p. 5.
[146] Ibid
[147] Wolfgang Niggl and others, "First evidence of coral bleaching stimulating organic matter release by reef corals", (11th International Coral Reef Symposium, 2008).
[148] Mariana Rocha de Souza and others, (2003) "Importance of depth and temperature variability as drivers of coral symbiont composition despite a mass bleaching event", Scientific Reports 13. Available at Doi: https://doi.org/10.1038/s41598-023-35425-9. (accessed on 17 August 2024)
[149] Ibid
[150] Ibid

decreased from 2.2 in 2019 to 1.8.[151] Concerns now mount as to the impact of maritime transport on coral reefs. It is dire then when we consider how or actions directly or indirectly can stifle and damage coral reefs. Other threats include pollution, the introduction of invasive species, harmful fishing practices, climate change and ocean acidification which will be discussed in Section B of this chapter.

Mangroves

Montgomery defines mangroves as salt tolerant plants that exist along sheltered tropical and subtropical coastlines.[152] This definition is enhanced by Webber who describes them as dominating the intertidal zone of sheltered (muddy) coastlines of tropical, sub-tropical and warm temperate oceans.[153] These endangered species are diverse coastal forests serving numerous purposes not limited to the marine environment,[154] and are often referred to as the "rainforest of the seas".[155] Like coral reefs, mangroves create their own ecosystem and they produce a complex grid or web of habitat for various amphibious and other marine species.[156] They become salt tolerant due to the frequency of tidal flooding which decreases progressively toward the more landward zones of the forest leading to an accumulation of salts making them susceptible to adverse conditions.[157] Webber emphasizes the importance of mangroves noting that they continue to be of tremendous value to humanity through a range of ecosystem services.[158] These include being a habitat for juvenile fish which are essential to coral reefs and their ecosystems, carbon sequestration, climate regulation, shoreline stabilization, water filtration and pollution regulation, as well as coastal protection and resilience.[159] Additionally, mangroves provide opportunities for

[151] National Environment and Planning Agency, "Coral Reef Health Index", NEPA Environment and Planning Agency's portal. Available at https://storymaps.arcgis.com/stories/403e6edf58b2462096d08c52315b9e64. (accessed on 26 November 2024

[152] J. M. Montgomery, K. R. Bryan and G. Coco, "The role of mangroves in coastal flood protection: the importance of channelization" Continent Shelf Research, vol. 243, (July 2022). Available at https://doi.org/10.1016/j.csr.2022.104762. (accessed on 17 August 2024)

[153] Mona Webber and others, "Mangroves", United Nations. Available at https://www.un.org/depts/los/global_reporting/WOA_RPROC/Chapter_48.pdf. (accessed on 17 August 2024)

[154] Hina Akram and others, "Mangrove Health: A Review of functions, threats and challenges associated with mangrove management practices", Forests (2023), vol. 14(9). Available at https://doi.org/10.3390/f14091698. (accessed on 17 August 2024).

[155] Ibid

[156] Borges, (n. 129)

[157] Webber, (n. 153)

[158] Ibid

[159] World Bank (2019). Mangroves Monitoring and Evaluation Manual for Jamaica (2019). Available at https://documents1.worldbank.org/curated/en/965411613137686768/pdf/Mangroves-Monitoring-and-Evaluation-Manual-for-Jamaica.pdf. (accessed 23 September 2024). p. 4

fisheries, aquaculture production and pharmaceutical generation.[160] Not to be ignored, are the cultural services that mangroves offer through tourism and recreation and education.[161] Consequently, when mangroves are compromised due to depletion, removal or degradation, risks are generated in the form of increased coastal erosion and biodiversity losses which would affect commercial and non-commercial fisheries, upon which Jamaica's coastal communities heavily depend. Additionally, if mangroves are not protected and preserved, there would be a loss of carbon reservoirs since mangroves allow for the sequestering of atmospheric carbon. Webber avers that mangroves are known to filter runoff and pollutants, improving water quality.[162] She further avers that they also absorb carbon dioxide from the air and store it in their roots and the soil.[163]

With mangroves dominating coastal areas, their purposes span far and wide. They act as the dwelling place for local flora and fauna, an attraction for tourists, and provide food and employment opportunities for humans. They also provide coastal protection thereby minimizing risks associated with floods, storms and even hurricanes. As Borges puts it, mangroves are a vibrant use of defense against strong tropical storms[164] which is why mangroves are invaluable for storm and hurricane-prone Jamaica. Globally, as at 2020, there were about 14.8 million hectares of mangroves, with more than a combined 40% of them predominantly found in Indonesia, Brazil, Nigeria and Mexico.[165] The mangrove coverage in Jamaica was approximately 9,945 hectares, with an example featured in the Figure 7.[166] Though this figure might not demonstrate it, mangroves form a very essential part of the marine ecosystem in Jamaica. However, as society continues to develop and climate change increasing, it has become apparent that mangroves, like coral reefs, are threatened in a number of ways. A major one is that mangroves are being removed or cleared to facilitate aquaculture and construction in certain cases. For example, the process of dredging, which is the removal of substratum from the sea floor, is one way in which mangroves are destroyed. This process is typically required in many ports of the world.[167] It entails the

[160] Ibid
[161] Ibid
[162] Webber, (n. 153)
[163] Ibid
[164] Borges, (n. 129)
[165] Food and Agriculture Organization of the United Nations, "Global Forest Resources Assessment 2020: Main Report". Available at https://doi.org/10.4060/ca9825en. (accessed on 1 September 2024)
[166] Ibid
[167] Paul L. A. Erftemeijer and Roy R. Robin Lewis, "Environmental impact of dredging on seagrass: A review." Science Direct Marine Pollution Bulletin vol. 52, issue 12 (2006). Available at https://doi.org/10.1016/j.marpolbul.2006.09.006. (accessed on 22 August 2024). p. 1553.

deepening and maintaining of navigational channels and harbour entrances.[168] It takes the form of the excavation of the bottom of the seabed, transportation of the materials dredged and the disposal all of same. This complex procedure can have adverse effects when the dredging or its disposal is done close to sensitive areas such as coral reefs and mangroves.[169] When a port or a terminal is being constructed, many of the mangroves are destroyed or depleted.

Figure 7: ***Mangroves at*** Portland Bight Discovery Centre, Salt River, Clarendon
Source: Tovia Elliott, Environmental Programmes Coordinator of The Port Authority

This is evident in Jamaica as coral reefs and mangroves are sometimes destroyed and degraded due to factors such as harbour and infrastructure development particularly because of the urbanizing of tourist attractions, including the establishment of hotels. This saw a combined total of 19.5 hectares of mangroves being lost during the period 2017 to 2021.[170] Of this number, 11 hectares were lost as a result of tourism activities related to cruise and cargo shipping.[171] Since 2021, there have been reports of at least five hectares of mangrove loss due to hotel development in Falmouth Trelawny, and 6 hectares of mangrove loss due to the creation of the new Falmouth market.[172] In the corresponding period, only 2.7 hectares of mangroves were rehabilitated.[173]

[168] Ibid
[169] Ibid
[170] The Forestry Department, "National Mangrove and Swamp Forest Management Plans 2023-2033" (Jamaica, 2022). Available at https://www.forestry.gov.jm/resourcedocs/NMSFMP_Final_Feb9_2023.pdf. (accessed on 28 September 2024). p. 53
[171] Ibid at p. 15
[172] Ibid at p. 20
[173] Ibid at p. 53

Accordingly, Jamaica lost more than six times the amount of mangrove forest gained. Figure 8 below shows the map of Jamaica's mangrove coverage as at 2022. It is therefore necessary for a balance to be struck between urbanization through developments which have a great impact on Jamaica's gross domestic product and the mangroves and coral reefs which need to be protected and preserved. Other threats include climate change and pollution typically caused by oil spills, and will be explored further in Section B.

Figure 8: Map of Mangrove and swamp forest areas in Jamaica

Source: The Forestry Department, *Jamaica's National Mangrove and Swamp Forest Management Plan 2023-2033* https://www.forestry.gov.jm/resourcedocs/NMSFMP_Final_Feb9_2023.pdf

Section B: The impact that cruise and cargo ships have on coral reefs and mangroves

One can appreciate that the marine environment is a critical part of our existence, as is maritime transport. By their very nature, both collide, and a relationship is established for which we now determine. Certainly, there can be no maritime transport if there were no ocean as its purpose and route require the use of the ocean. However, in using the ocean, considerations ought to be made for the marine environment. It may be argued that not many considerations are given to the impact that maritime transport has on the protection and preservation of the marine environment. This section will seek to analyze the environmental, social, and economic impact that cruise and cargo ships have on the coral reefs and mangroves. As a consequence of the maritime traffic that is derived from cruise and cargo ships, coral reefs and mangroves encounter a plethora of impacts. These impacts will be considered in light of the their social, economic and environmental effects, taking into account both positive and negative factors. In doing so, it will discuss the main environmental impact of ocean acidification, pollution, the introduction of invasive species and climate change. On a social level, it will look at how cruise and cargo ships affect the county's demographics and relationships. Finally, it will take into account the economic implications by considering the gross domestic product, bolstered by tourism, trade and employment opportunities.

Environmental implications

Ocean Acidification

As indicated above, a major environmental impact of maritime transport that affects the marine environment is ocean acidification. To understand ocean acidification, one must be able to appreciate the role carbon dioxide (CO_2) plays. Referred to as one of the most important gases in the atmosphere, $CO_2$is a colourless, odorless gas that is naturally present in earth's atmosphere.[174] It is a crucial component of the carbon cycle and is produced by the respiration of animals and plants.[175] Additionally, it is a significant GHG, trapping heat in the atmosphere and contributing to global warming.[176] Kleypas notes that CO_2 affects the radiative heat balance of the earth together

[174] Global Monitoring Laboratory, "Basics of the Carbon Cycle and the Greenhouse Effect. The Earth's Atmosphere". Available at https://gml.noaa.gov/outreach/carbon_toolkit/. (accessed on 17 August 2024)
[175] Ibid
[176] Ibid

with the calcium carbonate equilibrium of the oceans.[177] Kleypas further points out, that the beautiful creatures, namely the marine environment, are also the most vulnerable, and depend on a delicate balance of chemistry to remain viable. When there is an increase in amount of CO_2 in the ocean, this results in the pH level being lowered. Kleypas describes this as ocean acidification because of the process of decreasing pH which is projected to decline even more.[178] Though the ocean may be regarded as a large carbon sink, to have it be used to absorb more CO_2 than is required serves the purpose of destroying the marine environment. The destruction takes the form of dissolving coral reefs and making it difficult for marine animals to grow or maintain their shells.

Having explained CO_2, ocean acidification can now be defined. This is the reduction in the pH of the ocean over an extended period of time which is caused primarily by an uptake of CO_2 from the atmosphere.[179] Simply put, the greater the CO_2 in the atmosphere, the lower the pH level of the ocean becomes. This chemical change in the ocean makes it acidic and thereby adversely affects the marine environment. This stems from as far back as the Industrial Revolution when carbon dioxide levels began to increase.[180] It is sad that since the Industrial Revolution, ocean acidification has increased rapidly causing pH to drop by approximately 30% since the pre-industrial era.[181] The continued burning of fossil fuels to provide energy for ships does not make the situation any better with the increasing levels of CO_2 in the atmosphere. With the ocean absorbing more heat and CO_2 emissions in large quantities, coral reefs and mangroves are being threatened, and one could project that the ocean's temperature is likely to increase by the end of the century. Furthermore, with cruise vessels and cargo ships with the oxides being emitted from the ships' engine during their operations the ocean is becoming more acidic. For coral reefs, ocean acidification is the dominant cause for their degradation and destruction. Hoegh-Guldberg suggests that this acidification reduces the availability of carbonate ions, which are essential for corals to

[177] Joan Kleypas and others, (2006). Impacts of Ocean Acidification on Coral Reefs and Other Marine Calcifiers: A Guide for Future Research. Report of a workshop held 18–20 April 2005, St. Petersburg, FL, sponsored by NSF, NOAA, and the U.S. Geological Survey. p. 3.
[178] Ibid
[179] National Ocean Service, National Oceanic and Atmospheric Administration "What is ocean acidification?" Available at https://oceanservice.noaa.gov/facts/acidification.html. (accessed on 17 August 2024)
[180] Cem Gazioglu and others (2015) Connection between Ocean Acidification and Sound propagation. International Journal of Environment and Geoinformatics 2(2), 16-26. Available at DOI:10.30897/ijegeo.303538. (accessed on 17 August 2024) p. 17
[181] European Environment Agency, "Ocean Acidification", (May 2024). Available at www.eea.europa.eu/en/analysis/indicators/ocean-acidification. (accessed on 17 August 2024)

build their calcium carbonate skeletons.[182] As a result, the structural integrity of coral reefs becomes compromised, leading to their dissolution. When the coral reefs are destroyed then other marine ecosystems become threatened. Food production and fisheries also become impacted which in turn result in adverse effects on the economy. To avert this crisis, there is a great need for the reduction of carbon dioxide GHG emissions.

Together with climate change, this can lead to ocean warming which UNESCO's State of the Ocean Report 2024 indicates has doubled in 20 years due to the ocean steadily and constantly heating up, with 2023 recording the highest increase since the 1950s.[183] This goes counter to the Paris Agreement which aspires to keep global warming levels below 2°C.[184] As a consequence, coastal species are suffocating because oxygen levels in the ocean are declining which creates dead zones. Dead zones are areas that do not have any marine life due to the dwindling oxygen content, with approximately 500 dead zones having been identified globally.[185] The Ocean Report further projects that the ocean's acidity is likely to reach 170% by 2100 if it continues along the same trajectory. It is therefore necessary for Jamaica to consider measures which can be used to regulate the pollution caused by GHG emissions. These emissions have contributed to the earth's climate becoming warmer. This has induced the phenomenon of sea level rise, whereby there is a thermal expansion of sea waters because the ocean has become warmer.[186] This has the effect of aggravating coastal regions by way of erosion and flooding. When this happens, shorelines are shifted resulting in devastation and sometimes displacement of ports and the marine environment. As a consequence, the need to implement climate resilience measures is great in order to address the potential hazardous effects of sea level the rise. Examples of these measure range from building out land into rivers and seas and installing flood gates or barrier to combat potential chronic

[182] O Hoegh-Guldberg and others, "Coral Reefs under rapid Climate Change and Ocean Acidification", Science (New York, N.Y. 2008). vol. 318, 1737-42. Available at Doi:10.1126/science.1152509. (accessed on 17 August 2024)
[183] Intergovernmental Oceanographic Commission, "State of the Ocean Report 2024", UNESCO. Available at https://unesdoc.unesco.org/ark:/48223/pf0000390054. (accessed on 21 October 2024)
[184] *The Paris Agreement to the United Nations Framework Convention on Climate Change* (Adopted 12 December 2015, Entered into Force 4 November 2016) 3156 UNTS 107, Art. 2(1)(a)
[185] n. 183
[186] Anny Cazenave and Goneri Le Cozannet, "Sea level rise and its coastal impacts", Earth's Future, vol. 2, 15-34 (2013). Available at doi:10.1002/2013EF000188, (accessed on 30 November 2024). p. 15.

flooding. Nicholls has also suggested flood resilience measures to control or reduce groundwater extraction and manage water levels.[187]

Pollution

Pollution, especially nutrient runoff from agriculture, development and sewage, is another factor which affects the marine environment. It can lead to eutrophication in coastal waters, thereby affecting coral reefs and mangroves. Fabricius notes that eutrophication increases the growth of algae and phytoplankton, which can smother corals and block sunlight.[188] Additionally, certain pollutants can directly damage coral tissues and symbiotic relationships, further contributing to coral reef degradation. Maritime transport has the likelihood to contribute to this type of pollution in that when ports and harbours are being developed and maintained, the possibility exists that pollution may occur. Dumping at sea is another way in which maritime transport can have an impact on the marine environment. Article 1(5)(a)(i) and (ii) of the UNCLOS provides the definition for dumping as "any deliberate disposal of wastes or other matter from vessels, aircraft, platforms or other man-made structures at sea" and "any deliberate disposal of vessels, aircraft, platforms or other man-made structures at sea."[189] This definition is identical to the one provided by The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (London Convention).[190] Both UNCLOS and the London Convention made clear the distinction between deliberate dumping and the disposal of waste and other matter incidental to or derived from the normal operations of vessels.[191]

Another type of pollution attributable to maritime transport which affects the marine environment is noise pollution. This has the likelihood of disturbing and placing undue and elevated stress marine life.[192] This is so as it can interfere with the communication, navigation, and mating behaviors of marine animals.[193] On account of cruise and cargo ships, ports are required

[187] Robert J. Nicholls, "Planning for the impacts of sea level rise", Oceanography 24(2): 144-157 (2011). Available at doi:10.5670/oceanog.2011.34. (accessed on 30 November 2024) p. 151.
[188] Katharina E. Fabricius, "Effects of terrestrial runoff on the ecology of corals and coral reefs: Review and synthesis", Marine Pollution Bulletin, vol. 50(2), 125-46 (2005). Available at Doi: 10.1016/j.marpolbul.2004.11.028. (accessed on 19 October 2024)
[189] UNCLOS, (n. 8), Article 1(5)(a)(i) and (ii)
[190] *The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter* (adopted November 1972, entered into force 30 August 1975) 1046 UNTS 120, (henceforth known as 'London Convention)
[191] UNCLOS, (n. 8), Art. 1(5)(b)(i) and London Convention, (n. 190), Art. III(1)(b)(i)
[192] John A. Hildebrand, "Anthropogenic and natural sources of ambient noise in the ocean." Marine Ecology Progress Series, 395, 5-20. (2009). Available at DOI: 10.3354/meps08353. (accessed on 19 October 2024)
[193] Ibid

and in operating them, these ports generate significant underwater noise from ship engines, construction activities, and cargo handling. Hildebrand posits that this as anthropogenic noise generated by a variety of activities, including commercial shipping and development.[194] The sources of anthropogenic noise are said to becoming both more pervasive and more powerful, increasing oceanic background noise levels as well as peak sound intensity levels.[195]

It is important to note that the pollution does not necessarily come solely from cruise and cargo ships, but also from land-based sources which flows from port development and maintenance. This is usually because the construction involves dredging, land reclamation, and the building of infrastructure such as piers, breakwaters, and shipping channels. These activities can destroy critical marine habitats, including coral reefs, seagrass beds, and mangroves, which serve as nurseries for many marine species. There is no doubt of the importance of dredging as it enables the deepening and maintenance of navigational channels and harbour entrances.[196] However, this can lead to various adverse impacts on the marine environment particularly if the dredging or disposal is done in the vicinity of sensitive marine environments, such as coral reefs and seagrass beds.[197] This is because dredging and other construction activities increase sedimentation and turbidity in the water. With high levels of suspended sediments, benthic organisms are likely to become stifled and this reduces light penetration and impairs photosynthesis in aquatic plants and corals.[198] This can lead to a decline in primary productivity and disrupt food webs.

Invasive species

As part of a ship 's operations, there is the release of ballast water. This was first introduced in by ships in the 1850s as an alternative to dry ballast.[199] According to the International Maritime Organization (IMO), ballast water is defined as that which is pumped into a ship's hull to aid in its stabilization and to maintain safe operating conditions throughout a voyage.[200] This practice reduces stress on the hull, provides transverse stability, improves propulsion and maneuverability,

[194] Ibid
[195] Ibid
[196] n. 167
[197] Ibid
[198] Ibid
[199] Tony R. Walker and others, "Environmental Effects of Maritime Transportation" in *World Seas: An Environmental Evaluations,* Charles Sheppard, ed. (Academic Press, 2019). Available at doi: 10.1016/B978-0-12-805052-1.00030-9. (accessed on 19 October 2024). p. 516
[200] International Maritime Organization, "Ballast Water Management". Available at https://www.imo.org/en/OurWork/Environment/Pages/BallastWaterManagement.aspx. (accessed 19 October 2024)

and compensates for weight changes in various cargo load levels and due to fuel and water consumption.[201] While ballast water is critical for the use and operation of ships, there are consequences that may be derived as coral reefs and mangroves. When a ship docks, there is a release of the ballast water at that port. Since this is a continuing process of pumping in and releasing of ballast water from port to port, a ship's ballast water can contain a mix of different types of waters.[202] Consequently, this can lead to an introduction of non-native organisms or invasive species into the port of discharge. [203] Ruiz posits agrees noting that these species have the potential to outcompete, predate, or otherwise disrupt local marine species and ecosystems, leading to biodiversity loss and altered ecological dynamics.[204] Similarly, Abowei states that these invasive species may thrive in the new marine environment and disrupt the natural marine ecosystem. The example is given in the Baltic Sea where about 100 non-indigenous species have been recorded resulting in major changes near the shores eco-system.[205] The accumulation of various aquatic organisms on ships' hull is another source of invasive species. For this reason, it is critical that anti-fouling paint is used as a means to prevent the attachment of unwanted organisms.[206] This would aid in repelling invasive species from attaching to the hull of the vessels.

Social implications

Maritime transport has social implications for the marine environment and Jamaica as a whole. From a historical perspective, and as established under Section A, cruise and more so cargo ships were used to serve colonial interests. That is, ships were used to transport people and goods for the purposes of trade, including the slave trade, and for migration. Jamaica's population is predominantly black with traces of Africans as a result of the slave trade. But in the decades that followed slavery, and even in the 21st the English, Spanish, Europeans and Asians settled there and are serving in varying capacity and with a wide array of influences. This ultimately led to the

[201] Ibid
[202] National Invasive Species Information Centre, U.S. Department of Agriculture, "Ballast Water". Available at https://www.invasivespeciesinfo.gov/subject/ballast-water. (accessed 19 October 2024)
[203] Ibid
[204] Gregory M. Ruiz and others, "Invasion of coastal marine communities in North America: apparent patterns, processes, and biases." Annual Review of Ecology and Systematics, 31, 481-531 (November, 2000). Available at DOI: 10.1146/annurev.ecolsys.31.1.481. (accessed 19 October 2024)
[205] J. F. N, Abowei, A. A. Akaso and P. A. Bariweni, "Aspects of Environmental Pollution from Maritime Transport in Nigeria", Nigerian Journal of Agriculture, Food and Environment 7(4): 54-76, (December, 2011). p. 58
[206] *International Convention on the Control of Harmful Anti-fouling Systems on Ships*, (adopted 5 October 2001, and entered into force 17 September 2008) UNTS v. 3356, Article 2(2)

Caribbean and in particular Jamaica becoming a melting pot of cultures and people in Jamaica. It brought together a population with people from many other regions which changed the demographics in Jamaica which is indicative of Jamaica's motto "Out of many, one people".

Section A has pointed out that mangroves are typically found on the coastline of tropical countries. From a social level, communities use mangroves for a plethora of uses which supports their economic gains. Communities depend on mangroves for goods such as fuelwood, shellfish and palms, sometimes even through unsustainable land use conversion to aquaculture and agriculture.[207] Mangrove areas also serve as nurseries for fisheries and shrimp farms. This has also allowed for there to be the building of relationships and partnerships not just on a national level, but also regionally and globally through trade. Indeed, the Food and Agriculture Organization has recognized that mangroves support biodiversity conservation by serving as habitats, spawning grounds, nurseries and sources of nutrients.[208] Unfortunately, mangroves are often viewed as low value ecosystems and so not much attention is given to it despite it having a substantial social impact.[209] When ships and vessel emit harmful substances, they can affect these economic benefits that communities have based on their dependence on the mangroves. A major setback is evidenced by fish kills, though this is not primarily caused by pollution from ships. In Jamaica for example, an investigation into the September 2022 fish kill disclosed that this was due to low oxygen levels in the water.[210] In the press release, NEPA further disclosed that the fish kill was "attributed to eutrophic conditions associated with an algal bloom and oxygen depletion following recent rainfall and the discharge of stormwater into a confined area."[211] The same explanation was given a year later, when yet another fish kill affected the Harbour Head area, as shown in Figure 9.[212] As part of its efforts to protect and preserve the marine environment, NEPA assured citizens that enforcement actions were taken against operators who continue to engage in practices which affect

[207] Gayatri Acharya, "Life at the margins: a the social, economic and ecological importance of mangroves", Madeira y Bosques, vol. 8, no. 1, (January, 2002). Available at DOI:10.21829/myb.2002.801291. (accessed on 27 November 2024)
[208] Food and Agriculture Organization of The United Nations, *The World's Mangroves 2000-2020*, (2023). Available at https://doi.org/10.4060/cc7044en. (accessed on 27 November 2024)
[209] Acharya, (n. 207)
[210] National Environment and Planning Agency, "NEPA concludes investigations into fish kill" published 30 September 2022. Available at https://www.nepa.gov.jm/nepa-concludes-investigations-fish-kill. (accessed on 11 December 2024)
[211] Ibid
[212] The Jamaica Gleaner, "NEPA takes enforcement action in Harbour Head fish kill probe" published on 13 December 2023. Available at https://jamaica-gleaner.com/article/news/20231213/nepa-takes-enforcement-action-harbour-head-fish-kill-probe. (accessed on 11 December 2024)

the oxygen levels resulting in suffocation of the fishes.[213] Additionally, when there is pollution caused by grounding for example or through the introduction of harmful and invasive species, these aquacultural sites are affected. Acharya avers that the loss of these ecosystems would potentially result in local, national and global welfare losses.[214]

Figure 9: Fish kill in Habour Head, Jamaica
Source: https://jamaica-gleaner.com/article/news/20231213/nepa-takes-enforcement-action-harbour-head-fish-kill-probe

Economic implication

Cruise and cargo shipping provide essential services from an economic perspective. This perspective is intertwined with the aforementioned environmental and social impacts that they have on the marine environment. The tourism industry, for example, spans the environmental, social and economic pillars, and is instrumental in achieving financial leverage especially for Jamaica. It encourages a myriad of income streams that it affords through employment opportunities in the hotel and travel industry, as well as for the livelihood of coastal communities who provide ecotourism activities. Surely, Jamaica as a SIDS, regards income from trade as a significant part of the gross domestic product. In fact, Caribbean countries are said to be more dependent on tourism than any other country in the world. As Davenport posits, tourism is now the largest economic sector in the world being worth approximately US$3.5 trillion per annum and employing 200 million people at the end of the 20th century.[215] However, while cruise and cargo

[213] Ibid
[214] Acharya, (n. 207)
[215] John Davenport, J. and Julia L. Davenport, J. L., "The impact of tourism and personal leisure transport on coastal environments: A review", Estuarine, Coastal and Shelf Science vol. 67, 280-292, (March, 2006). Available at https://doi.org/10.1016/j.ecss.2005.11.026. (accessed on 11 November 2024). p. 281.

shipping are able to provide benefits through leisure and trade from imports and exports, this comes with great environmental risks which can be severely detrimental. Although tourism is effective in boosting a countries GDP, there has been dramatic ecological disturbances accompanied by reduced biodiversity.[216] Additionally, cruise ships can create a ripple effect on the economy because of the damage that they can cause of coral reefs through anchoring when they are being docked, or when channels are being dredged for construction and maintenance. In order to ensure that the necessary environmental measures are in place to protect and preserve the marine environment, financial support is required. This support ranges from infrastructure developments and maintenance, the removal and relocation of coral reefs and mangroves and costs expended in cases of overuse of water resources, pollution via emissions from the cruise and cargo vessels and sewage.[217] In some regards, the costs to fulfil the obligations are quite significant when compared to the cost of the failure to fulfil them.

[216] Ibid
[217] Ibid

PART TWO: The legal frameworks relating to cruise and cargo shipping and the protection and preservation of coral reefs and mangroves, and the linkages with sustainable development goals (SDGs)

Part Two of this dissertation will assess the legislative frameworks which govern the operations of cruise and cargo shipping, within the context of the protection and preservation of coral reefs and mangroves. This Part, like the previous one, will be divided into two Chapters with each Chapter having two sections. Chapter One will compare national and international instruments with a view to determine whether the standards in Jamaica relating to maritime transport and the marine environment are compatible with international standards. Section A will evaluate frameworks such as UNCLOS, MARPOL, SOLAS, BWM and RAMSAR. Thereafter, Section B will examine the efforts undertaken by Jamaica through the establishment of national legislations, to implement the objectives of these international legal frameworks such as the Shipping Act, and the Natural Resources Conservation Authority Act.

Chapter Two will commence in Section A with an assessment of the ocean related sustainable development goals, specifically SDG 7, SDG 13 and SDG 14, to include the objectives of the Paris Agreement. Following this, Section B will consider the response from Jamaica in relation to these SDGs and their targets and determine whether the efforts undertaken are effective in balancing the social, economic and environmental impacts of cruise and cargo shipping on the protection and preservation of coral reefs and mangroves. This part will conclude by providing recommendations based on the identified implications that maritime transportation in general have on the protection and preservation of the marine environment.

CHAPTER ONE: Evaluation of the legal frameworks governing the oceans, cruise and cargo shipping and the protection and preservation of coral reefs and mangroves

Section A: The international legal frameworks concerning the ocean and shipping

The oceans and shipping industry are regulated by a number of legislative frameworks, all aimed at ensuring compliance with regulatory standards. These relate, but are not limited to, the protection and preservation of the marine environment, and the obligations within which ships are to operate. In the 20th century, several international conventions evolved, and continue to evolve, with a level of focus on the protection and preservation of the marine environment. Of notable mention, is UNCLOS, which was negotiated and adopted at the Third United Nations Conference on the Law of the Sea in 1982. Another convention is MARPOL which primarily addresses vessel source pollution. Both these conventions, together with SOLAS, BWM and RAMSAR, all defined above and ratified by Jamaica, will be considered for the purpose of this dissertation. In addition, other legal instruments and opinions, such as The Paris Agreement and the 2024 Advisory Opinion of the International Tribunal on Law of the Sea, will be referenced. The shipping and environmental regulations enacted in Jamaica will be discussed in Section B of this Chapter.

UNCLOS

Koh, President of the Third United Nations Conference on the Law of the Seas, fittingly described UNCLOS as "the constitution of the oceans".[218] It opened for signature in Montego Bay, Jamaica, on 10 December 1982, and entered into force twelve years later, on 16 November 1994.[219] To date, UNCLOS has 170 State Parties, including Jamaica which ratified it on 21 March 1983.[220] It comprises 320 Articles from its seventeen Parts, and nine Annexes. Part XII, which is the focal part in this dissertation, has 46 Articles. Although UNCLOS has not defined the marine environment, it expressly urges the protection and preservation of "rare or fragile ecosystems, as well as the habitat of depleted, threatened or endangered species or other forms of marine life."[221] The words "protect" and "preserve" are fundamental to appreciating the marine environment under

[218] See remarks on 'A Constitution for the Oceans' by Tommy T. B. Koh, of Singapore, President of the Third United Nationals Conference on the Law of the Seas (10 December 1983) Available at https://www.un.org/depts/los/convention_agreements/texts/koh_english.pdf. (accessed on 24 October 2024)
[219]UNCLOS, (n. 8), Article 320
[220] Chronological lists of ratifications, accessions and successions to the Convention and the related Agreements. Available at https://un.org/depts/los/reference_files/chronological_lists_of_ratifications.htm. (accessed on 25 November 2024)
[221] UNCLOS, (n. 8), Article 194(5)

Part XII of UNCLOS. The Oxford dictionary defines "protect" as "to defend or guard from danger or injury".[222] It defines "preserve" as "to make lasting" or "to maintain or keep alive".[223] Together, these words insist on the guarding against danger or injury by maintaining and keeping something alive, the something being the marine environment. Furthermore, if any doubt were to have been cast on what the obligations to protect and preserve meant, the Tribunal of the South China Sea Arbitration between the Republic of the Philippines and the Republic of China considered that this obligation extends both to the "protection" of the marine environment from future damage and "preservation" in the sense of maintaining or improving its present condition.[224]

Part XII of UNCLOS commences with the charge in Article 192 that "States have the obligation to protect and preserve the marine environment".[225] This obligation confers the right on each State, by Article 193, to exploit its natural resources in conjunction with its environmental policies, in accordance with its duty to protect and preserve the marine environment.[226] This obliges States to minimize to the fullest possible extent the release of toxic, harmful and noxious substances, especially those which are persistent.[227] This is done through the implementation of measures to prevent, reduce and control all sources of pollution of the marine environment such as pollution from land-based sources,[228] pollution by dumping,[229] pollution from vessels[230] and pollution in the atmosphere.[231] This is not limited to areas solely within the jurisdiction of a State, as Article 194 fixes the responsibilities of States to take all measures necessary to ensure that activities under their jurisdiction or control are so conducted as not to cause damage by pollution to other States and their environment, and that pollution does not spread beyond the areas where they exercise sovereign rights.[232]

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[222] Oxford English Dictionary, "Protect". Available at https://www.oed.com/search/dictionary/?scope=Entries&q=protect. (accessed on 7 October 2024)
[223] Oxford English Dictionary, "Preserve", Available at https://www.oed.com/search/dictionary/?scope=Entries&q=preserve. (accessed on 7 October 2024)
[224] See *Tribunal of the South China Sea Arbitration between the Republic of the Philippines and the Republic of China.* Award of 12 July 2016, Vol. XXXIII, pp. 153-617. p. 519
[225] UNCLOS, (n. 8), Article 192
[226] UNCLOS, (n. 8), Article 193
[227] UNCLOS, (n. 8), Article 193(3)(a)
[228] UNCLOS, (n. 8), Article 207
[229] UNCLOS, (n. 8), Article 210
[230] UNCLOS, (n. 8), Article 211
[231] UNCLOS, (n. 8), Article 212
[232] UNCLOS, (n. 8), Article 194(2)

UNCLOS provides that States shall adopt laws and regulations, while taking into account internationally agreed rules, standards and recommended practices and procedures, to prevent, reduce and control land-based pollution[233] and pollution from and through the atmosphere.[234] States are encouraged to establish global and regional rules[235] which would foster international cooperation to achieving the common goal of making the oceans sustainable for future generations. States are to also adopt laws and regulations to prevent, reduce and control pollution of the marine environment by dumping[236] and to take other measures as may be necessary.[237] The rules are similar in relation to pollution from vessels under Article 211. Pollution from land-based sources is typically evidenced by the discharge of effluent or sewage waste or waste attributable to coastal activities including development, tourism and agricultural run-offs. It is important to highlight that pollution by dumping is not limited to pollution that emanates from land-based sources and it is reasonable to include dumping from cruise and cargo ships. While, UNCLOS does not vehemently prohibit dumping into the ocean, it requires that express prior approval of the coastal State, which has the right to permit, regulate and control such dumping, is given.[238] This is to be supported by national laws, regulations and measures to be adopted and shall be no less effective in preventing, reducing and controlling pollution than the global rules and standards.[239] Furthermore, the GHG emissions from cargo and cruise ships are tantamount to toxic, harmful and noxious substances. While there was dissension on whether these amount to pollution of the marine environment, ITLOS, in its Advisory Opinion, concluded that anthropogenic GHG emissions into the atmosphere constituted pollution of the marine environment and would therefore fall under the remit of Article 212.[240] This was so as it met the criterion established under Article 1(1)(4) of UNCLOS which require that there must be a substance or energy that must be introduced by humans directly or indirectly into the marine environment, and such introduction must result are likely to result in deleterious effect.[241] Additionally, ITLOS was careful to note that States with

[233] UNCLOS, (n. 8), Article 207(1)
[234] UNCLOS, (n. 8), Article 212(1)
[235] UNCLOS, (n. 8), Article 207(4)
[236] UNCLOS, (n. 8), Article 210(1)
[237] UNCLOS, (n. 8), Article 210(2)
[238] UNCLOS, (n. 8), Article 210(5)
[239] UNCLOS, (n. 8), Article 210(6)
[240] See International Tribunal for Law of the Sea (ITLOS) *Request for Advisory Opinion submitted by the Commission of Small Island States on Climate Change and International Law, Advisory Opinion*. (ITLOS Advisory Opinion) 21 May 2024, ITLOS Reports 2024, para. 179
[241] UNCLOS, (n. 8), Article 1(4)

greater means and capabilities must do more to reduce these emissions than States with less means and capabilities.[242]

This therefore shows the importance of States in ensuring that they establish international rules and standards, through the competent international organization, namely the IMO or general diplomatic conference, to prevent, reduce and control pollution of the marine environment from vessels.[243] States are to also ensure that they promote the adoption of routing systems designed to minimize the threat of accidents which are likely to cause pollution of the marine environment, including the coastline.[244] In minimizing the pollution from vessels, States are to have measures in place to prevent accidents and to deal with emergencies, to ensure safety at sea, to prevent intentional and unintentional discharges and to regulate the design, construction, equipment, operation and manning of vessels,[245] including pollution from any source.[246] The primary aim of these measures is to ensure that the rare or fragile ecosystems, the habitat of depleted, threatened or endangered species are protected and preserved.[247] States are also instructed under this Article that they are to refrain from unjustifiable interference with activities carried out by other States in the exercise of their rights and in pursuance of their duties under UNCLOS.[248]

The corresponding provisions for enforcement of these specific types of marine pollution are enshrined in Articles 213, 216, 217 and 222. The enforcement differs for flag, port and coastal states. Flag States have the responsibility to ensure that vessels flying their flag comply with the provisions of UNCLOS and applicable international rules and standards and are prohibited from sailing if they are not compliant.[249] These vessels are to carry on board the requisite certificates and where they are found to be non-compliant, the Flag States have the right to initiate investigations and if necessary institute proceedings.[250] Where a vessel is voluntarily within a port or at an off-shore terminal of a State, such port State can also initiate investigations and institute proceedings in respect of any discharges from a vessel outside the internal waters, territorial sea

[242] ITLOS Advisory Opinion, (n. 240), para. 227
[243] UNCLOS, (n. 8), Article 211(1)
[244] Ibid
[245] UNCLOS, (n. 8), Article 194(3)(b)
[246] UNCLOS, (n. 8), Article 194(1)
[247] UNCLOS, (n. 8), Article 194(5)
[248] UNCLOS, (n. 8), Article 194(4)
[249] UNCLOS, (n. 8), Article 217(1) and (4)
[250] UNCLOS, (n. 8), Article 217(3)

or exclusive economic zone of that State.[251] Similarly, a coastal state may enforce laws and regulations in cases of vessel source pollution if it has occurred within the territorial sea or the exclusive economic zone of that state.[252] The coastal state may also take enforcement actions in accordance with UNCLOS when a dumping violation, occurs within its territorial waters, exclusive economic zone and onto its continental shelf.[253] As it relates to pollution from vessels, a coastal state also has the right to enforce the laws and regulations adopted if the dumping occurs on its continental shelf.[254]

MARPOL

Another international convention, which is instrumental in connection with cruise and cargo shipping, is that of MARPOL, 1973, as modified by the Protocols 1978 and 1997, which was ratified by Jamaica on 13 March 1991. Prior to MARPOL, there was the International Convention for the Prevention of Pollution of the Sea by Oil ("OILPOL") which was created to take action to prevent pollution of the sea by oil discharged from ships. By now, it is clear that millions of ships, especially cargo ships and cruise vessels, navigate through the oceans on a yearly basis. Accordingly, there is the likelihood of risks such as pollution due to oils spills, not only through accidents or groundings of ships, but also as a consequence of operational discharges of legally allowed harmful and noxious substances into the oceans.[255] With this understanding, it became evident that measures had to be implemented to treat with any detrimental effects relating to the marine environment. This led to the creation of MARPOL with the objective to establish regulations for ship-generated waste in order to reduce pollution of the marine environment by oil and other harmful substances, as well as to minimize the accidental discharges of such substances. Though MARPOL was adopted on November 2, 1973, it failed to enter into force. Five years later, in response to a series of tanker accidents which led to pollution of oil in the ocean, the MARPOL Protocol was established. This Protocol absorbed the initial Convention and the combined instrument was entered into the force on October 2, 1983. Within the decade to follow, MARPOL saw a number of updates being made through amendments, now making it a Convention with six

[251] UNCLOS, (n. 8), Article 218(1)
[252] UNCLOS, (n. 8), Article 220(1)
[253] UNCLOS, (n. 8), Article 210(5) and Article 216(1)(a)
[254] UNCLOS, (n. 8), Article 216(1)(a)
[255] *1978 Protocol Relating to the 1973 International Convention for the Prevention of Pollution from Ships (including Annexes, Final Act and 1973 International Convention)* entered into force on 2 November 1973, took effect from 2 October 1983) 1340 UNTS 61 (henceforth known as MARPOL), Annex I and Annex II

Annexes, each uniquely crafted to deal with different types of pollution from ships and their effects on the marine environment.

Annex I outlines requirements for operational discharges which flow from the cleaning of cargo residues, ballasting of cargo tanks, as well as tank and bilge cleaning.[256] It also specifies regulations to prevent pollution from oil by accidental discharges by making it mandatory for new oil tankers being 5,000 dead weight tons or more to have double hulls and brought in a phase-in schedule for existing tankers to fit double hulls.[257] This is a significant effort aimed at minimizing the impact of oil mixing with water due to the stifling effect it can have on production within the marine environment by threatening oxygen levels through suffocation. Likewise, these measures align with the objectives of preserving and protecting the marine environment especially since several billion metric tons of oil are transported via the ocean on a yearly basis. For example, in 2022, approximately 1.95 billion metric tons of crude oil were transported globally by sea.[258] Interestingly, almost four decades before, in 1983, when Annex 1 took effect, seaborne trade of crude oil amounted to 3.2 billion metric tons.[259] Accordingly, Annex I ensures that each vessel carries proof of an International Oil Pollution Prevention Certificate, thereby reinforcing the obligations to take steps to protect and preserve the oceans. [260] Similarly, the Oil Record Book, which is preserved for a period of three years, holds records of the loading of or transfer of oil during voyage, when tanks are being cleaned or ballasted, when residues are being disposed of or when bilge water is being discharged overboard.[261] Annex I also makes provisions for the discharge of oil within and outside of special areas, provided that all the conditions set forth in Regulation 15 are met.[262] This helps to keep track on the amount of oil discharges in the ocean and thereby allow for effective steps to be taken to prevent the harmful effects on the marine environment.

[256] MARPOL, (n. 255), Annex I
[257] MARPOL, (n. 255), Annex I, Regulations 19 and 20
[258] Statista "Transport volume of crude oil in seaborne trade worldwide from 2010 to 2022" Available at https://www.statista.com/statistics/264013/transport-volume-of-crude-oil-in-seaborne-trade/#statisticContainer. (2022) (accessed on 28 October 2024)
[259] United Nations Conference on Trade and Development, "Review of Maritime Transport 1983" (UNCTAD Secretariat, 1984). Available at https://unctad.org/system/files/official-document/rmt1983_en.pdf. (accessed on 28 October 2024)
[260] MARPOL, (n. 255), Annex I, Regulation 5
[261] MARPOL, (n. 255), Annex I, Regulation 20(2)(a)
[262] MARPOL, (n, 255), Annex I, Regulation 15

Annex II regulates the control of pollution by noxious liquid substances in bulk.[263] This does not prohibit their discharge into the oceans, but sets parameters on their discharge. Ideally, tank cleaning water and washing agents (as well as ballast waters containing chemical residues) must be discharged at local port reception facilities or at another port where facilities are available.[264] Notwithstanding this, discharge into the sea is permissible as long as they are not discharged within 12 miles of the nearest land.[265] ANNEX III provides regulations for the prevention of pollution by harmful substances in packaged form[266] which are likely to be found in cargo ships. It prohibits the carriage of harmful substances unless they are adequately packaged to minimize hazard to the marine environment[267] and are durably marked and labelled.[268]

Annex IV regulates the discharge of sewage from ships, which requires ships to treat and store sewage before it can be discharged into the marine environment. This is to prevent the release of eutrophication and contamination into the ocean. Regulation 2 specifies the ship dimensions within which Annex IV applies. For example, it applies to new ships of 200 tons gross tonnage and above, or if less, then ships certified to carry more than to persons.[269] The average size cruise and cargo ships would satisfy this requirement. Accordingly, in order for either to discharge sewage into the sea, it requires an approved sewage treatment plant.[270] If the sewage is comminuted and disinfected using an approved system, it can be discharged at a distance of more than three nautical miles from the nearest land.[271] Otherwise, the sewage will have to be discharged at a distance of more than 12 nautical miles from the nearest land.[272] This is similar to the efforts to be undertaken to prevent pollution by garbage from ships in that garbage can be disposed into the sea at Special Areas after it is comminuted.[273] Outside of the Special Area, garbage can be disposed into the sea as far as practicable from the nearest land and in any case is prohibited if the nearest distance is less than 25 nautical miles from dunnage, lining and packing materials which float[274];

[263] MARPOL, (n. 255), Annex II, Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk (entered into force on 2 October 1983, took effect from 6 April 1987)
[264] MARPOL, (n. 255), Annex II, Appendix VI,
[265] MARPOL, (n. 255), Annex II
[266] MARPOL, (n.255), Annex III
[267] Ibid
[268] Ibid
[269] MARPOL, (n. 255), Annex IV. Regulation 2(a)(i) and (ii)
[270] MARPOL, (n. 255), Annex IV. Regulation 8(1)(b)
[271] MARPOL, (n. 255), Annex IV. Regulation 8(1)(a)
[272] Ibid
[273] MARPOL, (n. 255), Annex V, Regulation 4(2)
[274] MARPOL, (n. 255), Annex V, Regulation 3(1)(b)(i)

and less than 12 nautical miles for food wastes and all other garbage.[275] It is important to note that there is a complete prohibition on the disposal of all forms of plastic into the sea.[276]

ANNEX VI regulates marine pollution from anthropogenic GHG emissions from vessels by seeking to reduce its atmospheric pollutants and minimize the harmful environmental impacts. In doing this, it has employed emission control mechanisms specifically as they relate to emissions of nitrogen oxides and sulphur oxides by implementing global sulphur caps, for example, and creating emission control areas.[277] Examples of these can be found in the Baltic Sea and the United States Caribbean Sea region. In 2011, there were amendments aimed at reducing GHG emissions from ships through the inclusion of regulations concerning energy efficiency, which were adopted in 2018 and entered into force in 2022.[278] The objective has been to reduce the carbon intensity of international shipping, working towards the levels of ambition set out in the IMO Strategy on GHG emission from ships.[279]

SOLAS

SOLAS emerged in the 21st Century as the most important of all international treaties concerning the safety of merchant ships.[280] This first came to being in 1914 after the catastrophic sinking of the passenger liner Royal Merchant Ship Titanic in 1912.[281] Subsequent years of discussions and revisions led to SOLAS having four versions, now consolidated and being implemented through the IMO which officially adopted it in 1948.[282] A few decades later, tacit acceptance of all the versions of SOLAS took place in 1974 and ushered its entry into force six years later in 1980. It primarily addresses safety of life at sea for humans by establishing procedures relating to the evacuation process and health guidelines on board vessels.[283] However,

[275] MARPOL, (n. 255), Annex V, Regulation 3(1)(b)(ii)
[276] MARPOL, (n. 255), Annex V, Regulation 3(1)(a)
[277] MARPOL, (n. 255), Annex VI, Regulations 13 and 14
[278] International Maritime Organization, "Rules on ship carbon intensity and rating system enter into force". Available at https://www.imo.org/en/MediaCentre/PressBriefings/pages/CII-and-EEXI-entry-into-force.aspx. (2022) (accessed 28 October 2024)
[279] Ibid at 277
[280] International Maritime Organization, "International Convention for Safety of Life at Sea". Available at https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx#:~:text=The%20SOLAS%20Convention%20in%20its,and%20the%20fourth%20in%201960. (accessed 28 October 2024)
[281] Ibid
[282] Ibid
[283] *International Convention for Safety of Life at Sea* (adopted 1 November 1974, entered into force 25 May 1980) 1184 UNTS 2, (henceforth known as 'SOLAS'), Regulation II-2, 13

for this dissertation, Chapter V is considered to be the most relevant, which deals with the ship routing measures. This is evident through its provisions to prevent accidents[284] resulting in the pollution of the sea. Chapter II-1 instructs on the design and construction standards for ship, requiring that they be constructed using double hulls- ballast water management systems and oil spill prevention measures.[285] This is to encourage the need for safer ships which ultimately will result in cleaner oceans. Further, it provides that there be facilities on board the ship for pollution prevention, to include, separation apparatus to separate oil and water, sewage treatment plants as well as garbage or waste management.[286]

Notably, however, one of the ways to limit emergencies is through provided for under Chapter V. Here, it provides for the safety of typically all vessels at sea, which therefore includes cruise and cargo ships.[287] This does not cover warships or those operated by the government for non-commercial service, though these ships should still act in a manner consistent with the rules of SOLAS.[288] This encompasses the requirement for ships to be surveyed, inspected and then certified before put into service[289] in an effort to ensure the safety of vessels. Once inspected, the passenger ship gets a certificate called the Passenger Ship Safety Certificate which complies with the requirements of Chapters II-1, II-2, III and IV, while cargo ships, receive a Cargo Ship Safety Construction Certificate which complies with the requirements of Chapters II-1, II-2.[290]

Chapter V also mandates that each ship is equipped with navigation safety equipment or navigational aids such as GPS, radar, and electronic chart displays which will assist in the prevention of groundings and collisions.[291] A ship which flies the flag of a specific State can be inspected by other states if there are reasons to believe that the ship is not complying with the requirements of SOLAS. It also provides for vessel routing measures by encourages governments to develop routing systems to be adopted by IMO which are necessary for the safe and effective use of ships.[292] These systems may be made mandatory for all ships, certain categories of ships, or

[284] SOLAS, (n. 283)
[285] SOLAS, (n. 283), Chapter II-1
[286] Ibid
[287] SOLAS, (n. 283), Chapter V, Regulation 1
[288] SOLAS, (n. 283), Chapter V, Regulation 2
[289] SOLAS, (n. 283), Chapter 1, Part B, Regulations 6 and 7.
[290] SOLAS, (n. 283), Chapter V, Regulation 10
[291] Ibid
[292] Ibid

ships carrying certain cargoes, once they have become adopted and implemented through IMO.[293] In determining the routing systems, consideration is given to maritime safety and pollution prevention in order to protect sensitive marine environments such as mangroves and coral reefs. It is therefore necessary for ships to adhere to the mandatory routing systems unless there are compelling reasons not to use them.

BWM

With shipping playing a pivotal role to society and expanding on a wider scale, invasive aquatic species are becoming more prevalent. The introduction of steel hull and the use of water for ballast, instead of solid materials, in vessels has created additional risks of aquatic species invading the already fragile marine environment. Consequently, the IMO adopted BWM in 2004, which entered into force in 2017, comprising 22 Articles and an Annex of 24 Regulations and 2 Appendices.[294] The primary aim is to prevent the spread of harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments while averting any unwanted side effects.[295]

As with other international instruments, the BWM imposes general obligations to its Parties for them to undertake to give full and complete effect to the provisions of the Convention and its Annex.[296] The adherence to the obligations would seek to prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments.[297]A measure imposed to control and manage their ballast water and sediments is an approved Ballast Water Management Plan[298] which all ships in international traffic are required to have.[299] This plan is specific to each ship and includes a detailed description of the actions to be taken to implement the Ballast Water Management requirements and supplemental Ballast Water Management practices.[300] Each ship is also required

[293] Ibid
[294] International Maritime Organization. Available at https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Control-and-Management-of-Ships%27-Ballast-Water-and-Sediments-(BWM).aspx
[295] Ibid
[296] *International Convention for the control and management of ship's ballast water and sediments,* (adopted 13 February 2004, entered into force 8 September 2017), (henceforth known as 'BWM), Art. 2
[297] Ibid
[298] BWM, (n. 296) Annex, Regulation B-1
[299] Ibid
[300] Ibid

to carry with it on board a Ballast Water Record Book[301] as well as an International Ballast Water Management Certificate.[302] Furthermore, in cases where it is practicable, ships may install an on-board ballast water treatment system. These measures apply to all vessels except those not designed to carry ballast water.[303]

Each Party to the BWM is encouraged to implement more stringent measures as necessary to prevent, reduce or eliminate the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments, consistent with international law. In doing this, the Parties are to ensure that their practices do not cause greater harm than good to other States, while they are seeking to protect and preserve their environment, human health, property or resources. For example, the creation of Sediment Reception Facilities at ports and terminals pursuant to Article 5 is useful in preventing unnecessary harm as they would be equipped to receive the sediments that come from the cleaning or repair of ballast tanks. It is not only essential for there to be practical knowledge and implementation, but that there be theoretical knowledge as prescribed under Article 6. This states that Parties are to promote and facilitate scientific and technical research on ballast water management and monitor its effects. This could be read in conjunction with Article 13 which allows for technical assistance to be given, inter alia, to train personnel and to initiate joint research and development programmes aimed at effectively implementing the BWM. Another important aspect of the BWM is the requirements for survey, certification and inspection. Ships are required to be surveyed and certified[304] and may be inspected by port State control officers to confirm that there is a valid certificate.[305] The port State control officers can also inspect the Ballast Water Record Book (BWRB) and sample the ballast water.[306] The BWRB is to be used to record instances where ballast water is taken on board, discharged into the sea and circulated or treated for Ballast Water Management purposes.[307] It should also record when ballast water is discharged to a reception facility and accidental or other exceptional discharges of ballast water.[308] If necessary, a more detailed inspection may be carried

[301] BWM, (n. 296), Annex, Regulation B-2
[302] Ibid
[303] BWM, (n. 296), Art. 3
[304] BWM, (n. 296), Art. 7
[305] BWM, (n. 296), Art. 9
[306] Ibid
[307] BWM, (n. 296), Annex, Regulation B-2
[308] Ibid

out but such inspection ought not to present a threat to the environment, human health, property or resources, nor should a ship be unduly detained or delayed as a result of the inspection.[309]

Notwithstanding the foregoing, the Annex of the BWM has set forth certain procedures to include the manner in which ballast water is discharged, that is, through Ballast Water Management.[310] A critical aspect of the Annex, particularly in relation to the protection and preservation of the marine environment, relates to Ballast Water Exchange. Under Regulation B-4, all ships using ballast water exchange should do so at least 200 nautical miles from the nearest land and in water at least 200 metres in depth. If this is not possible, ships are to ensure that the exchange is as far from the nearest land possible, but in all cases must conduct the exchange at least 50 nautical miles from the nearest land and in water at least 200 metres in depth.[311] If none of these requirements can be met, arrangements can be made for there to be designated areas to conduct the exchange.

RAMSAR

Lastly, The Convention on Wetlands (RAMSAR) is an international governmental treaty established in 1971, and comprising 12 Articles.[312] Its mission is to have State Parties conserve and wisely use wetlands in order to achieve sustainable development worldwide. As of September 2024, there are 172 Contracting Parties[313], including Jamaica which ratified it on 7 October 1997. RAMSAR defines wetlands as areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres. This definition would therefore include coral reefs and mangroves. However, RAMSAR has not defined what is meant by "wise use". Notwithstanding this, COP-7 defines wise use as "the maintenance of their ecological character, achieved through the implementation of ecosystems approaches within the context of sustainable development."[314]

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[309] BWM, (n. 296), Art. 12
[310] BWM, (n. 296), Annex, Regulation A-2
[311] Ibid
[312] *Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat* (adopted 2 February 1971, entered into force 21 December 1975) (henceforth known as RAMSAR)
[313] Contracting Parties to the Ramsar Convention. Available at https://www.ramsar.org/sites/default/files/documents/library/annotated_contracting_parties_list_e.pdf. (accessed on 1 September 2024)
[314] Ramsar Information Paper No. 7, "The Ramsar concept of wise use". Available at https://www.ramsar.org/sites/default/files/documents/library/info2007-07-e.pdf. (accessed on 1 September 2024)

Pursuant to Article 2.1, each State is to designate at least one wetland to the List of Wetlands of International Importance, including its precise boundary description.[315] This is the flagship of RAMSAR also referred to as the "Ramsar List". The State shall also promote the conservation of wetlands by establishing nature reserves, whether or not they are included in the Ramsar List.[316] Today, there are 2,400 wetlands known as Ramsar Sites which cover more than 2.5 million square kilometres.[317] Globally, 305 Ramsar sites contain mangrove ecosystems, and Parties under the Ramsar Convention are to pursue policies and regional initiatives to conserve and restoral coastal wetlands, including mangroves.[318] Ramsar could be regarded as been instrumental in developing strategies for implementing conservation objectives through an ecosystem approach. In protecting mangroves worldwide, it could be used as a way to promote education, and encourage engagement at the community level, about mangroves and their importance.

[315] RAMSAR, (n. 312), Art. 2.1
[316] RAMSAR, (n. 312), Art. 4.1
[317] Ramsar, "The Ramsar List". Available at https://www.ramsar.org/our-work/wetlands-international-importance/ramsar-list. (accessed on 29 October 2024)
[318] Wetlands International, "Legal And Policy Recommendations To Support International Mangrove Targets". Available at https://www.wetlands.org/legal-and-policy-recommendations-to-support-international-mangrove-targets/. (accessed on 29 October 2024)

Section B: Examination of the efforts undertaken by Jamaica through the establishment of national legislations to implement the objectives of the international legal frameworks.

Jamaica is at liberty to exploit its natural and other resources but must take the necessary precaution not to harm or degrade the environment, particularly the coral reefs and mangroves. It has the responsibility, as postulated under UNCLOS and a slew of other international instruments, to preserve and protect its marine environment for future generations. In doing this, Jamaica took steps to enact national legislations on shipping and the marine environment which are largely administered by ministries, such as the Ministry of Economic Growth and Job Creation, and their several departments and agencies. In this section, some of these national legislative agreements will be examined with a view to determine the efforts undertaken by Jamaica pursuant to its international obligations in managing and safeguarding the marine ecosystems.

Legislations which protect and preserve coral reefs and mangroves

As was seen earlier, Part XII of UNCLOS deals with the protection and preservation of the marine environment including coral reefs and mangroves. This was the impetus for Jamaica to introduce legislations such as The Natural Resources Conservation Authority Act (NRCA), which is implemented through the Natural Resources Conservation Authority and administered by the National Environment and Planning Agency (NEPA). Consisting of 44 Sections and 3 Schedules, NRCA was enacted in 1991 with the objective to take the necessary steps for the effective management of the physical environment of Jamaica to ensure the conservation, protection and proper use of its natural resources.[319] A key feature of NRCA is the establishment of "protected areas".[320] Though NRCA has not specifically mentioned coral reefs and mangroves, these are substantiated by Article 5, which provides that the Minister, through a ministerial order based on the recommendation of NEPA, may designate any area of land or water as a protected area or environmental protection area, or any acts of land lying under tidal water and adjacent to such a land or any new area of water as a marine park.[321] Within these areas, the Minister may declare zones for specified purposes.[322] The Minister is also empowered to direct the enforcement of any

[319] *The Natural Resources Conservation Authority Act*, entered into force 5 July 1991 (henceforth known as NRCA), sect. 4(a)
[320] NRCA, (n. 319), sect. 5(1)(b)
[321] NRCA, (n. 319), sects. 5(1)(c) and 33
[322] NRCA, (n. 319), sect. 2(c)(i)

measures as recommended by the NRCA Authority that he thinks is necessary for preventing or mitigating any destruction or degradation to the environment, which includes the marine environment.[323] It also investigates the effect on the environment of any activity that causes or might cause pollution or that involves or might involve waste management or disposal, and takes such action as it thinks appropriate.[324] Its reach would therefore extend to cruise and cargo vessels in relation to the discharge of their waste, sewage, or other matter that pollutes the environment causing harm to coral reefs and mangroves. The increase in anthropogenic factors such as toxic emission from ships has shown the importance of NRCA, and for Jamaica to honour its obligations under UNCLOS. These factors have threatened and destroyed its coral reefs and mangroves and if the NRCA is not enforced effectively, then its impacts will become more dreadful.

Moreover, NRCA provides for regulations to be enacted to include standards and codes of practice relating to the protection and rehabilitation of the environment and the conservation of natural resources,[325] as well as for there to be an environmental impact assessment, where necessary, for construction or development.[326] This was evident through the PAJ obtaining a permit to construct Jamaica's newest cruise ship terminal. Specific to the protection of particular species of prescribed fauna and flora, such as coral reefs and mangroves, NRCA also allows for the Minister to make regulations for them.[327] In addition, the Act precludes anyone from discharging, causing or permitting the entry into waters, on the ground or into the ground, of any sewage or trade effluent or any poisonous, noxious or polluting matter, without a permit.[328] This would include the operators of cruise vessels, cargo ships or any form of maritime transport. Like other provisions in NRCA, a penalty is imposed through fine or imprisonment on persons who contravene this provision.[329] Additionally, notice can be served on an occupier of land who has been causing or is likely to cause the pollution of water.[330] Although cruise and cargo vessels are not regarded as occupiers of land, the operators of the ports with which they call are. If after the exchange of waste or other matter from the ships to the port, the operators of the port cause the

[323] *The Natural Resources (Marine Parks) Regulations*, entered into force 5 June 1992 (henceforth known as "NRMPR"), sect. 22
[324] NRCA, (n. 319), sect. 4(2)(e)
[325] NRCA, (n. 319), sect. 38(1)(a)
[326] NRCA, (n. 319), sect. 38(1)(b)
[327] NRCA, (n. 319), sect. 38(1)(m)
[328] NRCA, (n. 319), sect. 12(1)(a) and (b)
[329] NRCA, (n. 319), sect. 12(3)
[330] NRCA, (n. 319), sect. 17(1)(c)

waters to be polluted, then a notice can be served to them and if they fail to comply, an offence would have been committed which is punishable by fine or imprisonment.[331]

Like the NRCA, The Beach Control Act (BCA) also provides for the declaration of a protected area in an attempt to limit detrimental exposure to coral reefs and mangroves. It provides for this declaration on any part of the foreshore and the floor of the sea, and the water lying on such part of the floor of the sea.[332] It goes further to prohibit activities such as the use of boats other than those propelled by wind or oars, the disposal of rubbish or other waste matter, and the dredging or disturbance in anyway of the floor of the sea.[333] Additionally, BCA prohibits dredging or disturbance of any way of the floor of the sea[334] or destruction or removal of corals.[335] Although The Watersheds Protection Act (WPA) does not have any specific provisions pertaining to the marine environment, it allows for certain areas to be declared as watershed areas[336] and authorizes the establishment of Committees to ensure the proper carrying out of the functions of WPA.[337]

The Fisheries Act (FSA) is another national legislation that is instrumental in relation to the protection and preservation of the marine environment. It seeks to protect and conserve fish, which according to its definition includes corals and other marine life.[338] It works together with the Fishing Industry Act which establishes fish sanctuaries, or no fishing zones, in an effort to protect the marine environment, including coral reefs.[339] It is violation of FSA if corals or any organisms from the fish sanctuaries are removed[340] or if there is any act that harmfully alters, disrupts, destroys or releases any harmful substance into a fish habitat, even where it is unintentionally done.[341] This would therefore protect the coral reefs from the effects of substances released into the ocean by cargo and cruise ships, or even where damage is caused through anchoring or vessel grounding. The Natural Resources Conservation (Wastewater and Sludge) Regulations provide more specific regulations that cater to coral reefs and mangroves. It defines

[331] NRCA, (n. 319), sect. 17(2)
[332] *The Beach Control Act*, entered into force 1 June 1956, (henceforth known as BCA), sect. 7(1)(a)
[333] BCA, (n. 332), sect. 7(1)(b)(ii)
[334] BCA, (n. 332), sect. 7(1)(b)(v)
[335] BCA, (n. 332), sect. 7(1)(b)(vi)
[336] *The Watersheds Protection Act*, 1 April 1963 (henceforth known as WPA), sect. 5
[337] WPA, (n. 336), sect. 22
[338] *The Fisheries Act*, 24 December 2018 (henceforth known as FSA), sect. 2
[339] FSA, (n. 338), sect. 94. See also *Fishing Industry Act*, (1 October 1976), sect. 18
[340] FSA, (n. 338), sect. 94(d) and (e)
[341] FSA, (n. 338), sect. 94(2)

areas that have coral reefs and mangroves in the Caribbean Sea as "Class 1" waters, which are waters that due to inherent and unique environmental characteristics or fragile biological or ecological characteristics or human use, are particularly sensitive to the impacts of domestic wastewater[342] With such a classification, a permit is required by NEPA in order to avoid the discharge of effluent into the ground or other manner that may result in the sea being polluted[343] and for which breaches attract a fine or imprisonment.[344]

Jamaica, being an archipelagic state, has drawn its archipelagic baselines pursuant to Article 47 of UNCLOS.[345] For foreign cruise and cargo vessels, Jamaica's rights as a coastal state are limited save and except to prevent and punish infringements of its sanitation laws which occur within the contiguous zone.[346] This stands to reason that Jamaica can enforce this law if unsanitary actions which threaten or degrade coral reefs and mangroves originate from cruise and cargo vessels. While in Jamaica's archipelagic sea lanes, foreign vessels shall observe international regulations, procedures and practices for safety at sea and the prevention, reduction and control of pollution from ships.[347] Though a person on board a foreign ship shall not be arrested if that ship is passing through the territorial sea, nor can that person be investigated for a crime on board the foreign ship if such crime was committed before the foreign ship entered the territorial sea coming from another port and has not entered the internal waters, criminal liability can be imposed where the foreign vessel is in the exclusive economic zone and contravenes an international rule or standard for the prevention, reduction or control of pollution from ships.[348] This is also the case where this contravention results in substantial discharge causing or threatening significant pollution of the marine environment.[349] MAA further makes the point that passage is not considered innocent if a foreign vessel engages in the willful discharge of any substance which causes pollution in contravention with UNCLOS while in archipelagic waters or the territorial sea.[350] For the avoidance of any doubt or should there be inadequacies, the Minister is permitted

[342] *Natural Resources Conservation (Wastewater and Sludge) Regulations* entered into force 24 April 2014, (henceforth known as "NRCWSR"), sect. 2
[343] NRCWSR, (n. 342), sect. 7(1)
[344] NRCWSR, (n. 342), sect. 7(6)
[345] *Maritime Areas Act*, entered into force 28 November 1996, (henceforth known as "MAA"), sect. 3
[346] MAA, (n.345), sect. 20
[347] MAA, (n.345), sect. 9(3)(a)
[348] MAA, (n.345), sect. 14(2)(b)(i)(A)
[349] MAA, (n.345), sect. 14(2)(b)(ii)(A).
[350] MAA, (n.345), sect. 18(1)(g)

to make regulations to give effect to the provisions of MAA for to deal with the preservation and protection of the marine environment and the prevention and control of marine pollution.[351]

The Forestry Department in Jamaica is responsible for implementing the Forest Act. One of the main functions of this department is to protect and preserve watersheds in forest reserves, protected areas and forest management areas.[352] It assesses and manages mangroves which are essential to keeping the beaches in Jamaica clean, acting as a storm surge for the hurricane and storm prone island and serving as a habitat for a number of marine life. Section 5 of this Act allows for the declaration of crown lands, which are waste and vacant lands vested in the commissioner of lands, as forest reserves[353] for the purpose of conserving the forest which exists naturally[354] as well as to protect and conserve endemic flora and fauna.[355] In protecting the mangroves, the Minister can declare any crown land to be a protected area for the protection against storms, winds, rolling stones, floods and landslides.[356] He can also do this to protect against erosion[357] and to protect flora and fauna.[358]

Jamaica's shipping legislations

The Shipping Act (SA) was created in 1999 to incorporate key objectives of SOLAS, of which Jamaica became a party through accession in 1984. [359] It is administered by the Maritime Authority of Jamaica (MAJ)[360] which develops shipping and regulates matters involving merchant ships and seafarers.[361] MAJ keeps abreast of any revisions to SOLAS aimed at resolving the challenges faced by the international shipping industry, and takes steps to execute them through policies or legislative amendments. The provisions of SA coincide with SOLAS and its various amendments particularly regarding the registration of ships[362], the certification of seafarers[363], the

[351] MAA (n. 345), sect. 28(i)
[352] *The Forest Act*, entered into force 15 October 1996, (henceforth known as "FA"), sect. 4(n)
[353] FA, (n. 352), sect.. 5
[354] FA, (n. 352), sect. 6 (a)
[355] FA, (n. 352), sect. 6 (f)
[356] FA, (n. 352), sect. 23(1)(a)
[357] FA, (n. 352), sect. 23(1)(d)
[358] FA, (n. 352), sect. 23(1)(i)
[359] United Nations Treaty Collection. Available at https://treaties.un.org/pages/showDetails.aspx?objid=08000002800ec37f. (accessed on 28 October 2024)
[360] The Shipping Act, entered into force 2 January 1999, (henceforth known as "SA"), sect. 6(1)
[361] SA, (n. 360), sect. 7
[362] SA, (n. 360), sect. 8(1)(a)
[363] SA, (n. 360), sect. 8(1)(b)

safety of ships as regard their construction and navigation[364], as well as the inspection of ships for the purposes of maritime safety and prevention of pollution from ships.[365] SA also accounts for seaworthiness providing that a ship shall be regarded as being unseaworthy and therefore unfit to proceed to sea if it is likely to cause serious danger to the safety of persons, property or the marine environment.[366] It highlights that the factors amounting to a ship being unseaworthy such as the condition of its hull, equipment, machinery or cargo[367], if it is undermanned[368], or if it is overloaded, unsafe or improperly loaded.[369] With this, ships are only allowed to set sail if they are certified to be safe, thereby limiting the likelihood of risks to the coral reefs and mangroves. Furthermore, Jamaica is a party to the Memorandum of Understanding on Port State Control in the Caribbean Region, which was signed February 1996, and is a regime which allows for ships entering foreign waters to be searched. This is being done in collaboration with other Caribbean countries through the Caribbean Memorandum Of Understanding on Port State Control (CMOU).

Additionally, Jamaica has adopted the International Ship and Port Facility Code (ISPS Code) from SOLAS. This relates to the safety and management of ships through their operations in order to prevent issues such as pollution[370] and has been implemented in port facilities across the island of Jamaica.[371] It is important to recognize that MAJ works in collaboration with other local public bodies, such as The Port Authority (PAJ) in fulfilling the ISPS Code requirements which includes the establishment of a Port Community System by PAJ.[372] While MAJ deals directly with the registration and certification of ships, PAJ regulates ports and the shipping industry, through the Port Authority Act (PAA)[373], with its responsibility being more aligned with the development of ports and harbours and how these are regulated for cruise and cargo vessels. It bears noting here that SA provides an avenue for the inspection and power to require production

[364] SA, (n. 360), sect. 8(1)(c)
[365] SA, (n. 360), sect. 8(1)(e)
[366] SA, (n. 360), sect. 293(1)
[367] SA, (n. 360), sect. 293(2)(a)
[368] SA, (n. 360), sect. 293(2)(b)
[369] SA, (n. 360), sect. 293(2)(c)
[370] ISPS Code, Conference Resolutions 6, 7, 8 and 9. Available at https://portalcip.org/wp-content/uploads/2017/05/ISPS-Code-2003-English.pdf. (accessed on 24 October 2024)
[371] The Port Authority, "The Port Authority of Jamaica OAS Maritime Award Submission". Available at https://portalcip.org/wp-content/uploads/2019/06/Port-Authority-of-Jamaica-Executive-Summary-Final-3.pdf. (accessed on 24 October 2024)
[372] Jamaica PCS, "About Jamaica PCS". Available at https://www.jamaicapcs.com/about-us. (accessed on 24 October 2024)
[373] *The Port Authority Act*, entered into force 14 February 1972, (henceforth known as "PAA"), sect. 6

of documents if there is reason to suspect that the law in force at the time relating to the protection of the marine environment is not being complied with, which assists in ensuring that there is no deliberate threat to the marine environment.[374] Furthermore, in Section 457, the Minister is empowered to take necessary steps to amend the Act and make regulations to accord with its responsibilities under international treaties or convention relating to the protection and preservation of the marine environment.[375]

The protection and preservation of the marine environment through responsible shipping is a priority for Jamaica that in 2016, steps were taken by MAJ to implement the rule pertaining to the verification of gross mass of cargo carried in containers.[376] This prohibited containers that are without a verified weight from being loaded on a ship.[377] A container's weight could be verified using a weigh bridge, or by adding up the weights of the cargo, the goods comprising the cargo, materials used to pack the cargo and the container itself.[378] Once the weight is determined, a certificate is issued. MAJ works in conjunction with the Bureau of Standards Jamaica to ensure calibration of the equipment used to weigh the container accurately certifies the weight. The Kingston Wharves Limited is an approved weight bridge operator and provides certified gross mass weight for all containers exported from its terminal. The requirement for a weight limit is critical as it has the potential to protect and preserve coral reefs and mangroves. If there is no weight limit, then this would lead to bigger containers being transported on bigger ships, resulting in greater impacts. While the MAJ has developed and shared these guidelines with stakeholders, unfortunately, this has not yet been incorporated as law.

[374] SA, (n. 360), sect. 326
[375] SA, (n. 360), sect. 457
[376] The Jamaica Gleaner, "New rules IMO's mandatory verification of mass of packed shipping containers" published on 14 March 2016. Available at https://jamaica-gleaner.com/article/shipping/20160315/new-rules-imos-mandatory-verification-mass-packed-shipping-containers. (accessed on 31 October 2024). The new rule took effect on July 1, 2016.
[377] Ibid
[378] Ibid

CHAPTER TWO: Ocean related Sustainable Development Goals and the effectiveness of Jamaica's efforts in protecting and preserving coral and reefs and mangroves from the impacts of cruise and cargo shipping

Greater consideration is being given to the sustainable use of the oceans. This considers the impact that maritime transport has on and requires States to maintain a necessary balance before the effects become more catastrophic. Therefore, there is the need to engage in activities with positive social, environmental and economic goals while ensuring that there are no adverse effects in achieving these desired goals. To help to achieve this, a deliberate understanding of might prove useful for States to understand the basic definition of "sustainable" which is then merged with the definition of "development" and appreciate it as that which is able to continue at the same level for a period of time even as things and times change. Accordingly, this section will look at sustainable development goals 7, 13 and 14 and assess their respective targets aimed at achieving a cleaner, safer and greener ocean.

Section A: The sustainable development goals which are directly linked to cruise and cargo shipping and the protection and preservation of coral reefs and mangroves.

Sustainable development, though not easily or fully understood, has evolved as a ubiquitous concept in today's society. It establishes goals and objectives intending to satisfy different aspects of human life considering social, economic and environmental pillars. Mensah posits that while there is extensive literature on sustainable development, issues regarding its definition, history and its implications for human development continue to be unclear.[379] Though the definitions vary, the most commonly regarded one has been proposed by the Brundtland Commission Report which defines it as development that meets the needs of the current generation without compromising their ability of future generations to meet their own needs.[380] Consequently, it is incumbent on those on earth today to work on improving social well-being, the environment and the economy in order to protect and preserve the different facets of society for future generation. One key way to do this is to engage in actions that will not jeopardize the ecosystems of the world. While the process of achieving sustainable development may look different for each

[379] Justice Mensah, "Sustainable Development: Meaning, history, principles, pillars and implications for human action: Literature Review", Cogent Social Sciences, vol. 5, issue 1, (August, 2019). Available at doi: 10.1080/23311886.2019.1653531. (accessed on 18 October 2024), p. 2.
[380] Ibid at p. 6

country, the goal is the same. It is for this reason that in September 2015, all United Nations Member States adopted the 2030 Agenda for Sustainable Development (SDG).[381] This comprised 17 goals and 169 associated targets with a view to put an end to the varying levels of inequalities which exist in the world and to make that change visible by at least 2030.[382] While these targets may be considered as ambitious, they are necessary and their success is contingent on cooperation from all sectors of national, regional and international societies. For the purpose of this dissertation, the SDGs that relate to maritime transport and the marine environment that will be examined are SDG7, SDG 13 and SDG 14.

SDG 7 relates to affordable and clean energy and aims to ensure access to affordable, reliable, sustainable and modern energy for all.[383] Energy is used in practically every sphere of human existence as it is essentially the ability to make things work.[384] It bears pointing out that least developed countries and SIDS do not have the same level of access to energy as their more developed counterparts and as such this SDG is seeking to address this by seeking to create a balance. SDG 7 is comprised of three substantive targets, namely to ensure universal access to affordable, reliable and modern energy services; to substantially increase the share of renewable energy in the global energy mix by 2030; and to improve or double the global rate of improvement in energy efficiency.[385] It also has two means of implementation targets.[386] The predominant concept surrounding this SDG is that energy intensity needs to decrease in order for energy efficiency to increase. To achieve this target by 2030, renewable energy must be accelerated across the three key categories of electricity, heat, and transport.[387]

SDG 7 applies in this instance as energy is fundamental to the existence of maritime transportation. It is energy that is generated in a ship's engine that is used in its propulsion system causing it to sail from one point of the ocean to the next. Not only does maritime transportation

[381] United Nations, Department of Economic and Social Affairs, "Sustainable Development "The 17 Goals"". Available at https://sdgs.un.org/goals. (accessed on 28 April 2024)
[382] Ibid
[383] United Nations, Department of Economic and Social Affairs. "Sustainable Development "Goal 7"". Available at https://sdgs.un.org/goals/goal7 (accessed on 28 April 2024)
[384] U.S Energy Information Administration, "What is Energy?". Available at https://www.eia.gov/energyexplained/what-is-energy/. (accessed on 21 October 2024)
[385] n. 383
[386] Ibid
[387] IEA, "Tracking SDG 7: The Energy Progress Report 2024", World Bank. Available at https://www.iea.org/reports/tracking-sdg7-the-energy-progress-report-2024 (accessed on 24 October 2024)

use energy, but it also discharges energy into the ocean resulting in consequential damages. With fossil fuels still being the dominant source of energy, its consumption is detrimental to the coral reefs and mangroves and therefore can hardly be regarded as sustainable. The consequential creation of carbon dioxide not only pollutes the environment but also accelerates climate change and global warming.[388] If not properly dealt with, it is believed that the energy-related GHG will increase by more than twofold by 2050.[389] It is this vein that there has been a call to action, through the Paris Agreement, for cleaner and more renewable energy and for States to limit global warming to 2 degrees Celsius, while aiming to maintain 1.5 degrees Celsius.[390]

Furthermore, maritime transportation would play a critical role in achieving the objectives of SDG 7 if it were to explore energy efficient and environmentally friendly shipping. It is necessary to use the least amount of energy from ships to minimize the risks to marine environment. This can be achieved through improving ships' infrastructure and technology, by using renewable and more energy efficient features of the ships. This would include the use of low-carbon shipping and renewable sources of ocean energy particularly through the decarbonization of fuels used for energy. Maritime decarbonization is the process of reducing GHG from the global maritime sector that limits temperature rise to 1.5-degrees Celsius.[391] This would result in less pollution in the marine environment and thereby improving the lives of the coral reefs and mangroves.

Target 7.a hopes that by 2030, there will be enhanced international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.[392] Target 7.b wishes to expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, SIDs and land-locked developing countries, in accordance with their respective programmes of support, also by 2030.[393] Together with these targets, the IPCC in 2007,

[388] Antiono Valente, Diego Iribarren, and Javier Dufour, "Harmonized life-cycle global warming impact of renewable hydrogen", Journal of Cleaner Production, vol. 149, pgs. 762-772 (2017) Available at https://doi.org/10.1016/j.jclepro.2017.02.163. (accessed on 21 October 204)
[389] Ibid
[390] n. 184
[391] Office of Energy Efficiency and Renewable Energy, "Maritime Decarbonization". Available at http://www.energy.gov/eere/maritime-decarbonization. (accessed 1 November 2024)
[392] n. 383
[393] Ibid

suggested that if GHG were reduced by fifty to eighty percent below 1990 levels by 2050, then the climate could likely be stabilized.[394]

For there to truly be any sustainable use of the ocean, it is imperative that ships be created with the vision to reduce their impact on climate change. The need to look for innovative opportunities to minimize fuel consumption and be influential in the industry cannot be overemphasized in the creation of a sustainable shipping environment for the future. The Deming Cycle of PLAN, DO, CHECK, ACT has been recommended as a way to decarbonize the oceans.[395] This could be achieved through de-rating a ship's main engine by modifying turbocharger and readjusting the engine timing, as well as having the ships created with more efficient propellers absorb engine power.[396] This would have to be efficiently planned and monitored in order to reduce the daily fuel consumption of the ships, to include the involvement of stakeholders to conduct energy audits to verify the energy usage of the ships.[397] Furthermore, true optimization of the energy efficiency for ships requires the implementation of slow steaming or speed reduction in vessels, but this is related to market conditions and is driven by fuel prices, freight rates and demand.[398] Moreover, Rehmatulla acknowledges that energy efficiency has become a top priority for shipping companies, and agrees that there are barriers, including economic ones, which impede the implementation of energy efficiency.[399] He notes a major barrier being associated with the cost and benefit analysis as it relates to investing in low carbon and energy efficiency, and speculates that many investors are unlikely to explore energy efficient shipping because of the higher risk of depreciation of ships with an innovative design compared to the risk of a ship with a conventional design.[400]

Climate change has become one of the biggest challenges to marine environment and though it is not a new phenomenon, its impact is intensifying in a more rapid way. It has been

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[394] Ibid
[395] Victor N. Armstrong, "Vessel optimisation for low carbon shipping", Ocean Engineering, vol. 73, pp. 195-207. (November, 2013). Available at doi: https://doi.org/10.1016/j.oceaneng.2013.06.018. (accessed on 28 October 2024). p. 196.
[396] Ibid
[397] Ibid at p. 200
[398] Ibid
[399] Nishatabbas Rehmatulla and Tristan Smith, "Barriers to energy efficient and low carbon shipping", Ocean Engineering, vol. 110, part B (December, 2015). Available at https://doi.org/10.1016/j.oceaneng.2015.09.030. (accessed on 28 October 2024), p.103
[400] Ibid

asserted that climate change is the movement in the usual state of the environment which causes shifts in temperatures and weather patterns, on account of natural sources and human activities which contribute to more heat being absorbed by the ocean. [401] These human activities underscore the environmental impact of climate change, and include the burning of fossil fuels, deforestation and GHG. This view is supported by Sherman et al, who agree that the trend towards a warmer period is attributed to the human element or other anthropogenic factors that are adversely affecting the marine environment.[402] Since climate change is a global threat that transcends every border, it has become more necessary for all to work together, through international cooperation to mitigate the impact. SDG 13 establishes such a goal which incorporates maritime transport because of the impact that these have on climate change. This goal relates to climate action with a view to take urgent steps to combat climate change and its impact. This goal has three targets and three means of implementation. Target 13.1 deals with the strengthening of resilience and adaptive capacity to climate related hazards and natural disasters in all countries. This means that people ought to be more informed about the reality of climate change and its consequences, such as sea level rise. Along with adaptive efforts, States are to mitigate climate change effects by integrating measures in national plans and policies. As of now, it is projected that the world will exceed the 1.5 degrees Celsius threshold by 2030, and if sustained will likely face 2.5 degrees Celsius warming by 2100.[403] As a consequence, SDG 13 is working on deep, rapid and sustained GHG emission reduction by 43% by 2030, which could lead to net zero emissions by 2050.[404] This is not an easy feat to achieve and so States must act swiftly and as a matter of urgency to reduce emissions. The construction of greener and smarter ships can be used as a means of creating a cleaner ocean which makes for a healthier marine environment. With this, the coral reefs and mangroves are better able to survive and thrive, thereby having more economic, social and environmental benefits.

[401] Guy Jacques and Herve Le Treut, *Climate Change*. (United Nations Educational, Scientific and Cultural Organization Publishing, 2005)
[402] Kenneth Sherman and Sally Adams, *Sustainable Development of the World's Large Marine Ecosystems during Climate Change: A commemorative volume to advance sustainable development on the occasion of the presentation of the 2010 Goteborg Award*. (International Union for Conservation of Nature and Natural Resources Publishing, 2010)
[403] United Nations, Department of Economic and Social Affairs Sustainable Development, "Goal 13". Available at https://sdgs.un.org/goals/goal13. (accessed on 28 October 2024)
[404] Ibid

The fact that the earth is covered by over 70 percent water shows how crucial the oceans are to humankind because livelihoods are significantly built around them. Regrettably though, the oceans are in a crisis due to anthropogenic and other factors such as ocean acidification and pollution. These typically derive from maritime transport and lead to the marine environment being damaged or degraded. SDG 14, which deals with life below water, recognizes the critical contribution the ocean can make and establishes seven targets with three means of implementation to sustainably manage and protect marine and coastal ecosystems from pollution, as well as address the impacts of ocean acidification.[405] Target 14.1 aims to prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.[406] Marine debris refers to any persistent solid material, such as plastic, that is disposed of into the marine environment.[407] Sewage from treatment plants can also pollute the ocean resulting in eutrophication when nutrients such as nitrogen and phosphorous are discharged from the sewage treatment plants. This results in a buildup of algae which in turn blocks light from the marine environment thereby affecting their ability to grow. These effects also have the potential of posing threats to maritime navigation and safety as well as to human health.

Target 14.2 intended for States to sustainably manage and protect the marine and coastal ecosystems by 2020, with a view to avoid significant adverse impacts, which includes the strengthening of their resilience and for actions to be taken for their restoration in order to achieve health and productive oceans. According to Andriamahefazafy, this target failed to achieve its desired outcome in 2020 with 51% of countries making low progress.[408] It is apparent that this target was intended to conserve the marine ecosystem by preventing over exploitation. This is similar for target 14.5, which requires coverage for marine protected areas, and which also shows that a high number of countries, 53%, have failed to meet this target.[409] As for target 14.3, this is aimed at reducing ocean acidification, by minimizing and addressing its impacts through enhanced

[405] United Nations Development Programme, "What are the Sustainable Development Goals?", Available at https://www.undp.org/sustainable-development-goals. (accessed on 25 October 2024).
[406] United Nations, Department of Economic and Social Affairs Sustainable Development "Goal 14". Available at https://sdgs.un.org/goals/goal14#targets_and_indicators. (accessed on 28 October 2024).
[407] National Ocean Service | National Oceanic and Atmospheric Administration, "What is marine debris?". Available at https://oceanservice.noaa.gov/facts/marinedebris.html. (accessed on 28 October 2024).
[408] Mialy Andriamahefazafy and others, "Sustainable Development Goal 14: To what degree have we achieved the 2020 targets for our oceans?", Ocean and Coastal Management, vol. 227, (2022). Available at https://doi.org/10.1016/j.ocecoaman.2022.106273. (accessed on 23 October 2024), p. 4
[409] Ibid

scientific cooperation at all levels by 2030. As levels increase from human activities, so too do the levels increase in the ocean, making it more acidic. This adversely affects the ability of corals to build their shells and skeletons as they require carbonate ion which becomes depleted as the ocean becomes more acidic. When pH levels in the ocean decreases, shells and skeletons tend to dissolve more easily. As a consequence, growth and reproduction of marine animals are stifled and this not only affects the marine environment but also food supply and production for humans.

Section B: The effectiveness of the efforts taken by Jamaica to protect and preserve coral reefs and mangroves from the impacts of cruise and cargo shipping

With the marine environment being affected due to its fragility to withstand ocean acidification, pollution, invasive species and other anthropogenic activities, Jamaica has the responsibility to play its part in its protection and preservation. Surrounded by the Caribbean Sea, Jamaica is a tropical maritime island with an area of 11,420 square kilometres, comprising an irregular coastline of 1,022 kilometres long. [410] The Kingston Harbour, which is the 7th largest natural harbour in the world[411], is considered to be Jamaica's highest polluted waterway,[412] being a clear example of threatened coral reefs. To demonstrate its commitment to protecting and preserving the marine environment, and in particular its coral reefs and mangroves, it has been shown earlier that Jamaica has adopted several international legal instruments, and has incorporated them into national legislations. However, it must be mentioned that whilst legislations are in place, the overarching effect of the obligations that Jamaica has in protecting and preserving the marine environment must coincide with the enforcement of these legislations. This Section will therefore analyze whether the efforts taken by Jamaica, including the one pertaining to the relevant SDGs, are effective in balancing the impacts of cruise and cargo shipping on the protection and preservation of coral reefs and mangroves.

The effectiveness of the national environmental regulations concerning MPAs

Based on the legal instruments that have been reviewed, it has been realized that the protection and preservation of the marine environment is a topic which permeates all corners of the world. It is a determined view that the way in which the ocean is treated as a result of cruise and cargo shipping, whether directly or indirectly, remains a major concern for the marine environment. With Jamaica's ratification of UNCLOS, it acknowledges its duty to prevent, reduce and control pollution of the marine environment.[413] It also acknowledges the need to implement

[410] Embassy of Jamaica Washington D. C., "Geography of Jamaica". Available at https://www.embassyofjamaica.org/about_jamaica/geography.htm (accessed on 18 October 2024)
[411] Clean Currents Coalition, "Kingston Harbour, Jamaica". Available at https://cleancurrentscoalition.org/coalition-projects/kingston-harbour-jamaica/. (accessed on 18 October 2024)
[412] Voluntary National Review 2022, "Goal 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development". Available at https://www.pioj.gov.jm/wp-content/uploads/2022/10/VNR_Goal_14.pdf, p. 219 (accessed on 18 October 2024)
[413] UNCLOS, (n. 8), Article 192/194

requirements for preventing operational and accidental pollution from ships.[414] This is evidenced by the adoption of NRCA[415] which can be regarded as effective in mitigating against the impacts of maritime transport on coral reefs and mangroves. This is particularly so because it provides for the designation of MPAs, six of which have been declared covering 1,918 km^2[416] and four RAMSAR sites.[417] Through such designations, there are restrictions on the activities that can be done in these highly sensitive areas, in order to shield the marine environment from threats such as pollution and habitat destruction. With Jamaica taking steps to designate MPAs and other protected areas, it shows its fulfilment of Article 194(5) which provides that States must take the necessary measures to protect and preserve rare or fragile ecosystems, as well as the habitat of depleted, threatened or endangered species and other forms of marine life. Moreover, the use of MPAs has found favour in the implementation of SDG14 as it has exceeded the target of 10% by 5%.[418]

The designation of MPAs is regarded as one of the primary policy instruments for managing marine resources.[419] He highlights their importance in conserving coral reefs, noting that these marine species have been experiencing increasing disturbances with one of the most pervasive threats being habitat degradation.[420] Habitat degradation can take the form of dredging and modifying coastal areas which are typical for a port to be developed to facilitate cruise and cargo ships. This entails the removal or destruction of coral reefs and the clearing of mangroves. Even after development, anchoring is another method used by cruise and cargo ships while docking at a port, which if not done properly, can cause physical damage by disturbing the coral reefs and mangroves through breakage or erosion, and other marine ecosystems. Within the past five years, it has been determined by an environmental expert who provided technical information for this dissertation, that there has been no damage to coral reefs from groundings or accidents in

[414] MARPOL, (n. 255)
[415] NRCA. (n. 319)
[416] Marine Structures, "Marine Structures Provided Products to Port Royal Jamaica". Available at https://marinestructures.com/marine-structures-provided-products-to-port-royal-jamaica/
[417] Ramsar, Jamaica, Available at https://www.ramsar.org/country-profile/jamaica. (accessed on 29 October 2024)
[418] Voluntary National Review 2022, (n. 412)
[419] C. Cvitanovic and others, "Critical research needs for managing coral reef marine protected areas: Perspectives of academics and managers". Journal of Environmental Management, vol. 114 (2013), pp. 84-91. Available at https://doi.org/10.1016/j.jenvman.2012.10.051. (accessed on 29 October 2024).
[420] Ibid

Jamaica.[421] However, it was declared that dredging activities in August 2018 resulted in the sedimentation of some corals in the Montego Bay area and claims of damage to the fisherfolk equipment.[422] Similarly, in the Kingston Harbour, there were complaints of anchor damage in the outer anchorage area where swinging anchor chains caused damage to the seafloor.[423] Notwithstanding these incidents, and after assessments and analyses, it was confirmed that the coral reefs in the areas in questions did not suffer any significant damages. Moreover, with the existence of MPAs, anchoring is not a likely issue since docking is impermissible within such areas. This therefore has allowed for beaches and rivers to be used sustainably by providing social, economic and environmental benefits of leisure activities, tourism and fishing.

It is worthwhile to note that the NRCA works in tandem with the BCA and FA which also allow for protected area designation. This ensures that fishing areas, which are critical to the livelihood of coastal communities, are protected and preserved. In the recent construction of Jamaica's newest cruise ship terminal located in Port Royal, there were certain limitations aimed at ensuring sensitive areas, and in particular the marine areas, are not destroyed or degraded during the port development, and even beyond. The use of a floating pier system, known as the SeaWalk, supports the efforts to protect and preserve coral reefs and mangroves, as it allows the terminal to operate without impacting the extremely sensitive environment.[424] The intention of the SeaWalk was to provide a lower impact alternative to conventional cruise ship piers, thereby limiting habitat destruction due to dredging requirements, land reclamation, the installation of pilings and other infrastructure.[425] This helps to preserve the mangroves in Port Royal, which is not just a heritage site, but also a RAMSAR site.[426] Furthermore, when the terminal was being created, the assurance

[421] Interview with Tovia Elliott, Environmental Programmes Coordinator of The Port Authority, Jamaica, 26 November 2024 (henceforth known as Interview)
[422] Ibid
[423] Ibid
[424] Ibid
[425] The Port Authority, "Environmental Impact Assessment of the Old Coal Wharf for the Port Royal Cruise Ship Pier Development Project". Available at https://websitearchive2020.nepa.gov.jm/new/services_products/applications/eias/docs/kingston/port_royal/eia-port_royal_cruise_pier_development_project.pdf. (accessed on 26 November 2024). p. 346.
[426] RAMSAR, "The Convention on Wetlands". Available at https://www.ramsar.org/country-profile/jamaica. (accessed on 18 October 2024)

was given that there was no expectation of mangrove losses or destruction due to the normal operations or activities of cruise ships calling at said terminal.[427]

The environmental expert notes that with regards to ship channel, dredging is typically required for construction or maintenance purposes in Jamaica.[428] While dredging can be detrimental to ecological resources such as mangroves, NEPA has been able to provide some assistance in their conservation through environmental permit and licensing conditions. NEPA has been effective in stipulating that the mangroves ought to either be conserved via mangrove sediment barriers or replanted as in the case of port developments in Falmouth.[429] Another solution for mangrove conservation occurred in the early 2000s, where dredging at the Port of Kingston involved the use of dredge sediments to fill in lands to the immediate west of the West Terminal.[430] This ultimately provided adequate substrate to facilitate establishment of mangroves to the western side of the Port.[431] Today, the mangrove forest is a dense network of trees comprised of typical local mangrove species such as red *(Rhizophora mangle)*, black *(Avicennia germinans)* and white *(Laguncularia racemosa)* mangroves which provide ecosystem services of wave buffering and nursery grounds for nearby fishing communities.[432]

Notwithstanding this, it is the view that further assessments and data are necessary to confirm any incidents of anchoring in any MPAs and the effect that this has had on coral reefs. This is so because of the apparent shortfall in specifically addressing shipping as a stressor to the marine environment, as well as Jamaica having one of its largest and most widely used cruise ship terminals situated within the region of MPAs. Furthermore, although MPAs are useful in managing and conserving the marine environment, administrators must ensure that they monitor and report on the activities and findings of the marine environment in these MPAs. Though this is the case, it must be noted that the social impact can be influenced by the lack of community engagement. Whilst there are MPAs, some residents or even developers may take the risks to destroy, degrade or otherwise engage in actions that can likely adversely affect coral reefs and mangroves. This

[427] National Environment and Planning Agency, "Verbatim Notes of a Public Hearing to Present the EIA Study of The Old Coal Wharf, for the Port Royal Cruise Pier Development Project". Available at https://www.nepa.gov.jm/sites/default/files/2019-12/verbatimreport.pdf. (accessed on 18 October 2024)
[428] Interview, (n. 421)
[429] Ibid
[430] Ibid
[431] Ibid
[432] Ibid

could be as a result of the inadequacy of the sanctions for breaches of the legislations. In the NRCA for example, a breach can result in a fine of up to fifty thousand Jamaican dollars, which is miniscule to the effect of the harm that could be caused by failing to protect and preserve these coral reefs and mangroves. The Prime Minister of Jamaica admitted that such a fine "do[es] not function as sufficient deterrent to polluters, and in some cases rogue developers,"[433] thereby proposing a five million Jamaican dollar penalty for environmental breaches under NRCA.[434]

The effectiveness of the national shipping regulations concerning pollution and ship-generated waste

GHG emissions from cruise and cargo ships release toxic fumes that contribute to ocean acidification which impact coral reefs and mangroves. With the influx of these vessels calling at Jamaica's ports, the likelihood of the health of coral reefs and mangroves being threatened is high. Though Jamaica is a signatory to international agreements/treaties and there are local legislations and measures in Jamaica to protect coral reefs and mangroves from shipping impacts, in many cases, these have not been effective. While the SA makes provision for ship-generated waste, it does not provide for pollution caused by these emissions. Instead, it focuses on pollution in the form of the illegal discharge of waste, sewage and oily bilge water. Notwithstanding this, it must be noted that the SA does not specifically deal with the disposal of ship-generated waste. Legislation requires that there be port reception facilities at each port of call, or at an offshore location nearby. To date, there are no established port reception facilities situated at the ports in Jamaica to receive ship-generated waste. The environmental expert explains that while the ports have the capacity to collect garbage, oily waste and sewage from vessels, the shipping lines have to engage companies approved by the Ministry of Health and Wellness (MOHW) and National Solid Waste Management Authority (NSWMA) to collect and dispose of at an approved local disposal site.[435] This arrangement is with private companies which can pose risks associated with their capacity to handle any overload of ship-generated waste as well as compliance challenges since the government has little oversight in the management of these private entities and therefore cannot instruct them on their standards of practice. Instead, the government can only hope that

[433] The Jamaica Gleaner, "Proposed $5 million fine for environmental breaches", published on 21 March 2024. Available at https://jamaica-gleaner.com/article/news/20240321/proposed-5-million-fine-environmental-breaches. (accessed on 21 October 2024)
[434] Ibid
[435] Interview, (n. 421)

these standards are in keeping with internationally accepted ones. For this reason, it can be said that Jamaica has not been efficient enough to ensure that ship-generated wastes are effectively disposed of.

Furthermore, Jamaica has taken steps by establishing requirements for preventing operational and accidental pollution from ships by way of legislations. These legislations include port state control obligations which are consistent with MARPOL, and for which Jamaica is ensuring compliance by using a series of checks and balances.[436] The MAJ ensures that vessels are regularly checked by its port state inspectors, pursuant to the stipulations provided under the Shipping Act and if deemed non-compliant, may be detained until the defect is corrected. This is one of the ways in which Jamaica is enforcing its responsibilities under international legal frameworks to assure the protection and preservation of the marine environment. Former Director General, Rear Admiral Brady, avers that the measures undertaken in Jamaica by PSC are for pollution prevention and maritime security.[437] He further avers that with collaboration with other Caribbean countries through the CMOU ships found to be in breach of the regulations may be detained until the deficiencies are rectified and are brought into compliance.[438] Notably, Jamaica is in a strategic position to enforce PSC compliance not only because it has national laws which provide for this, but also because the Secretariat is situated in Jamaica. CMOU allows for inspection to be conducted annually on over 1,200 local (small) vessels and approximately 15% of foreign vessels that call at Jamaican ports.[439] In 2024 so far, more than a score of general cargo/multi-purpose ships were inspected under the CMOU in Jamaica, though not detained. Though the legislations do not specifically speak to it, the revenues, fees and tariffs that are generated from port activities are able to assist with financing the measures used in protecting and preserving the marine example. While budgetary allocations are expected to be made through the government's coffers, the monies collected should able to assist with the funding of port reception facilities for example.

[436] Jamaica Information Service, "Port State Control Ensuring Compliance With International Maritime Standards". Available at https://jis.gov.jm/features/port-state-control-ensuring-compliance-with-international-maritime-standards/. (accessed on 28 October 2024)
[437] Ibid
[438] Ibid
[439] Maritime Authority of Jamaica, "Our Responsibility". Available at https://maritimejamaica.com/About-Us/Our-Responsibility. (accessed on 28 October 2024)

From the environmental protection perspective, there are instances of little or no implementation of legislation. The environmental expert stressed that Jamaica has still not ratified the Specially Protected Areas and Wildlife (SPAW) Protocol, which is a legally binding treaty to protect and sustainably manage coastal and marine resources.[440] There are also issues relating to enforcement of legislations. While the general measures regarding land-based sources of pollution appear to be somewhat effectively managed or controlled more is required from a national perspective. The NSWMA implements measures to prevent, reduce and control land-based sources of marine pollution, such as routine garbage collection and sewage collection, treatment and disposal. Notwithstanding this, there are residents who continue to show scant regard for proper garbage disposal and a such cause their litter to flow into the marine environment. While it is difficult to prevent pollution by littering due to disregard of proper procedures, even with the existence of regulations in place, it is critical that Jamaica enforce the laws by implementing stricter penalties as the current fines are insufficient to the deleterious effects that pollution from land-based sources have on the marine environment. Additionally, NEPA has been supporting this through its efforts in the management of Jamaica's natural resources. One such effort is its Plastic Waste Minimization Project, which include beach-cleanups which assist in limiting the amount of plastic that enters the ocean.[441] This project resulted in the removal of 15.2 tonnes or 33,580 pounds of plastic material being collected in order to reduce the amount of waste entering the Kingston Harbour.[442] Since the project started, there has been a more concerted effort by citizens to refrain from littering plastic bottles resulting in a marginal decrease in the amount of plastic bottles that were collected during the international coastal cleanup day. Furthermore, Jamaica has taken steps in confronting these challenges through the implementation of legislation. For example, there is a ban on single use plastic bags and plastic straws.[443] Moreover, Jamaica is dealing with the issue of pollution through its collaboration with the government and civil society through the "Nuh Dutty Up Jamaica" campaign as well as recycling and waste management programmes.[444] Lastly, NEPA continues to do work as it relates to the protection and preservation of the four RAMSAR sites that have been designated as wetlands of international importance.

[440] Interview, (n. 421)
[441] Voluntary National Review 2022 (n. 412)
[442] Ibid
[443] Ibid. See also *The Natural Resources Conservation (Plastic Packaging Materials Prohibition) Order 2018* and *The Trade (Plastic Packaging Materials Prohibition) Order 2018*
[444] Voluntary National Review 2022 (n. 412)

Jamaica's implementation of the ocean-related SDGs

Jamaica boasts of its involvement in shaping the negotiations which led to the adoption of the 2030 Agenda in 2015. This inspired the country's Vision 2030 framework and National Development Plans which include a Medium-Term Socio-Economic Policy Framework and the Country Implementation Plan for Jamaica. To achieve the vision, Jamaica, as a SIDS, relies on the institution of sectoral policies which are strongly aligned with the SDGs, reflecting about 91 percent fully or partial alignment with 115 SDG targets.[445]. Of importance is National Development Goal 4 which is similar to SDG 14 and entitled "Jamaica has a healthy natural environment".[446] This goal seeks to prioritize sustainable management and use of the environment and its natural resources, as well as to adapt to climate change and urban and rural development practices.[447] Though the measures primarily concern land-based sources, rather than vessel source pollution, it is still vital to discuss them due to the relationship that land-based source pollution has on cruise and cargo ships. With this in mind, Jamaica sought to update and enforce legislation to support the reduction of land-based sources of pollution in 2018.[448] It advised of plans to improve data and information to guide in the decision-making processes and explore the potential of the blue economy and its contribution to sustainable development.[449] Additionally, with climate change being a constant issue to the marine environment in Jamaica, the government has also considered plans to implement policies to affect change and build resiliency to deal with its effects.

Jamaica identified that the main threats to marine resources were climate change effects and pollution. The pollution issues in Jamaica, stem from the fact that 1/3 of Jamaica households use improper methods of waste disposal. Approximately 30% of Jamaicans, who dispose of their garbage, do so by burning or dumping into the ocean or rivers.[450] While it did not account for waste being disposed of by cruise and cargo vessel, it is reasonable to submit that the measures include vessel source pollution. The ability to verify the vessel source pollution lies with Jamaica's

[445] Ibid
[446] Ibid at p. 217
[447] Ibid
[448] Ibid
[449] Ibid
[450] Ibid at p. 143

authority to inspect vessels coming into its port or terminal facilities. As a consequence of these forms of pollution, beaches become eroded, coral reefs become unhealthy and there is a decline in fish biomass and biodiversity. In addressing this issue, Jamaica has a beach monitoring program which evaluates the level of beach erosion. Jamaica has engaged in intervention to limit beach erosion through the Beach Restoration Guidelines which encourage the construction of seawalls and revetments to help curb the issues of beach erosion.[451] This is of particular importance, especially in relation to coral reefs, which were ranked in the category of fair, poor and critical in 2020.[452] These results were less than favourable than the ones in 2019, because the amount of coral reefs sites being regarded as critical was more than the sum of the sites deemed fair and poor. For this reason, Jamaica has identified the need to conduct research, mapping and monitoring, in order to reduce pollution and habitat destruction.[453]

Another of Jamaica's effort in ensuring that it plays its part in the climate change phenomenon was evident in its oral submission at the International Court of Justice (ICJ) hearing in Netherlands on December 13, 2024.[454] The submission stems from the United Nations General Assembly Resolution no. 77/276. Jamaica's submission, as with the other SIDS, was done with a view to ask the ICJ to establish obligations of States in respect of protection of the environment against harmful greenhouse emissions, as well as the consequences for causing significant harm to the climate and other parts of the environment. Jamaica has joined other SIDS in recognizing that major emitters of GHG have failed to adequately address climate change and the time has now come for measures to be enforced to keep them accountable.

Overall, Jamaica's legislations can be considered as compatible, even if partial, with international legal frameworks. There are legislations, policies and guidelines which incorporate international conventions and instruments aimed at governing the shipping industry and the protection and preservation of the marine environment. It cannot be stated however that there is an overwhelming confidence in the enforcement of the legislations. While the adoption of national legislations is a step in the right direction for the fulfilling of its international obligations to protect

[451] Ibid
[452] Ibid at p. 221. See also National Environment and Planning Agency's Coral Reef Health Index (n. 151)
[453] Voluntary National Review 2022 (n. 412)

[454] Ministry of Foreign Affairs and Foreign Trade, "Jamaica to make Oral Submission at ICJ Hearings on Climate Change". Available at https://mfaft.gov.jm/site/jamaica-to-make-oral-submission-at-icj-hearings-on-climate-change/. (accessed 17 December 2024).

and preserve the marine environment, it cannot be overlooked that there are gaps in the implementation and enforcement of the measures provided. Together with the measures and mechanisms are in place, there is a need for greater and more active participation from all stakeholders in Jamaica. The government and its ministries, departments and agencies must collaborate with the citizens, regional and international parties to ensure that the ocean is being sustainably used and preserved for future generations.

Recommendations and Conclusion

As this dissertation comes to an end, it is useful to differ to the fourth preambular recital of the "Constitution of the oceans", which reads thus:

"Recognizing the desirability of establishing through this Convention, with due regard for the sovereignty of all States, a legal order for the seas and oceans which will facilitate the international communication, and will promote the peaceful uses of the seas and oceans, the equitable and efficient utilization of their resources, the conservation of their living resources, and the study, protection and preservation of the marine environment."

This profound charge, aptly captures the essence of how the oceans are to be governed, with UNCLOS not intended to be viewed in isolation from other international legal regimes and nationally enacted instruments. Undeniably, there is a multifaceted relationship that exists between maritime transport and the marine environment, for which an integrated approach to ocean governance is fundamental for their continued existence. Owing to cruise and cargo ships, the oceans have experienced impacts, both positive and negative, with coral reefs and mangroves being a central concern. It is worth pointing out that this is not the case solely in Jamaica, as this has been seen as an occurrence on a global scale. The positive effects of maritime transport through cruise and cargo shipping are evident with the growth in Jamaica's GDP with exports generating millions in revenues and tourism being the most economic activity. Conversely, its negative effects range from pollution, ocean, acidification, and other anthropogenic factors which, if not controlled or managed sustainably, can lead to severe crises for the oceans. A lack of appreciation and understanding of ocean affairs and the consequences that human actions can have on them continue to be factors that contribute to the degradation and destruction of the marine environment. While the social economic and environmental impacts have been explored, this final chapter will represent conclusions and recommendations based on the findings that have been uncovered throughout this dissertation.

For ease of reference, Part One discussed the history, evolution, and relevance of cruise and cargo shipping and their relationship to the marine environment. It traced the history back to when the Vikings developed ships to how these ships have evolved in the 21st century. It provided insights on when maritime transport first emerged in Jamaica from the Transatlantic Slave Trade to it now being used as a significant economic opportunity for Jamaica. This Part then moved on

to explore the marine environment, specifically coral reefs and mangrove and described how they have been impacted by cruise and cargo shipping. Part Two assessed the international and national legal frameworks relating to cruise and cargo ship and the protection and presentation of coral reefs and mangroves. Furthermore, this Part concluded with the sustainable development goals and the link that these have on maritime transport and the marine environment. It also analyzed the effectiveness Jamaica's legislation and actions in achieving the targets established by the sustainable development goals.

As the information unfolded in this dissertation, it was realized that they were both positive and negative impacts that cruise cargo ships have coral and mangrove. It explained on these impacts and linked them to the Jamaican realities. It perused international legal frameworks as well as national legislation and determine that Jamaica, for the most part, has been compatible with international legal standards. It also revealed that the measures that have been implemented by Jamaica are largely effective in mitigating against the threats relating to marine pollution, certification through establishment of MPAs, and vessel inspections. It was noted, however, that more needed to be done in terms of bring our awareness to the citizens of Jamaica, so that they are more alert and ready to take action in the fight against marine pollution. Jamaica's commitment to a safer and cleaner marine environment necessitates the effective implementation of measures that align with its international obligations. Whereas Jamaica has made strides in enacting national legislations to accord with these international obligations, many of them fall short in achieving effectiveness due to lack of enforcement.

There were difficulties in ascertaining data relevant to the topic from websites in Jamaica, as access was denied on some of the websites from Jamaica in what appeared to have been imposed restrictions on searches outside the jurisdiction. With the dearth of information, there was a need to seek assistance from residents there, some of which still proved futile. Additional attempts were made to rectify the issue through the use of interviews from experts employed within the cruise and cargo industries in Jamaica. a hybrid approach was initiated through real time interviews as well as sending the interview questions via email. Despite these efforts to obtain specific and technical information, favourable responses were underwhelming as only one interviewee assisted with providing information. This may have been attributable to the time difference which could have impacted the availability of potential interviewees. Though a longer time frame to complete the dissertation, and more latitude with the page limit, writer's block presented a real challenge in

the completion of the dissertation. The writing challenges were also impacted by an unbalanced circadian rhythm, impacted by the time zone, the darkness and the adverse weather conditions.

It is being recommended that townhall sessions, educational campaigns and more capacity building programs be implemented in order to have a more intentional cooperation from the citizens in achieving a cleaner ocean. Though there are beach cleanups for example, and other programs that are in place from time to time, the view is that there needs to be more promotion and marketing on a wider scale so that these programs can have a greater reach and effect. This is to say that the ocean should be regarded as more important that is should be promoted on a more frequent basis rather than only when there are events such as World Ocean Day or International Coastal Cleanup Day. Agencies such as a NEPA should strengthen their collaborative efforts with other ministries departments and agencies to have campaigns and sensitization drives throughout the year.

One of the key revelations of this research has been that Jamaica still does not have a port reception facility, which is inconsistent with what is required on the international legal framework. Consequently, it is recommended that Jamaica moves posthaste in constructing port reception facilities to receive sewage and otherwise from cruise and car ships when they duck at port in Jamaica in order to accord with international legal standards. The financial constraints may impede the timeframe within which these facilities can be constructed, the government is urged to maintain this as a priority on its list until completed. While the legal framework in Jamaica as it relates to shipping is largely consistent with MARPOL, and has some tenets of SOLAS, there continues to be a shortfall with regards to port reception facilities. As of the writing of this dissertation, none of the ports in Jamaica is equipped with a reception facility for waste accumulated on cruise and cargo ships. Instead, private arrangements have had to be made with cruise lines for the disposal and collect of their waste at local ports. In this vein, it is proposed that Jamaica constructs port reception facilities at its ports so that it can fulfil the international requirements set forth in MARPOL.

Another recommendation is for there to be collaborative governance in the enforcement of measures to protect and preserve the marine environment. The ministries, departments and agencies in Jamaica are encouraged to work together to review, survey and analyze the marine environment, and to ensure the timely and frequent production of reports on the monitoring and

management of the marine environment. Although NEPA produces a coral reef health index and the Forestry Department produces a swamp management plan, these can be done on a more frequent basis. Furthermore, it is essential to have training opportunities, not only for personnel within the field, but also for the wider population, and within the schools, so that all citizen are aware of the marine environment and the responsibilities attached to same which all citizens should be encouraged to possess. This could include greater collaboration with international communities, especially as it fosters capacity building. The April 2023 launch of the Coral Restoration Project by CoralCarib in Portland is an excellent example of stakeholder and citizen involvement in the protection and preservation of coral reefs in Jamaica. The aim of the project is to enhance and support new and sustainable livelihood activities, and build greater capacity to effectively manage MPAs. Additionally, there should be a need to implement greater set-back from the shoreline for some infrastructure development especially with the threats associated with sea level rise. One would appreciate that this may not be possible in ports where coastal lands are prime assets, however, where development must occur, implement some form of environmental banking or compensation whereby ecological resources can benefit. To aid in the protection and preservation of the fragile ecosystems, it is necessary for catchment areas to be designed to trap the settlement of sediments preventing them from entering the sea. Finally, there is a need for stronger enforcement of existing legislations with effective or stricter penalties as the current ones are insufficient and disproportionate to the threats caused by the failure to protect and preserve the marine environment.

The time is therefore now, to make the ocean a better place for you and for me and the entire human race.

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