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Examining the island states process of planning, preparedness, and response to the oil spills using a case study of the MV Wakashio oil spill

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EXAMINING THE ISLAND STATES PROCESS OF PLANNING, PREPAREDNESS, AND RESPONSE TO THE OIL SPILLS USING A CASE STUDY OF THE MV WAKASHIO OIL SPILL

By

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Declaration

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

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

(Signature): 

.....

(Date): 21st September 2021

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Abstract

Title of Dissertation: **Examining the island states process of planning, preparedness, and response to the oil spills using a case study of the mv Wakashio oil spill**

Degree: **Master of Science**

The purpose of this dissertation is to understand the planning, preparedness, and response of island states to oil spills response, identify the challenges faced, and examine how to address those challenges. Most of major maritime accidents may end up with oil spills and oil spills are significant threat to the marine environment and they cause an impact on human, environmental and social sectors. International frameworks and regulations are in place to prevent and manage oil spill incidents and most of the states have adopted instructions and legally binding instruments with regard to the management of oil spills to their national laws. Regardless of all the plans regulations and other documents some countries find themselves unable to manage oil spills and are faced with issues regarding liabilities and compensation for oil pollution damages.

In this study, qualitative research method is used with a case study of the m.v. Wakashio incident in Mauritius Island in July 2020. A total of 11 semi-structured interviews were conducted, and selecting personnel to be interviewed for this study was a purposeful selection method and most of the interviewees were mainly involved with the oil spills management and had the requisite expertise. From the interviews two themes were created which are risks and stakeholders. Risks associated with the planning and preparedness to the oil spill and stakeholders associated in response to the oil spill.

The findings from this study discuss what actually happened in m.v. Wakashio oil spill and gap of knowledge and preparedness in addressing the incident. Further, it discusses the challenges during the oil spill management specially how the global pandemic affected the oil spill response. The study also explores how communities were affected by the oil spill alongside the stakeholder response and how they addressed to the situation.

Based on the findings, this study recommends to make policy and planning aimed at reducing the likelihood of oil spills, providing effective emergency response, and facilitating recovery and to conduct comparative study of oil spill accidents occurred during and before COVID – 19.

KEYWORDS: Oil Spill, Preparedness, Response, Contingency Plan, Compensation, m.v. Wakashio, Bunker Spill

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List of Abbreviations

CLC	Civil Liability Convention
DWT	Deadweight tonnage
FAO	Food and Agriculture Organization
FTX	Field Training Exercises
GDP	Gross Domestic Product
GSIS	Global Integrated Shipping Information System
GVA	Gross Value Added
IMO	International Maritime Organization
IMS	Incident Management System
IOGP	International Association for Oil and Gas Producers
IPIECA	International Petroleum Industry Environmental Conservation Association
ITOPF	International Tanker Owners Pollution Federation
JDR	Japan Disaster Relief
LLMC	Limitation of Liability for Maritime Claims
LNG	Liquefied Natural Gas
LOA	Length Overall

MARPOL	The International Convention for the Prevention of Pollution from Ships
MOL	Mitsui O.S.K Lines
MUR	Mauritian Rupee
MV	Merchant Vessel
NCG	National Coast Guard
NGO	Non-Governmental Organization
NOSCP	National Oil Spills Contingency Plan
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
OPRC	International Convention on Oil Pollution Preparedness, Response and Co-operation
OSC	On Seen Coordinator
PACPLAN	Pacific Islands Regional Marine Spill Contingency Plan
REC	Research Ethic Committee
SAT	Scientific Advisory Team
SDR	Special Drawing Rights
SFAT	Strike Force Advisory Team
SIDS	Small Island Developing States
SLOC	Sea Lines of Communication
SOCAT	Socioeconomic Advisory Team

SOPEP	Shipboard Oil Pollution Emergency Plan
TEU	Twenty-foot Equivalent Unit
UN	United Nation
UNCLOS	United Nations Convention on the Law of the Sea
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNITAR	United Nations Institute for Training and Research
USCG	United States Coast Guard
VLSFO	Very Low Sulphur Fuel Oil
WMU	World Maritime University

1.0 Introduction

During the last two decades, there have been a large number of oil spills all over the world from tankers and non-tanker vessels. Of those, there were 243 from oil tankers, spilling approximately 360,000 tons of oil into the sea (ITOPF,2018). At the same time, non-tanker vessels' spills have also been significant during the last two decades (see Table 1), and some bulk carriers and large container ships carry more fuel than tankers carry as cargo (Zhu,2007). Therefore, non-tanker vessel oil spills also pose a risk of harm to the environment and the economy of the states. Even though non-tanker vessels may carry a smaller quantity of oil, the location of the spill has a great influence on the cost of the spill, as it will determine the degree of response required, as well as the degree of damage to the environment and the economy (USCG,2007).

Table 1: Oil Spills incidents from non-tanker vessels from year 2005 to 2021(Source; ITOPF)

Year	Name of the vessel	Location	Quantity (tons)
07/2020	mv Wakashio	Mauritius	1000
02/ 2019	mv Solomon	Solomon Island	700
10/2015	Flinterstar	Zeebrugge	Unknown
12/ 2013	Silver	Morocco	Unknown
08/2013	St Thomas De Aquinas	Philippines	120
03/2012	Stoltvalor	Saudi Arabia	430
12/ 2012	Asian Lily	Papua New Guinea	Unknown
12/ 2011	TK Bremen	France	70
10/2011	Rena	New Zealand	200
09/ 2011	Golden Trader	Denmark	205
03/2011	Oliva	Nightingale Island	1,400
01/2011	Gdansk	Venezuela.	Unknown
06/2010	Fu Ping Yuan	Republic of Korea	Unknown
05/2010	Bunga Kelana 3	Singapore	2,500
09/ 2009	Agios Dimitrios 1	China	859
08/2009	Gulser Ana	Madagascar	634
10/2006	Rokia Delmas	France	Unknown

As per Table 1, there were some oil spills in island states which resulted in a huge impact on the environment and the economy of the country, though the quantity of the oil was less compared with the tanker accident. For example, environmental damage was estimated at around $51 million after an oil spill on Solomon Island in 2019 (Fox, 2020). Recent non-tanker oil spills that happened off Mauritius Island when the MV Wakashio grounded off the east coast of Mauritius on July 25, 2020, caused a greater threat to the environment and economy of the country (UNCTAD,2020). When studying the oil spills, the small island states have a high degree of inherent vulnerability related to external factors because they tend to be small, remote, face environmental challenges, and have a limited resource base (FAO,2014). There are currently 39 Small Island Developing States (SIDS) and their combined population is 63.2 million people (UN 2014). Biodiversity is an important issue for the sustenance of many SIDS, since industries like tourism and fishing can account for more than half of the GDP of the economies of small islands (UN-OHRLLS,2021). SIDS are comprised of a combined gross domestic product (GDP) of $575.3 billion (UNESCO,2019) and when compared with a developed country like the UK's GDP of $2.7 trillion (World Bank,2020), it is very less.

This study focused on oil spill preparedness and response of small island states and was mainly discussed on Mauritius Island. The most discussed strategic islands in the Indian Ocean are Sri Lanka, Maldives, Mauritius, and Seychelles (Baruah, 2018). The Indian Ocean is home to the main sea routes connecting the Middle East, Africa, and East Asia with Europe and America.

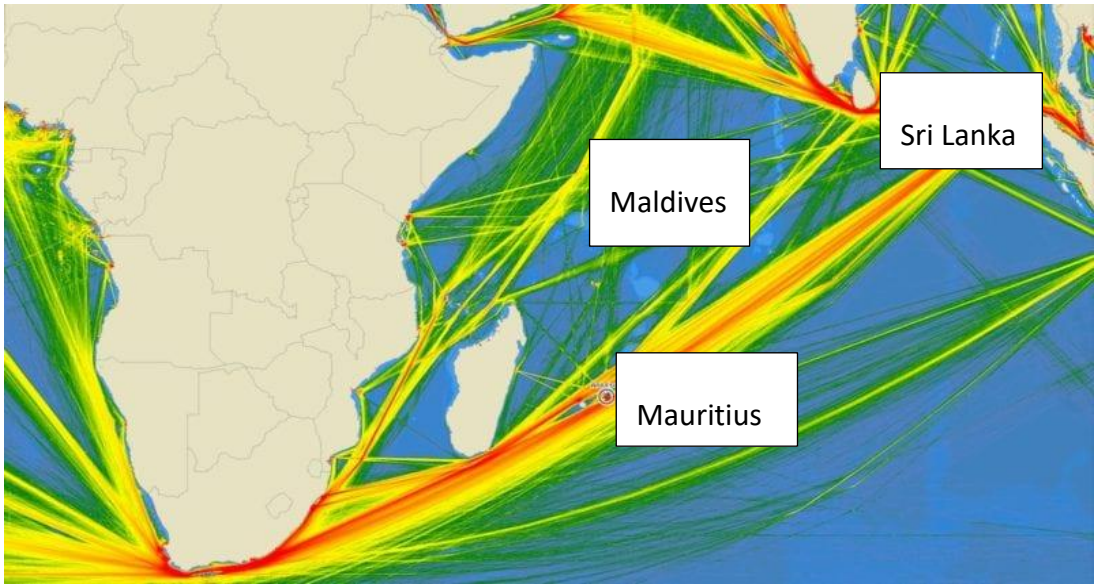

Figure 1: Major Shipping routes in the Indian Ocean
(Source; https://gcaptain.com/heres-why-so-much-world-trade-passes-mauritius/)

These major shipping routes carry more than half of the world's oil and the volume of container shipping through the region's ports has increased from 46 million TEUs in 2000 to 166 million TEUs in 2017 (Kannangara et al., 2018).Therefore, the large number of ships poses a significant risk of oil pollution from ships to coastal states which their economy is mainly dependent on fisheries, aquaculture, and tourism, especially considering the steady increase in the size of ships and the corresponding amount of bunker fuel oil carried (see Table 2) by vessels of all types (UNCTAD,2012).

Table 2: Fuel carrying capacity of vessels (Source; Freight Waves,2020; AgFlow.2021)

Category of vessel	Category of Size	Tonnage (DWT)	Fuel Carrying Capacity (in Gallons)
Bulk Carriers	Handy max tanker Panamax Aframax Suezmax VLCC ULCC	40,000 -50,000 50,000-80,000 80,000-120,000 120,000-200,000 200,000-320,000 320,000-550,000	400,000 400,000-420,000 420,000-600,000 550,000-1.25 million 1.25 -3.00 million 2.5 -4.5 million
Chemical Carriers	Handy Size Handy max Panamax	15,000-35,000 40,000 -50,000 50,000-80,000	100,000-350,000 400,000 400,000-420,000
Container ships	Ultra Large New Panamax Panamax	>18,000 TEU 8000-16000 TEU 5000-8000 TEU	4.5 million 2.5 - 3.5 million 1.5 - 2 million
LNG Gas Carriers	Fully Pressurized Semi-pressurized Fully refrigerated	<3500 CBM 3500-15,000 CBM 15,000-85,000 CBM	100,000-120,000 120,000-500,000 500,000- 700,000
Cruise Vessels	Small Cruise Ship Large Cruise Ship Mega Cruise Ship	400 Ft. 900-1100 Ft. 1300 Ft.	130,000 1-2 million 4 million

The grounding of the vessel MV Wakashio, off the coast of Mauritius, drew attention to countries' preparedness and response arrangements for oil spills and other hazardous marine pollution incidents (Swanepoel,2020). However, events in Mauritius have highlighted the role of international frameworks in this field and the importance of encouraging all countries to adopt the latest legal instruments among themselves (Asariotis & Premti, 2020). The main objective of the relevant international legal framework is to enable countries to prevent pollution, respond to pollution, and determine liability in the event of an accident (Asariotis & Premti, 2020). Although international treaties establish binding obligations for cooperation in response actions, there are gaps in the regulation of the prevention of such oil spills (Shapovalova, 2019). If countries, particularly developing countries, are not parties to

international liability and compensation instruments, it will be extremely difficult for them to restore the environment and socioeconomic issues caused by oil spills.

1.1 Problem Statement

Maritime oil spills are a significant threat to the marine environment and they have an impact on human, environmental, and social sectors. Most major maritime accidents may end up with oil spills. As a result, every country should have plans in place to respond to, prevent, and manage any oil spills in their waters. Further countries should come forward to mutually support each other through regional contingency plans by sharing knowledge, resources, and technology. International organizations, including IMO, have adopted several guidelines, instructions, and legally binding instruments with regard to the management of oil spills. Regardless of all the plans, regulations, and other documents, some countries find themselves unable to manage oil spills and are faced with issues regarding liabilities and compensation for oil pollution damage. So it is important to know that this issue is only faced by some particular states or all the states other than landlocked. Therefore, it is necessary to study which states are most facing the issues of managing oil spills and what the reasons are for them.

1.2 Objectives

The purpose of this study is to understand the planning, preparedness, and responses of island states to oil spills and examine what are the challenges faced, and explore how to address those challenges using the case study of the mv Wakashio oil spill.

1.3 Research Questions

International frameworks and regulations are in place to prevent oil spill incidents, and there are also regimes for oil pollution damage compensation. Most states have fully complied with all these frameworks and the regimes. However, when oil spills happen, states are struggling to manage them and face a lot of consequences, especially the small states.

(i) What are the challenges faced by small island developing states in planning, preparedness, and response to oil spills?

(ii) What was the experience of Mauritius consequent to the mv Wakashio oil spill?

(iii) What are the lessons learnt from the mv Wakashio oil spill?

1.4 Motivation

Fishing and tourism are some of the main factors in the island state's GDP. If any major oil spills happen, then it directly affects the island state's economy. The researcher, being a citizen of an island state that is very close to one of the major SLOCs in the Indian Ocean, has been seeing that large numbers of ships are passing daily very close to the coastal area that carries fuel as cargo and as bunkers. Therefore, the country is always exposed to a huge risk of oil spill incidents. Being an island state requires examining the planning, preparedness, and response to such oil spills. Therefore, the researcher was motivated to do the case study on the bulk carrier MV Wakashio which ran aground off Mauritius early in the evening of 25 July 2020 since Mauritius Island also has similarities with the researcher’s island.

2.0 Literature Review

This chapter discussed the literature review of planning and preparedness for oil spills, as well as the contingency plan and the response to the oil spills. Then they discussed the previous three oil spills in island states, because this study is about the preparedness and response of the island states. After that, this chapter discussed the impacts of the oil spills on the environment and socioeconomic aspects in brief. Finally, they discussed compensation and liabilities and the few international instruments on oil spills.

2.1 Planning and Preparedness for oil spills

When preparing to deal with any disasters or emergencies, planning and preparedness are two of the most important phases to consider. It is the combined effort of various stakeholders with their different roles. This literature review discussed the importance of planning and preparedness for oil spills and what key factors should be considered when planning and preparing and contingency planning for oil spill management.

According to (Alexander, 2015), the emergency plan has to be a living document and it should not be restricted to a desk drawer without being used or updated. He suggested that every six-month plan should be checked and do the necessary updates. Even though ITOPF (2014) also highlighted the importance of review and updating of the plans, according to them, plans should be actively managed, updated, and regularly reviewed**,** for example, based on lessons learned from actual events or exercises, or in accordance with changes in regulations.

According to (Li et al., 2016), a contingency plan is a set of instructions that describe the steps to take before, during, and after an emergency, and this oil spill contingency plan helps minimize potential hazards to human health and the environment by ensuring a timely and coordinated response. As Jenkins (2000) highlighted, when developing an oil spill plan, the first step in assessing the impact of a potential accident is to define all the catastrophic levels of accidental spills that must be considered, and

the next step is to consider the potential impact of such disasters. Even though ITOPF (2014) also mentioned the same idea, the scope of the plan is determined by the risk of spills in the geographic area covered by the plan. However, as per IPIECA (2015), the degree of complexity involved in the planning process largely depends on the type of operation, local conditions, and environmental and socio-economic sensitivities. It is very important to pay attention to the environment and the socio-economic aspects when planning, because oil spills cause a lot of damage to the environment and the socio-economics of society. Issa & Vempatti (2018), Walker (2014), and Liu & Wirtz (2009) have talked about the impact of oil spills on people, including health, society, economy, usage, and culture in a wide range of entities of various sizes.

When preparing a plan for the oil spill, it involves various stakeholders. According to OPRC 1990 Article 6 (1 b), "a national contingency plan for preparedness and response which includes the organizational relationship of the various bodies involved, whether public or private, taking into account guidelines developed by the Organization" The effective response to the oil spill depends to a large extent on the preparations of relevant organizations and individuals. Alexander (2015) has mentioned that the emergency plan is to be shared among the participants and stakeholders, which specifies their tasks and responsibilities. Quarantelli (1998) also mentioned that sharing information by organizing regular meetings with stakeholders and forming informal linkages between stakeholders should be part of disaster planning. As per the ITOPF (2014), to work together as a coherent team, all responders must understand the plan and be familiar with their own roles and the roles of others in the response structure. Therefore, it is very essential for every stakeholder to know their duties and responsibilities as well as other stakeholders' duties and responsibilities. If not during the emergency, there will be a lot of misunderstandings among the stakeholders. Conducting regular exercises and training programmes will help.

In a nutshell, planning and preparedness are one of the most important phases to be considered when preparing to address any contingency. When preparing the plan, there

are a few aspects to consider. Those include risk assessment and defining all the catastrophic levels of the spills. Stakeholder engagement is another important element in the contingency plan, and understanding each other's roles and responsibilities will result in an effective response to the oil spill.

2.2 Response to oil spills

The response to an oil spill is a dynamic, time-sensitive, diverse, and complex process with numerous limits and problems. This literature review explains the aims of the response to oil spills, what factors are to be considered, and the challenges that come with responding to oil spills.

Firstly, the oil spill response aims to minimize the damage to the environment. Hardy (2013) and Tierney (1993) state that emergency planning and response activities can reduce injuries, save lives, reduce property damage, reduce secondary hazards, reduce environmental impact, and allow the resume of normal operations more quickly. Steele et al., (2001) also talked about a similar idea to Hardy (2013), but it is more specific to oil spills, and his idea of oil spill response aims to minimize damage and reduce the time for environmental recovery.

As per the US Department of Commerce, the oil spill response goals are to ensure the safety of human life, stabilize the situation to preclude it from worsening (e.g., source control, on-water recovery) and minimize adverse environmental and socio-economic impacts.

According to the review of disaster preparedness of Tierney (1993), disaster response activities are actions taken when the disaster occurs (or prior to impact, if the event is predicted or forecasted), aimed at reducing threats to life safety, secondary hazards, and losses caused by the event. These include warning, evacuation, protection of life and property, search and rescue, caring for the wounded, providing emergency shelters for victims, damage assessment, debris removal, and other activities that occur during the emergency period after the impact.

The response to an oil spill is a dynamic, time-sensitive, diverse, and complex process with numerous limits and problems. According to Sheppard (2019), the quantity and quality of the spilled oil, the location of the spill, the environmental and weather conditions, and the availability of response strategies are factors that affect the consequences of responses. Zhong & You (2011) mentioned the similar idea of Sheppard (2019), and in addition, they have highlighted the importance of coordination of coastal protection activities, legal constraints, and performance degradation with bad weather. Response activities are frequently hampered by a limited time frame and poor decisions, which can jeopardize oil recovery efficiency and waste resources (Sheppard, 2019). During any major oil spill, a lot of coordination and planning are required. For instance, over 39,000 personnel, 5000 vessels, and 110 aircraft have been involved in the Deepwater Horizon oil spill response and over 700 km of booms have been deployed; 275 controlled burns have been carried out (Zhong & You, 2011). According to the IOGP Report 520, the elements that are critical for a successful response include having a strong Incident Management System (IMS) in place, as well as a strong stakeholder engagement program, to guarantee that appropriate authorities and communities support the planned plans and tactics in the event of a spill. Furthermore, having a good understanding of the tiered preparedness and response concept along with the spill impact mitigation assessment process by the stakeholders is also key to a successful response.

Grubesic et al. (2017) discussed a response model which has two elements: strategic planning and tactical response. The strategic element related to the issue of oil spill response focuses on where to find sufficient human resources and equipment for effective oil spill response. These decisions must be made before the oil spill, which means that planners must rely on probabilistic information about the location, frequency, scale, and duration of the oil spill. The second element focuses on tactical or operational decisions related to the response to the oil spill. These decisions were made after the leak occurred and must include the location of the transportation/equipment location, the best combination of equipment for the leak.

As per Ornitz & Champ (2002), in the operational decision-making process for oil spill response, a wide range of issues and activities have to be considered, and these include the nature of the spilled materials, which alter in physical and chemical properties and biodegrade over time, local environmental conditions, the sensitivity of impacted natural resources, and the selection and efficacy of response/clean-up solutions. According to Hook et al. (2016), some understanding of the characteristics and behavior of VLSFO is essential for planning, responding, cleaning up, and determining the extent of damage, as well as recovering from an accidental release. As per Scarlett et al., (2021), the m.v Wakashio spill is the first recorded VLSFO since the implementation of the IMO regulations, which is mainly released into the environment.

The oil spill response aims to minimize the damage to the environment, ensure safety of human life and reduce the socio-economic impacts. The response to an oil spill is a dynamic, time-sensitive, diverse, and complex process with numerous limits and problems. The quantity and quality of the spilled oil and the location of the spill are two important factors during the oil spill response. For an effective oil spill response, a good decision-making process and coordination are two essential factors.

2.3 Bunker spills in Island States

This literature review discussed only a few oil spills that occurred in small island states, because this study has mainly focused on oil spills in small island states.

2.3.1 Bunker spill in the Solomon Island 2019

The Solomon Islands sea area is one of the richest marine biodiversity areas in the world and has one of the world's most important coral reef systems, home to 485 coral species and 1,019 fish species (Kessler, 2019). On 5th February 2019, Hong Kong-flagged bulk carrier MV Solomon Trader ran aground spilling heavy fuel across coastal areas and sensitive coral reef system at Kangava Bay, Rennell Island. The vessel's grounding caused extensive damage to its hull and fuel tanks, which were

carrying some 700 metric tons (772 tons) of oil (Kessler, 2019). The Solomon Islands requested assistance from Australia for managing the oil spill (Kessler, 2019). Solomon Islands is a part of PACPLAN (Pacific Islands Regional Marine Spill Contingency Plan) which provide the framework for cooperative regional responses to major marine spills in the Pacific Islands region and under PACPLAN, Australia has been allocated as the primary source of assistance to the Solomon Islands (ITOPF,2019*).*

A team comprising of local and international experts carried out an environmental damage assessment four months after the spill, and it was estimated at around $51 million (Fox, 2020). However, the Solomon Island adopted the Bunker convention into their national legislation in 2021 as per the IMO database and they were not part of the Bunker Convention when the oil spill incident occurred.

2.3.2 Bunker spill in Mauritius 2016

The Liberian flagged vessel mv Benita ran aground along the coast of Le Bouchon off the southeast of the Mauritius Islands on 17 June 2016 while on route from India to South Africa. When the incident happened, the ship was carrying around 145 metric tons (MT) of fuel oil and 30 MT of diesel. Soon after the grounding, anti-pollution booms were placed around the vessels with dedicated teams to collect and remove any oil that had accumulated (Schuler, 2016). A salvage company was at the site with less time and was able to pump out all the fuel on board, resulting in only a very minor oil spill. Further, they were able to tug out the vessel from the grounding location. With the mv Benita incident, the Mauritius authorities were much more aware of the risk and had an elaborate planning tool, and they gained experience in oil spill management (Beguer, 2020).

2.3.3 Bunker spill in Papua New Guinea 2012

The Japanese-owned refrigerated cargo ship mv Asian Lily ran aground on Kwaiawata Island in the Milne Bay Province of Papua New Guinea on 24th December 2012 and the fuel oil had spread along approximately 115 meters of the island's coastline

(Wilson, 2013). Milne Bay contains a high diversity of corals and marine life, including more than 1,000 species of fish, 630 species of molluscs, and 360 species of hard coral, as well as seagrasses and mangrove forests. Kwaiawata Island is a small island that has a population of around 300 people and fisheries play a central role in the socio-economic existence of the people of the island (Reynolds, 2014). Seventy percent of the island's households rely on fishing and other marine resources for subsistence (Wilson, 2013). There was more damage done to the coral reef and marine ecosystem by the mv Asian Lily due to the long delayed response to the incident by the authorities, as per Wilson (2013). However, when there is an oil spill in a remote area, it is very difficult to respond the same way as in non-remote areas. During this incident, there was no helicopter landing site or any tracks or pathways appropriate for transporting equipment across the island (Reynolds, 2014). Therefore, effective and reasonable response methods are mainly dependent on the available resources. Due to the logistical constraints, rag wiping was used as opposed to other more equipment-focused techniques (Reynolds, 2014). In an oil spill, response, health, and safety remain very important factors throughout the response operation, and during the response in remote areas, the majority of the workers will be part of a local community who are not fully aware of the international standards, safety measures, and health measures. Therefore, it is important that those managing the response utilize their experience to ensure that the relevant health and safety best practices are applied, and those carrying out the work are sufficiently trained and briefed to do the task. (Reynolds, 2014).

2.3.4 Overview of bunker spills in Island States

Some of the island states are rich in marine biodiversity especially their coral reef systems and the livelihood of the people who lives in these coastal areas are mainly dependant on fisheries and other marine resources for subsistence. Once an oil spill has occurred, it affects the socio economy of the people. When there is an oil spills in the island states they request the assistance of other countries. Some locations of the oil spills occur in remote areas and when there is an oil spill in the remote area it is very difficult to respond in the same way as in non-remote areas. Therefore, effective

and reasonable response methods are mainly dependent on the availability of resources.

2.4 International frameworks regarding oil spills preparedness and response

There are mainly two international legal systems that deal with marine pollution, the United Nations Convention on the Law of the Sea (UNCLOS) and the International Maritime Organization (IMO) conventions. These frameworks have been put in place to prevent, reduce and control environmental pollution and as compensation for damage caused by pollution. In this literature, the researcher discussed few international instruments which are more relevant to the mv Wakashio incident.

2.4.1 UNCLOS

The United Nations Convention on the Law of the Sea (UNCLOS) stipulates that according to Part XII of UNCLOS Article 192, countries have general obligations to protect and preserve the marine environment. Provisions related to the prevention, reduction, and control of marine pollution from ships are given in Article 211 of UNCLOS under the heading "*Pollution from vessels*". It explains that the States shall establish international rules and standards to prevent, reduce, and control pollution of the marine environment from vessels, and those rules and standards have to be re-examined from time to time. According to UNCLOS Article 235, states must provide prompt and adequate compensation for damage to the marine environment caused by pollution. Furthermore, it states that states should work together to implement existing international law and further develop international law regarding the liability and compensation process, as well as develop criteria and procedures for the payment of adequate compensation.

2.4.2 IMO Conventions

The International Maritime Organization (IMO), being the competent international organization, formulates the rules and regulations to prevent, reduce, and control the pollution of ships in the marine environment and compensate for the damage caused

by the pollution. With the initiatives of the Intergovernmental Maritime Consultative Organization (IMCO), predecessor of IMO, several international instruments were introduced to prevent, reduce, and control the pollution of ships to the marine environment. Some of them are the International Convention for the Prevention of Pollution of the Sea by Oil (OILPOL) in 1954 (entered into force in 1958), the International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties in 1969 in response to the SS Torrey Canyon incident in 1967, and the International Convention for the Prevention of Pollution from Ships (MARPOL) in 1973. Furthermore, in relation to the incident of the grounding of the Exxon Valdez in 1990, in Alaska, which led to the adoption of the International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC) (entered into force in 1995) (Fujii & Higuchi, 2020).After the Torrey Canyon oil spill incident, there was a requirement for victims of oil pollution incidents to be adequately compensated for their losses (Lavelle & Asariotis, 2012).This led to the adoption of the 1969 International Convention on Civil Liability for Oil Pollution Damage (1969 CLC) and the 1971 International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (1971 Fund Convention). However, these systems are limited to oil tankers, and with the increase in the number of oil pollution incidents caused by vessels other than tankers, the International Convention on Civil Liability for Bunker Oil Pollution Damage (Bunker Convention 2001) was adopted in 2001 for compensation for oil pollution damage caused by vessels other than oil tankers.

2.4.3 International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC)

The maritime disaster also shows that countries need to be prepared and equipped for such incidents, and to respond quickly for a more efficient recovery and clean-up operation to reduce potential pollution damage, and in some cases, reduce the resulting costs (Lavelle & Asariotis, 2012). In July 1989, a conference of leading industrial countries in Paris called on the International Maritime Organization (IMO) to develop new initiatives to minimize pollution from ships. This call was endorsed by the

International Maritime Organization's General Assembly in November of the same year, and work on a draft agreement to establish an international cooperation framework to cope with catastrophic occurrences (IMO,2019). As a result of the above, the International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) was adopted in 1990 to set a framework for international cooperation and mutual support in the preparation for and response to significant oil pollution incidents. The following are few important features of the OPRC Convention.

- Each party is responsible for ensuring that ships have a shipboard marine pollution emergency plan (Article 3 (1)(a)).

- Each party shall require that operators of offshore units under its jurisdiction have oil pollution emergency plans that are coordinated with the national system (Article 3 (2)).

- Each Party shall require that authorities or operators in charge of such sea ports and oil handling facilities as it deems appropriate under its jurisdiction have oil pollution emergency plans or similar arrangements that are coordinated with the national system (Article 3 (3)).

- Each party is required to report without delay any event on their ship or offshore unit involving a discharge or probable discharge of oil (Article 4 (1) (a)).

- Each party is required to report without delay any observed event at sea involving a discharge of oil or the presence of oil (Article 4 (1) (b)).

- Each party shall establish a national system for responding promptly and effectively to oil pollution incidents, and this system shall include, as a minimum, the designation of the competent national authority or authorities, the national operational contact point or points, and an authority which is

entitled to act on behalf of the State to request assistance (Article 6 (1) (a) (i) (ii) (iii)).

- Each party shall establish a national contingency plan for preparedness and response which includes the organizational relationship of the various bodies involved, whether public or private, taking into account guidelines developed by the organization (Article 6, (1) b).

- Each party, within its capabilities either individually or through bilateral or multilateral co-operation with the oil and shipping industries, port authorities and other relevant entities, shall establish a minimum level of pre-positioned oil spill combating equipment, a programme of exercises for oil pollution response, and detailed plans and communication capabilities for responding to an oil pollution incident (Article 6 (2) (i)(ii) (iii)).

In 2000, the OPRC convention was further developed to address international cooperation in combating major incidents or threats of marine pollution with a specific focus on hazardous and noxious substances, and a Protocol of the OPRC-HNS Protocol was adopted in 2000.

2.5 Compensation and Liabilities

Oil transportation continues to be a high-risk activity, both for those involved in the production and marketing of oil and for others in society (Soto-Onate & Caballero, 2017). The oil spill has brought enormous economic and environmental disasters, and the biodiversity of the affected ecosystems has changed irreversibly. The first set of conventions was formulated after the Torrey Canyon incident in 1967, which polluted approximately 190 kilometers of the British coastline, and the total clean-up cost was estimated at 3 million pounds (UNCTAD,2012). The unprecedented event was the most destructive and costly maritime disaster to date, and led to the adoption of a comprehensive legal framework to address the issue of liability and compensation for oil pollution damage caused by the spill of oil from the tankers:

(1) 1969 International Convention on Civil Liability for Oil Pollution Damage (1969 CLC)

(2) 1971 International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (1971 Fund Convention)

2.5.1 CLC 1969

The Civil Liability Convention established a strict liability system for tanker owners and introduced mandatory liability insurance (Jacobsson, 1994). The CLC, came into force in 1975 and specifies the first level of oil spill compensation for ships that transport oil as cargo. It provides the responsibility of ship-owners for any damage caused by oil pollution in the territory or territorial waters of Contracting States. CLC 69 is a revolutionary instrument, a breakthrough in maritime law, which changed customs and practices forever. Together with its 1992 Protocol, the CLC is still the main international instrument for managing and regulating civil liability for oil pollution from ships caused by persistent oil. The ship should carry bulk persistent oil as cargo. According to Faure & Hu (2006), the Convention provides for strict liability for oil tanker owners who cause pollution, but in some cases, the owner's liability is limited.

2.5.2 Fund Convention 1971

Although the Civil Liability Convention of 1969 is a useful mechanism for ensuring the payment of oil pollution damage compensation, it does not fully address all of the legal, financial, and other problems presented during the meeting that resulted to the CLC Convention's adoption. (IMO,2019). In 1971, at a conference in Brussels, the International Fund for compensation for oil pollution damage was established and it entered into force in 1978, which is the second level of compensation.

The fund was established on the basis of two main reasons. First, it was a common understanding that the responsibility should not be taken exclusively by ship-owners alone, but should be extended to interesting interests, i.e. petroleum companies, and

second, it was necessary to guarantee compensation to those who suffer from damage due to oil contamination in cases where the CLC coverage was insufficient or even unattainable. The Fund Convention of 1971 was revised through protocols in 1984, 1992, and 2003, significantly increasing the amounts of compensation in the states that chose to ratify it.

2.5.3 Convention on Limitation of Liability for Maritime Claims (LLMC)

The Convention on Limitation of Liability for Maritime Claims, 1976, was adopted on November 19, 1979, and came into force on December 1, 1986. It replaced the International Convention Relating to the Limitation of the Liability of Owners of Seagoing Ships, 1957 (IMO,2019). LLMC 1976 was later amended by the Protocol of 1996 and it increased the compensation limits. The aims of LLMC were to enable ship-owners and others (including insurance companies) to limit their liability in a way that can satisfy legal claims, provided that effective insurance or other financial guarantees can be provided. The limit applies to two types of claims for loss of life or personal injury and claims for property (such as damage to other ships, property, or port work). As per the LLMC 1976, the limit was set at 333,000 SDR, with an additional amount based on tonnage added to individual claims for ships not exceeding 500 tons. For other claims, the liability limit under the 1976 Convention is 167,000 SDR (Special Drawing Rights) plus an additional amount based on the tonnage of ships over 500 tons.

The Protocol of 1996 was adopted on May 2, 1996, and came into force on May 13, 2004. It increased the limits of the amount of compensation payable in the event of an incident and also introduced a "tacit acceptance" procedure for updating the amounts. According to the 1996 Protocol, the limit of liability for claims for loss of life or personal injury is 2 million SDR, and the liability for property claims is 1 million SDR for ships not exceeding 2,000 gross tons. In 2012, a set of new amendments were introduced to the Protocol 1996 by a decision of the Legal Committee of IMO, increasing the limits. It came into force on 8 June 2015. As per the new amendments, the limits have increased from 2 million SDR to 3.02 million SDR for loss of life or

personal injury on ships not exceeding 2,000 gross tonnages, and they have increased from 1 million SDR to 1.51 million SDR for property claims for ships not exceeding 2,000 gross tonnages (IMO,2019).

2.5.4 Bunker Convention 2001

The adoption of the Bunker Convention is intended to ensure that persons who have suffered damage due to oil spills can obtain adequate, timely, and effective compensation when carried as fuel in ships' bunkers (IMO,2019). The convention applies to damage caused in the territorial zones (including territorial waters) and the exclusive economic zones of the contracting States and this convention provides a separate instrument that covers only pollution damage. The convention was adopted on 23rd March 2001 and entered into force on 21st November 2008. As of September 16, 2021, 102 states had ratified the convention, accounting for 95.08% of global tonnage (IMO GSISI, 2021). The level of coverage must be equal to the limit of liability under the applicable national or international limitation regime**,** but under no circumstances should it exceed the amount calculated under the 1976 Convention on the Limitation of Liability for Maritime Claims as amended (ITOPF 2019). Table 3 shows the previous oil spills from non-tanker vessels and total maximum liability was calculated, and the amount of compensation reduced. A key requirement of this convention is that registered owners of ships need to maintain compulsory insurance, and another key clause is the requirement for direct litigation, which allows direct claims for pollution damage from insurance companies (IMO, 2019).

Table 3: The amount of compensation for damages claimed for Oil spillage accidents from non-tanker vessels (Source; Fujii & Higuchi, 2020)

Vessel Name	Incident Date	Flag of registry	Location	Cost Estimated(US $)	LLMC 96 Limit(US $)
Ku San	15/07/2006	South Korea	Osaka, Japan	2,790,680	1,553,610
Server	12/01/2007	Cyprus	Norway	35,309,997	12,333,351
Sea Diamond	05/04/2007	Greece	Greece	37,313,239	13,921,331
Don Pedro	11/07/2007	Spain	Spain	16,500,000	6,903,107.65
Gold Leader	05/03/2008	Belize	Japan	50-60 million above	1,642,516.27
Pacific Adventure	11/03/2009	Hong Kong	Australia	30,750,000	18,900,000
Full City	31/07/2009	Panama	Norway	46,410,451.59	10,0414,067
Bohai Challenge	31/01/2011	Panama	Japan	8,574,612.18	5,660,000(Approx.)

When comparing the Bunker Convention with the CLC and Fund Conventions, the Bunker Convention;

- It has a different definition of oil.
- There is no second tier ‘Fund’
- Claims are not channeled only to the registered ship-owner;
- It establishes no limits on its own liability.
- The compulsory insurance requirement is set at 1,001GT and does not apply to ships carrying a minimum of 2,000 tons of oil cargo.

The grounding of the MV Solomon Trader in February 2019, which spilled more than 300 tons of heavy fuel oil into Kagava Bay and the subsequent oil spill caused significant environmental impacts and economic losses ranging from US $14 million to US $38 million, triggered the accession of the government of Solomon Island to the Bunkers Convention (Solomon Island Government,2021). At the time of the incident, Solomon Island was not a party to the Bunker Convention 2001 and the convention

entered into force on 15th February 2021. The government of Solomon Island has started the process of pursuing owners and insurers for compensation arising from pollution damages caused by MV Solomon Trader after it came into force (Herald, 2021) and according to the Article 8 of the Bunker Convention, a time limit for action under the convention of 3 years from the date when the damage occurred and, in any event, 6 years from the date of the incident which caused the damage.

3.0 Methodology

In this chapter, the research methodology will be discussed and research methodology is organized into the sections such as research design, data collection, participants, interviews, data analysis, ethical issues, and limitations.

3.1 Research Design

This study used a case study approach to examine the oil spill preparedness and response of the island states. According to Stake (1995), the case study method is used as a research strategy, in which researchers explore in-depth plans, events, activities, processes, or one or more individuals. The cases are limited by time and activities. Researchers use various data collection procedures to collect detailed information over a long period (Dodge, 2011). In this study, a single case study method was chosen to study the mv Wakashio incident on Mauritius Island in July 2020.

A qualitative research method was used in this research based on both syntheses of secondary information and primary data since the purpose of this study is to understand the planning, preparedness, and responses of island states to oil spill responses and what challenges are faced and how to best address those challenges. To study the oil spill management of mv Wakashio, it was necessary to get the experience and knowledge of people who were involved with it directly and indirectly. Otherwise, the researcher has to depend on secondary data only. In general, qualitative research methods are particularly useful in discovering the meaning that people give to events they experience (Bogdan & Biklen, 2003; Denzin & Lincoln, 2000). Further, the qualitative research method allows events to be described based on the participants' perspectives, and provides a way to explore multiple realities, and stimulate an overall understanding of the phenomena investigated (Young et al., 2018).

3.2 Data Collection

3.2.1 Primary Data Collection

Qualitative research, interviews are the most widely used technique for collecting primary data (Young et al., 2018). To collect primary data, a total of 11 semi-structured interviews were conducted, including interviews from stakeholders from government officials, experts from other organizations, NGOs, journalists, and the local community in Mauritius Island. In addition, a survey form was sent to 23 countries that have not ratified the Bunker Convention 2001 to find the reasons for not ratifying the convention.

3.2.2 Secondary Data Collection

Secondary data refers to data that has been collected for other purposes or refers to data collected by someone other than the user (Allen, 2017). To collect secondary data for this study scholarly articles about oil spills management, local and foreign newspaper articles about the mv Wakashio incident, and few other oil spills incidents in island states were referred to. Further, special attention was given to the article from Lloyd's List, Marine Pollution Bulletin and technical papers of ITOPF and few local newspapers articles like Mauritius Times and international media like BBC and Al Jazeera referred to gather the secondary data.

3.3 Participants

Selecting personnel to be interviewed for this study was a purposeful selection method, and while selecting the interviewees, the researcher tried to select the people who were mainly involved with the oil spill management and the expertise. The researcher approached potential interviewees from Mauritius Island who were the stakeholders in the National Oil Spill Contingency Plan, National Crisis Committee, and other organizations. The researcher sent e-mails to 45 people in Mauritius Island requesting an interview, but only two people responded, and others did not respond, apparently due to the ongoing court process on the mv Wakashio. In addition, a few others (personnel from the UN, IMO, ITOPF, NGOs, and journalists) who were directly

involved in the oil spill management process of the mv Wakashio incident were interviewed. In addition, to examine the preparedness and response of two other island states, personnel in these states involved in oil spill management were also interviewed.

3.4 Interviews

Eleven participants in total were interviewed for this research. All the participants who are particularly knowledgeable about the oil spill contingency plan and management and articulated their knowledge, and insights which can help assist an observer in the understanding event of the mv Wakashio incident. The participants were interviewed between 04th July 2021, and 18th August 2021. All interviews were conducted through Zoom and social media (WhatsApp) and lasted 35 to 55 minutes. With the consent of the participants, I recorded the interviews in audio/video to ensure accurate transcription. I also took handwritten notes during each interview so that I could track key points to review or highlight particularly interesting or important ideas later in the interview. As the first step in the interview process, I reminded the participants of the research purpose, research procedures, expected benefits, their right to withdraw from the research at any time, and the protection of confidentiality. I also provided information about myself and the WMU master's program to build a relationship and earn their trust. I used a semi-structured interview method and the questions guide was approved by the WMU Research Ethics Committee. Open-ended questions were used throughout the interview to encourage participants to answer questions freely and openly. I used follow-up questions when necessary to encourage participants to formulate or clarify answers and to get more information. After every interview, the transcription process began. Therefore, the primary data was collected through the semi-structured interview method (see Table 4).

Table 4: Details of interviews

Sr no	Interviewee	Date of Interview	Duration of interview	Organization	Rational for selecting interviewee
01	R1	29/06/2021	45 min	ITOPF	Engaged in the clean-up process in Mauritius
02	R2	04/07/2021	37 min	Department of Shipping	Involved with the oil spill management process
03	R3	15/07/2021	46 min	UN	Involved with coordination process of providing expertise and the assistance to the Wakashio incident
04	R4	30/07/2021	18 min	Independent Activist	Involved with the cleaning process and media
05	R5	06/08/2021	1 hour and 45 min	Oil spill Expertise (IMO)	Provided technical assistance during the oil spill management
06	R6	10/08/2021	30 min	NGO	Actively participated in clean-up process and providing aid for people who were affected from the oil spill
07	R7	11/08/2021	30 min	Papua New Guinea (PNG)	Representing Island State
08	R8	15/08/2021	35 min	Activist from Mauritius	Actively participated in clean-up process by making booms (locally made)
09	R9	16/08/2021	30 min	Professor from Copenhagen University	Expert knowledge
10	R10	17/08/2021	35 min	East Timor	Representing Island State
11	R11	18/08/2021	40 min	National Coast Guard Mauritius	Involved with oil spill management process

3.5 Data Analysis

The analysis of primary data was done by using the thematic analysis method. All of the interviews were transcribed, and a considerable number of codes were generated. The codes were then combined and mixed to create main themes. Different respondents' perspectives on that particular topic were obtained. The themes are divided into two parts which are risks and stakeholders. Risks associated with the planning and preparedness to the oil spill and stakeholders associated in response to

the oil spill and national and international frameworks. Under the theme of risk, analysis of the oil spill incident, predicted risk and unpredicted risks were carried out where as in stakeholder's theme, stakeholders response and stakeholders who were affected by the oil spill were analysed and future plans and recommendations were discussed.

3.6 Ethical Consideration

The interviews and sending out survey forms were commenced only after obtaining approval from the WMU Research Ethics Committee (REC). As an ethical consideration, the informed consent form was sent to all the participants to read, understand and sign before commencing the interviews. The interview data protection process is another ethical consideration in this study and it was in line with the university guidelines. The research data is stored on the researcher's personal computer with password protection. Confidentiality is another ethical consideration in this study that protects the identity of the participants. To protect the identity of the participants, their names are not mentioned and they will be anonymous in the research, and respondents are named R1, R2, R3, and so on.

3.7 Limitations

During any oil spills, there will be many sectors to discuss but this study was limited to planning and preparedness to the oil spills by island states and few discussions about the environmental and socio-economic impact from the oil spills. The timeframe, budget constraints, and COVID-19 pandemic to travel around to collect data were other limitations of this study. Data gathering through the interview was one of the difficult tasks during the study and the researcher had sent nearly 45 emails to the people who were involved with the mv Wakashio incident in Mauritius and only two people responded. Despite best efforts, the interview could not be secured with any one from the National Oil Spill Contingency Plan committee and the National Crisis Committee of Mauritius. Further, the limited response to other interview requests also materialised only after sustained perseverance.

4.0 Case study of the mv Wakashio

4.1 Introduction

Mauritius, Rodriguez, Agalega, Tromelin, Cargados Carajos (St. Brandon), and the Chagos Islands, including Diego Garcia, make up the Republic of Mauritius, which is located in the Indian Ocean. Mauritius' main island is located in the south-western Indian Ocean, roughly 2,000 kilometres east of Africa's east coast and 855 kilometres east of Madagascar.

Figure 2: Location of Mauritius Islands (Source: NBSAP 2006 - 2015)

Mauritius is situated between the southern tip of Africa and the northern entrance to the Strait of Malacca, which connects the Indian and Pacific Oceans, and it is the preferred route between the large markets and manufacturing centers of China, Japan, South Korea, and other parts of East Asia, and the resource-rich regions of West Africa

and Latin America, or the markets of Eurozone (Lee,2020). On 25th July 2020, a 300 m Japanese bulk carrier mv Wakashio sailing from China to Brazil ran aground on the coral reef near on the southeast coast of Mauritius (Seveso et al., 2021).

4.2 Ship's particulars

Built in 2007, the mv Wakashio was a Cape Size Bulk Carrier (Explainer,2020). According to the IMO GSIS, it had a carrying capacity of 203130 DWT, a draught of 8.7 meters, a length overall (LOA) of 299.95 meters, a width of 50 meters, and was built with a double hull. The ship was registered in Panama and had the IMO number 9337119. It was owned by a Japanese company.

4.3 Incident

The mv Wakashio left port Lianyungang, China on 4th July 2020 was bound for Tubarao, Brazil, and no cargo, but having 3,800 tons of Low-Sulphur fuel oil and 200 tons of diesel on board (Mitsui-O.S.K.Lines, 2020). On 25th July 2020 when the ship was navigating near the coast of Mauritius, it suddenly ran aground on a coral reef of Blue Bay (Maritime Investigation Department,2021). The causes for the grounding of the ship have not been discussed in this study since the study is focused on the management of oil spills. However, two preliminary investigation reports have been published by the MOL[1] and the flag sate (Panama) of the mv Wakashio (Maritime Affair Investigation Department, 2001). The day after the incident, the Mauritius government activated the National Oil Spill Contingency plan (NOSCP) since the location of the grounding (see Figure 3) was close to a marine park, two internationally protected wetland sites of international importance (under the Ramsar Convention on

[1] https://www.mol.co.jp/en/pr/2020/20090.html

Wetlands 1971, as amended in 1987)[2] including a small coral atoll hosting endemic species of Mauritius' rich and rare biodiversity and a popular tourist destination(UNCTAD,2020).

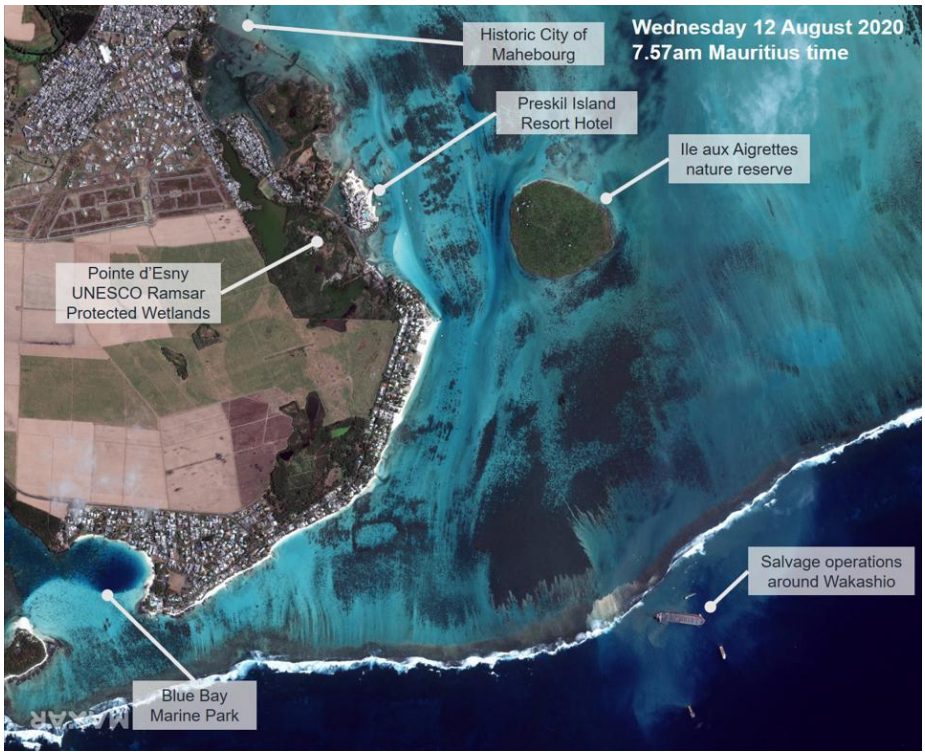

Figure3: Location of mv Wakashio (Source https://www.fleetmon.com/maritime-news/2020/30533/major-oil-spill-mauritius-island/)

Due to bad weather conditions, the first signs of cracks in the hull were reported on August 5th and, shortly thereafter, oil began to leak. However, it was a minor oil slick and the authorities assumed that NOSCP was still sufficient since the risk of the oil spill was low (Saini, 2020). After the 5th of August, the vessel began flooding and

2 https://www.ramsar.org/sites/default/files/documents/library/the_ramsar_convention_in_international_law.pdf

sinking, and the Prime Minister, Pravind Jugnauth, declared a national environmental emergency, fearing huge damage to the environment and the economy (Anna, 2020). According to the Minister of Environment, Solid Waste Management and Climate Change, around 400 booms had been deployed to protect sensitive areas, and a command post had been established to monitor the situation (OCHA,2020). By the 10th of August, around 1000 tons of oil had been spilled and the oil slick had expanded (see Figure 4) to almost ten times its original size since the vessel first started leaking heavy oil into the coastal waters on August 6th, 2020 (Degnarain, 2021). The minister of fisheries stated that 'the country is experiencing this kind of disaster for the first time and is not in a position to manage the situation with the available equipment' and requested international assistance (Saini, 2020).

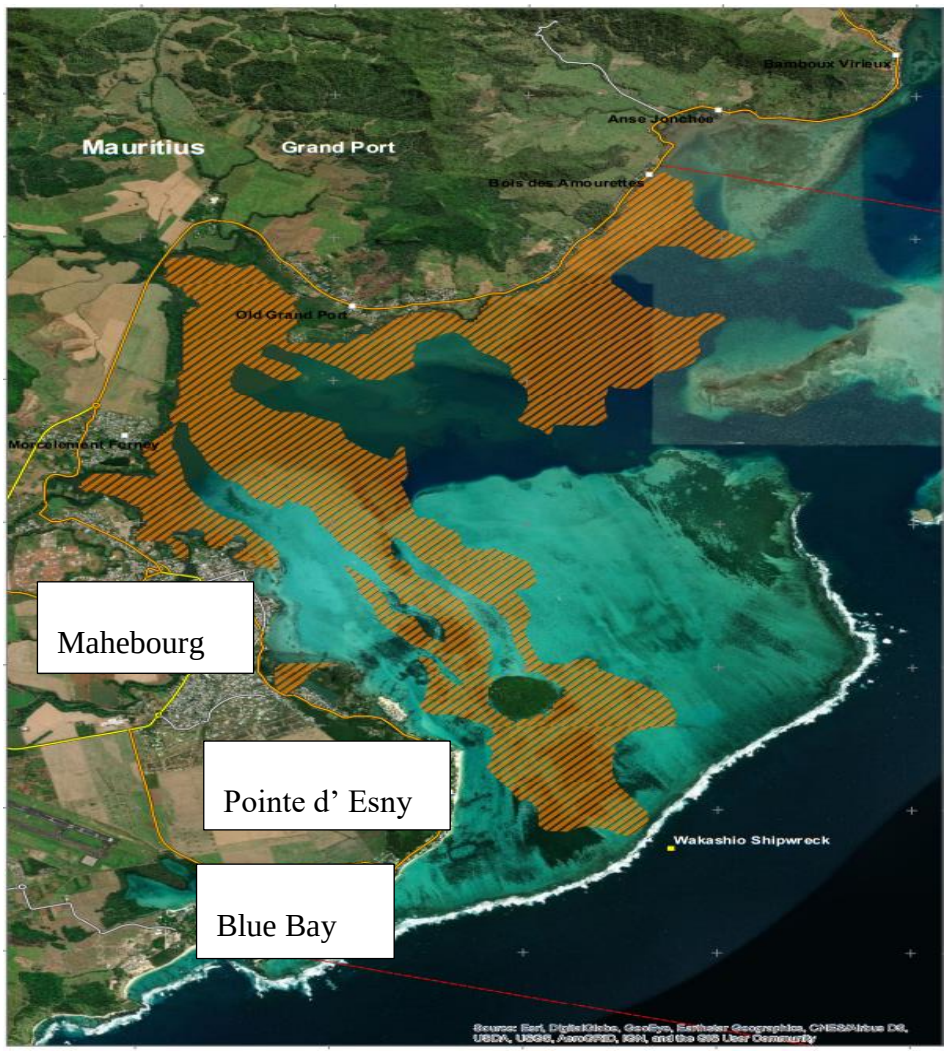

Figure 4: Potential oil observed at the surface of the Pointe d'Esny reef on 10th August 2020 (Source UNITAR,2020)

France sent a military aircraft with pollution control equipment from its nearby island of Reunion to help deal with the spill in Mauritius, while Japan sent a team of six to assist Mauritius in its efforts (Khadka, 2020). The Indian Government had provided technical support on environmental and pollution control and clean-up (OCHA,2020). Table 5 illustrate the equipment brought by the countries to assist Mauritius during the mv oil spill.

Table 5: Equipment received from other countries (Source; BBC,2020; Sandhu, 2020)

SN	Date	Country	Equipment
1	08.08.2020	France	300 metres of Booms
2	09.08.2020	French Naval Vessel (Champlain)	2 - recuperates + motor pumps, pipes and accessories (7M3 / 500KG) 340 m of absorbent dam (10M3 / 350KG) 250m of pipes to be buoyed
3	16.08.2020	Indian Air Force	- 2 HI Sprint Ocean Booms with Power Pack - 2 Near Shore Booms (Ocean Booms) with Power Pack - River Boom (16 boxes) with River Boom blower - 3 Disc Skimmer SS-50 with Power Pack - 1 Heli Skimmers - 1 Honda Blower - 1 Salvage Barge - 10,000 Log9 Absorbent Pads
4	24.08.2020	Indian Navy - INS Nireekshak	Diving Support vessel provided assistance removal of floating and submerged oil from the site near the Wakashio wreck

Nearly 3000 tons of fuel were removed from the ship with the help of helicopters and another two vessels (MT Elise and MT Tresta Star) by 12th August (Nagashiki Shipping Co., LTD., 2020). Due to the bad weather and the rough sea, the mv Wakashio broke into two parts with nearly 166 tons of fuel on-board. IMO announces it has deployed an expert, jointly with the UN Office for the Coordination of Humanitarian Affairs (UN OCHA), to support the Government of Mauritius by providing technical advice on issues related to oil spill response. Salvage and clean-up efforts were hampered by the high winds with waves of five meters high (Bakhsh, 2020). The re-floating operation of the forward part of the hull was completed on

August 19th, 2020, and NGO Greenpeace warned of the severe environmental consequences after the government decided to sink the front part of the vessel. However, operations to sink the forward part of the ill-fated vessel were completed, despite environmental concerns. The local population, non-governmental organizations (NGOs) (See Table 6), and community service groups responded quickly and actively participated in restricting the spread of oil spills in different ways, using different manual methods to control the spill and remove oil from the sea surface and along the coast (Seveso et al., 2021).

Table 6: NGOs participation during the mv Wakashio incident (Source; Author from interviews)

SN	NGOs
1.	Mauritian Wildlife Foundation
2.	Eco-mode Society
3.	Eco-sud
4.	CSO Platform on Climate Change
5.	Mauritius Marine Conservation Service
6.	Fondation Ressources et Nature (FORENA)
7.	SovLanatir
8.	Association of Tourism Professional
9.	Plaisancier Armio Petite Regatte
10.	Coral Garden Conservation
11.	Resistanz et Alternatives
12.	Zenes sans Frontier

Hundreds of Mauritian citizens hurriedly set up temporary barriers with sacks filled with straw and other materials to control the leakage (Edmunds, 2020).

Figure: 5 Local populations, non-governmental organizations (NGOs) and community service groups rigging and deploying artisanal booms https://www.nbcnews.com/news/world/mauritius-residents-join-efforts-contain-oil-spill-grounded-ship-splits-n1236868

Thousands of people demonstrated in Mauritius over the government's handling of the incident (Vyawahare, 2020), and the people started by asking the decision makers to be held accountable for their late response when they got stuck on the ship and the general handling of the disaster (Raghoo,2021). MOL announced that it will provide long-term contributions to the environment and the society of Mauritius with the support and cooperation of experts and organizations with specialized knowledge in environmental restoration and protection, working closely with the government of

Japan (MOL,2020). Nagashiki Shipping, a Japanese ship-owner, has appointed Lianyungang Dali Underwater Engineering, a Chinese salver, to begin removal operations on the ship's stern on November 5th, 2020. (See Appendix “A” for the time lines of the mv Wakashio incident).

4.4 Environmental Impacts

The grounding of the mv Wakashio happened in an environmentally sensitive and biodiverse area off the east coast of Mauritius (UNCTAD,2020). The Blue Bay Marine Park was declared as a marine protected area and designated a marine park in year 2000 and it was officially nominated as the second internationally important wetland in Mauritius (Ramsar Wetland) in year 2008 (CHM,2015). The oil spill in Mauritius affected sensitive ecosystems, such as mangrove forests. Since the mangrove forest is a hotbed of the marine environment, the consequences for marine life can be disastrous (Seveso et al., 2021). The Japan Disaster Relief (JDR) team observed no direct impact on coral and mangroves in the sites of Blue Bay Marine Park, but they observed turbidity that occurred near the touchdown point, which is believed to be caused by fine carbonate particles produced by broken coral, and they also reported oil pollution in the mangroves, especially near the mouth of the Riviera des Creoles (Toyoshima et al., 2020). 51 melon-headed dolphins were washed away near the coast of Mauritius in the same area where the oil spill occurred, but no traces of hydrocarbons were found on the animals' skin, digestive tract, or respiratory tract (Seveso et al., 2021). The government of Mauritius established different professional working groups, composed of government officials, university researchers, NGOs, and foreign scientists, especially scientists from Japan and scientists from the United Nations (UN), to initiate coordinated preliminary ecological monitoring shortly after the disaster (Seveso et al.,2021).

4.5 Socioeconomics Impacts

In Mauritius, the blue economy has been identified as one of the pillars of its economic development, leading to its transformation into a high-income economy by 2025 (V.N

& Narnia, 2018). Mauritius' blue economy is currently represented by coastal tourism, fisheries, seafood processing and port activities, which are also regarded as traditional marine activities. Except for coastal tourism, these activities account for 10.5% of the gross domestic product (GDP) and employ approximately 7,000 people (Nairobi Convention Secretariat,2019*)*. Mauritius's tourism industry is reportedly a popular destination for its pristine beaches, which contributed approximately US $ 1.6 billion to its economy in year 2019 and has been negatively affected by COVID-19 (UNCATAD,2020). The spill has happened during the ongoing fragility caused by the coronavirus pandemic and there was no tourism during that time. However, spill could negatively impact tourism in the long term.

Fisheries and aquaculture are an important part of the Mauritius economy, accounting for about 1.5% of the gross domestic product, employing 22,000 people, including the provision of fish processing and services for the fishery sector (Raffaello & Lucio, 2017). There are 2200 registered fishermen who engage with artisanal fishing (Lalliee et al 2018) in Mauritius and among them there are 630 fishermen in southeast coast of Mauritius. The daily income of the artisanal fisherman was MUR 300 per day (Soondron,2010) and the government of Mauritius declared the area from Trou d`Eau Douce to Le Bouchon ban on fishing, swimming and all other marine activities on 28th August 2020(Mauritius Government Information Service,2020). The government of Mauritius has been paying MUR 5100 monthly for registered fishermen who were affected from the oil spill (Ighobor, 2021). According to UNDP's Resident Representative for Mauritius and Seychelles "One of the findings was that the spill directly affected approximately 48,000 Mauritians living in 17 coastal villages along the 30 km shoreline".

4.6 Compensation and Liabilities

Since Wakashio is not a tanker, for the compensation regime, the Civil Liability Convention 1992 and the IOPC Fund Convention 1992 are not applicable and any compensation claims seem likely to be dealt with under the 2001 Bunker Convention.

Mauritius is a party to the 2001 Bunker Convention, which establishes the strict liability of ship-owners for damage caused by fuel oil pollution (IMO,2020). However, as per Article (6) of the Bunker Convention 2001, the amount of liability may be limited in accordance with any applicable national or international regime, such as the Convention on Limitation of Liability for Maritime Claims (LLMC), 1976, as amended in 1996. Mauritius is part of LLMC 76, which sets the limit of liability for property damage and pollution claims covered in the MV Wakashio case at US $18 million (IMO,2020). The lower limit of approximately US $18 million is hardly enough to make up for the estimated loss due to the impact of approximately 1,000 tons of heavy fuel oil on the unspoiled ecological environment in Mauritius (Hall, 2020). The researchers could not find any fully completed assessment on clean-up costs and pollution damage from the oil spill, but according to Osler, (2020), the impact on the fishing and tourism sectors will be more expensive. According to MI News Network, the ship owner has agreed to pay US $25,000 to 50 fishermen in total as compensation for the loss of livelihood in the area. Initially, Mauritius requested US $34 million for the clean-up process, but the P & I Club of Japan promised to provide US $9 million over the next few years to accelerate the clean-up of oil spills and restore marine life and the environment. Further, MOL has established the "MOL Charitable Trust" (the Trust) in the Republic of Mauritius on 21st June 2021 as part of its benevolent and philanthropic actions to support activities for the public benefit of Mauritius and its people to address the impacts of the oil spill. It is a total of 800 million yen (US $7.2 million) fund (MOL,2021).

4.7 National Oil Spill Contingency Plan (NOSCP) of Mauritius

The National Oil Spill Response Plan (NOSCP) was developed in 1990 to identify potential resources, equipment, and personnel to respond to future oil spills. In 1986, the Government of Mauritius sought help from the United Nations Environment Programme (UNEP) and the International Maritime Organization (IMO) to help develop the Mauritius National Contingency Plan (NOSCP,1990)**.** In order to solve various environmental problems and effectively implement NOSCP, the

Environmental Protection Act was promulgated in 2002, with independent attention to NOSCP (Belal & Jain, 2020)**.** The NOSCP was revised and updated between 1998 and 2002, when the World Bank provided funding for the Western Indian Oil Spill Contingency Project to the island nations of the Indian Ocean Commission and provided necessary equipment and materials, such as oil booms, floating tanks, absorbents, dispersants, skimmer pumps, etc., and most importantly, training for the stakeholders of NOSCP (Prayag, 2020).

The NOSCP is linked to contingency plans developed by Port Louis, the resident oil company, and the National Disaster Management Plan and all of these plans can be combined with NOSCP, depending on the location and size of the oil spill (ITOPF,2021). According to the NOSCP, the Director of the Environment Department of the Ministry of Environment and Sustainable Development is the Director of NOSCP. If a spill occurs within the port boundary, the port master of the Mauritius Port Authority (MPA) will assume the role of On Scene Coordinator (OSC PORT).

If the spill occurs outside the scope of the port authority or oil company and in the Exclusive Economic Zone, the NOSCP director assumes overall control. The Commandant of the National Coast Guard (Police Department) will be the On Scene Coordinator for operations at sea and the Commanding Officer of the Special Mobile Force will be On Scene Coordinator for inland waters (NOSCP,1990). The On-Scene Coordinator will be assisted by three advisory teams (SAT, SOCAT, and SFAT), which will provide relevant assessments in the scientific, socioeconomic, and operational aspects of the response. NOSCP consists of a three-tier approach, and Tier 1 means any spill up to 10 MT will be dealt with using locally owned resources.

Tire 2 spills are classified as 100 MT and will be managed by the National Oil Spill Response Team, which may be supported by regional resources. Any spill exceeding 100 MT is classified as Tier 3 and may require international help.

4.8 Conclusion

The MV Wakashio ran aground on a coral reef in Blue Bay on July 25, 2020, when the ship was navigating near the coast of Mauritius. On 26th of July 2020, the Mauritius government activated the National Oil Spill Contingency plan and several booms had been deployed to protect sensitive areas, and a command post had been established to monitor the situation. The Mauritius government requested international assistance and France, India, Japan and Australia provided the response equipment with experts. The local population and non-governmental organizations (NGOs) responded quickly and actively participated in the response process. The oil spill affected sensitive ecosystems, such as mangrove forests, and the government has established different professional working groups to initiate coordinated preliminary ecological monitoring shortly after the disaster. The spill directly affected approximately 48,000 Mauritians and the ship owner, P&I club, and MOL agreed to pay compensation.

5.0 Data Analysis and Discussion

5.1 Chapter Introduction

This chapter analyses the status of preparedness and response to the oil spills by the small island states, the response of international frameworks and regimes contribute to react to the oil spills and the lessons learnt from this disastrous incident.

5.2 Experience of Mauritius to the mv Wakashio oil spill

Under this, researcher expects to analyse what actually happened in MV Wakashio oil spill and gap of knowledge and preparedness in addressing the incident.

5.2.1 Analysis of mv Wakashio oil spill incident

Emergency Phase

The first major oil spill incident that happened on the Mauritius coastline was the first major oil spill incident during the global pandemic COVID-19. Also, it can be regarded as the first major spill of very Low-Sulphur fuel oil. According to the IPCC, "the ongoing oil pollution incident from the grounded 203,000 DWT bulk carrier mv Wakashio" is threatening an ecological catastrophe around the Indian Ocean island of Mauritius, endangering corals, fish, and other marine life already under threat from climate change" (IPCC 2020). The interviewees discuss how the emergency phase, project phase, and contingency plan were carried out during the incident.

The IMO (International Maritime Organization) special representative to Mauritius for the Wakashio incident explained in his interview an important perspective in responding to oil spill incidents by smaller states. According to him, the difference is in how much effort and time the nation can put into planning, buying equipment, and initial tier one response during the emergency phase. In addition, he mentioned that the risks of oil spills not only come from ships arriving at the port but also from all the ships passing through the territorial sea. Furthermore, he mentioned that a contingency plan is about educating people, not running drills or exercises. Also, he mentioned that

appointing a talented individual who can run a fast-moving dynamic incident response is vital for the whole operation. He complimented Saudi Arabia's commercial oil spill plan, which within short notice arrived at the incident location fully equipped with all the communication means, including the internet and satellite, and with innovative and modern big printers and scanners, everything a response team would need[3].

An officer from the National Coast Guard of Mauritius expressed his experience during the emergency phase of the Wakashio Oil Spill Incident. The plan was activated right from day one, since the grounding of the ship on July 25th, 2020. Immediate actions were taken to protect the most sensitive eco-areas around the incident. The NCG deployed booms to protect the Blue Bay Marine Park and the Pointe Jerome Wetlands, which are classified as Ramsar sites. It is worthwhile, according to the officer, to mention that the above measures were taken despite the fact that there were no oil spills at that time and that the reports which the National Crisis Committee was receiving on a daily basis mentioned that the risk of oil spill was low (from the Salvage Masters). The spill occurred on the night of August 5th, and operations to contain the spilled oil commenced early the next morning. A company (Polyeco Co. Ltd.) was appointed as the environmental arm of the P & I Club, but they were short of appropriate equipment. Around 15.9 km of booms have been deployed at different areas, namely Blue Bay Marine Park, Pointe d'Esny, Ile aux Aigrettes, Pointe Brocus, Mahebourg Waterfront, near the wreck of the MV Wakashio, as well as at 4 rivers, namely Rivière La Chaux, Rivière des Créoles, Rivière Champagne, and Grande Rivière Sud, according to a statement delivered by the Honourable K. Ramano, Minister of Environment, Solid Waste Management and Climate Change. According to the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), mv Wakashio had on board around 4200 metric tons (MT) of fuel for its own consumption, including low-sulfur fuel oil (3894 MT), diesel (207 MT), and lubricant

[3] Fourth Transcript

oil (90 MT). The barges were brought to shore, the oil pumped out in container lorries, then transported to a depot for storage. The oil which has spread over the shores of the South, Southeast and part of the East of the island has either surfed over the booms or drifted due to changing tides and waves due to wind and current directions[4]. The Washington Post emphasized that local authorities indicated that approximately 3000 MT of fuel was pumped out before the ship broke in two, whereas around 1000 MT leaked into the sea. In addition, even by August 24th, 1122 tons of contaminated liquid waste (oil mixed with seawater) and 792 tons of contaminated solids on the shore had been carted away, as mentioned in the press release of the National Crisis Committee on the same day. According to ITOPF, as of 11th August, "approximately 800-900 tons of fuel oil had leaked from a breached tank and drifted into the lagoon surrounding Pointe d'Esny; oil has also come ashore at various locations around the Baie de Grand Port, including areas of mangrove. Other estimates indicate between 1,000 and 2,000 tons of fuel oil might have leaked from the ship into the environmentally sensitive waters "(ITOPE, 2020). About 27 square kilometers of the island's southeast coast are affected by this ecological disaster.

In contrast, an activist who was interviewed for research gave a different perspective on the incident, saying that the respective authorities and government hadn't started working for twelve days until the oil spill was recorded. The fuel started spreading over the waters and down to the coast. And it started to accumulate, spreading to the southeast region[5].

Giving interviews for the research, contract workers and negotiators of the Mauritius Ports Authority-Maritime Union and Other Staff Union (MPA-MAOSU) gave different views. According to the interview, there was dynamic citizen mobilization,

[4] Tenth Transcript

[5] Fifth Transcript

but the Mauritius government had not taken the plan to mitigate the damage effectively. According to him, the contingency plan was documented in the year 2008 and after that, oil spill response equipment had never been reviewed or maintained, which was a huge issue during the emergency phase[6].

Project Phase

The researcher interviewed the representative from ITOPF (International Tanker Owners Pollution Federation) who started work on site after the end of the emergency phase, starting in early September. "*So I was the sort of second team on site for Wakashio"*. The characteristic of the project phase is that most of the stakeholders have estimated and assessed the impact of a catastrophe by then. In addition, how it differs from the emergency phase is that the crisis meetings that would happen once a day or twice a day have been reduced to bi-weekly during the project phase. Therefore, by the project phase, all the parties associated are aware of techniques to exercise, resources, and involved parties. The representative gives an overview of his job description, and researchers find it essential to examine his job description in order to understand his stance on incidents during the project phase. His role was to monitor two contractors, Le Floch Depollution and Polyeco SA, assigned to cleaning different parts of the shoreline, establish adequate information flow through communication channels, brainstorm to mitigate damage, and feed back to the Mauritius government and all the other stakeholders engaged[7]. Cleaning was being carried out by two contractors under the supervision of the Solid Waste Management Division in non-sensitive areas and according to four stages, as stated by the Honourable K. Ramano, Minister of Environment, Solid Waste Management, and Climate Change.

[6] Ninth Transcript

[7] First Transcript

(i) Disposal of accumulated/stacked waste oil and unused artisanal booms

(ii) Collection of contaminated debris, such as plastic bottles, wood, and other common waste

(iii) Removal and washing of contaminated seaweed

(iv) Pressure washing contaminated rocks in confined spaces.

Contingency Plan

According to the Republic of Mauritius, Parliamentary Debates (Hansard), National Assembly on July 28th, 2020, the National Oil Contingency Plan was activated by the Ministry of Environment, Solid Waste Management, and Climate Change on the day of the ship's grounding and oil booms were deployed, but on August 7th, the mv Wakashio began leaking its bunker fuel.

According to the UNCTAD report, the government of Mauritius activated its national oil spill contingency plan, declared a state of environmental emergency, and called for international help. The stakeholder involvement in the planning is discussed in the following paragraphs. In brief, aid was sent from a number of countries, including France, India and Japan, as well as from international bodies, to help Mauritius deal with the spill, such as: IMO, OCHA, the United Nations Development Program (UNDP), and the International Tanker Owners Pollution Federation (ITOPF). The Japanese owners and managers of the bulk carrier (Nagashiki Shipping), and its P&I Club, contracted specialist oil response and salvage teams to help mitigate the effects of pollution and the vessel's time-charterers (Tokyo-Mitsui O.S.K. Lines, Ltd.) also pledged to cooperate and provide support.

5.2.2 Analysis of Planned Risks Relating to the General Oil Spill Incident

Environmental Impact

It is inevitable that environmental hazards will be a major outcome of any oil spill incident. This was true for Mauritius as well. The researcher takes the following excerpt from the interview given to the media by Amanda Serumaga, UNDP's Resident Representative for Mauritius and Seychelles, regarding her view on environmental impact. According to Serumaga, MV Wakashio grounded on 25 July 2020 and by 9 August 2020, an estimated 1,000 tons of oil had already spilled into the south-eastern coastal waters at the coral reefs of Pointe d'Esny, home to key biodiversity hotspots and hosts UNESCO Ramsar sites, just 400 m from the shore. The disaster left an impact on lives and livelihoods and, more broadly, has negative implications for the economy and the environment. According to conservationists, the consequences of the oil spill on these eco-sensitive habitants and wetlands would take years to reverse and revive. Therefore, UNDP collaborated with the International Organization for Migration (IOM) to conduct an impact assessment, as part of the broader UN emergency response that is coordinated by the Office of the UN Resident Coordinator. One of the findings of the assessment was that the spill directly affected approximately 48,000 Mauritians living in 17 coastal villages along the 30 km shoreline[8].

Compensation for Victims and Stakeholders

The IMO (International Maritime Organization) special representative to Mauritius for the Wakashio incident was interviewed by the researcher for a pragmatic understanding of risks, preparedness, and response related to the incident. While explaining his job description, he insisted his role was to provide technical advice for

[8] Eight Transcript

the parties involved. He explained that while providing advice, it was essential to be realistic. He also explained the claim forms and victim protection associated with them[9]. According to the IMO (International Maritime Organization) special representative to Mauritius for the Wakashio incident, in creating a claim form it is essential to ask all the appropriate questions. He took examples from his experience at Hebei Spill over South Korea and the Middle East.

As the UN representative explained in his interview, they have brought two specialists to assist with the compensation process, but the government has not taken any help from them.

During the interview of the activist, he mentioned that the compensation process is not happening in the proper way and he said that "*I heard that it's not trickling down to the fishermen and I know that there are still a lot of unhappy people in the south right now"*. Therefore, it is evident that the compensation process for the mv Wakashio has not been progressing in favour of those who were affected by the oil spill.

However, according to literature, the ship owner has agreed to pay 25,000 USD to 50 fishermen in total as compensation for the loss of livelihood in the area, and the P & I Club of Japan has promised to provide US $9 million over the next few years to accelerate the clean-up of oil spills and restore marine life and the environment.

5.2.3 Comparison of Actual vs. Planned Risks of the MV Wakashio Oil Spill Disaster

Human Behaviour and Climatic Change

The Deputy Director of Shipping in Mauritius describes the reason behind the gap between planned contiguous preparedness and actual real-time incident preparedness.

[9] Fourth Transcript

The main reasons, in his opinion, stem from human behavior and climate conditions. Unlike in a drill or practice, the panic associated with a real-life incident is overwhelming, and weather conditions are usually neutral during a lifeboat drill or life raft launch[10].

Sulphur Fuel

A representative from ITOPF (International Tanker Owners Pollution Federation) explained the weightage and gravity of the oil spill, which initially started with low-sulfur fuel oil. According to the representative, this prompted scientists to conduct a scientific experiment to determine how the Sulphur oil might react in the environment. It is important to note that any oil when you test in the lab versus when it actually happens in a real-time environment, there is a significant gap. This is also evident in the MV Wakashio Oil Spill. According to the interview, he regards that, unlike how it was actually predicted, it turns out that in this case, the oil spill was really less viscous than expected, mainly due to ambient temperature and tidal movements[11].

Oil Spill Spread

A representative from ITOPF (International Tanker Owners Pollution Federation) offered his view on trapped oil in the shoreline or that had sunk into the sediment on a spring tide, washed back out, went up the shoreline again and spread oil into another area of the shoreline. This was a significant problem during the emergency phase. In addition, the shallow shoreline hinders booms from keeping track, resulting in the

[10] Second Transcript

[11] First Transcript

boom being ineffective or actually sitting on coral reefs, which are harmful to the corals[12].

Moreover, the IMO (International Maritime Organization) special representative to Mauritius for the Wakashio incident explained in his interview, gave an example where emergency phase decision making is crucial. He expressed that most of the time in oil spill incidents, the oil is split into two parts. One part may be 1000 tons, and the other part may be 100 tons. In this situation, most people mistakenly only care about cleaning 1000 tons, but 100 tons might be spread into an eco-sensitive area or 100 tons may be in somewhere that is easier to clean[13]. This was the case for MV. Wakashio, UN satellites revealed 30 kilometers of shoreline along the coast of Mauritius have been heavily affected by the heavier engine fuel oil leaked from the Wakashio and EU's own satellite analysis shows how the flow of oil changed from Monday 10 August to Saturday 15 August, becoming more absorbed into the coastline and many river estuaries on that part of the coast (Forbes, 2020).

COVID - 19

The ITOPF (International Tanker Owners Pollution Federation) representative stated that the COVID-19 pandemic, social distancing, and quarantine rules associated with it were the other major unforeseen threat. All the foreign officials who entered Mauritius related to the Wakashio oil spill incident had to undergo PCR or antigen tests and compulsory quarantine or self-isolation for two weeks, which added an extra layer of challenge. Therefore, this incident taught every stakeholder to plan a contiguous plan to operate under a global pandemic. There were not only resource personnel and team delays due to COVID-19, but also equipment and machinery

[12] First Transcript

[13] Fourth Transcript

delays due to supply chain failure as a result of COVID 19[14]. The Deputy Director of Shipping Lines in Mauritius affirmed that the ineffective supply chain and lack of manpower were due to COVID, whereas foreign vessels which arrived for aid had to be isolated due to COVID protocols[15].

The IMO (International Maritime Organization) special representative to Mauritius for the Wakashio incident mentioned in his interview that the COVID-19 pandemic and protocols associated with it affect the timeline and field visits in conducting consultancies. Apart from self-isolation and quarantine, the team members arrived at different times and each had to undergo quarantine, which affected the efficiency.

Lack of Accessibility to Shoreline

Another challenge that the team had to overcome during the response was access to the shore, which is difficult from both inland and waterways. The reason is that the shoreline is annexed by a big tidal lagoon which becomes shallow during low tide, resulting in no access by boat to visit impacted islands. Therefore, the response timeline always had to be on par with the tide timeframe. This becomes a grave issue when sea water is contaminated by oil. During low tide, a vessel cannot get out or even drag a boom was difficult as it caught up coral and broke itself, harming the coral system[16].

Ecosystem of Mangroves

A representative from ITOPF (International Tanker Owners Pollution Federation) who started working on site during the project phase explained the unplanned risks of oil spills and their effect on the environment. Mangroves are a group of trees and shrubs

[14] First Transcript

[15] Second Transcript

[16] First Transcript

that live in the coastal intertidal zone. They are highly sensitive and the process of cleaning them may cause more damage to the eco system. In relation to the Wakashio, the representative affirmed that the most affected ecosystem is 40 kilometers width mangroves. The representative added that the process of rejuvenating mangroves was pretty much a trial and error, working with the private contractors and Mauritius government to discover the most appropriate approach and trailing them and observing to save the mangroves[17]. According to ITOPF (International Tanker Owners Pollution Federation) indications, clean-up operations may be delivered following a two-stage process: first, the prompt removal of the gross contamination; and second, targeted activities to limit the pollution damage and help the natural healing process.

The types of operational response guidelines based on actions and response strategies for monitoring and restoring mangrove habitats impacted by large oil spills were well developed as Standard Operational Procedures, responses, actions, and their timing depended on four threat phases of the spill incident: "Pre-Spill", "During Spill Pre-Impact", "During Spill Post-Impact", and "Post Spill". For each phase, specific action and monitoring plans are developed and suggested according to Duke (2016).

5.2.4 Analysing Future Risk in MV Wakashio and Mechanisms to Reduce Such Risks

The representative from ITOPF (International Tanker Owners Pollution Federation) further explained to the researchers that, apart from the contingency plan, the real time oil spill over is much different and full of surprises. He explained that the sign-off phase would come after six months of clean-up response up to 1000 metric tons. The Mauritius government played a critical role in mitigating the hazards and did very well under all of those circumstances to get a response going because their borders were closed. The main reasons for the successful clean-up procedure are the absence of

[17] First Transcript

centralized decision making in crisis response, the active role of the Mauritius Ministry of Environment, and ensuring adequate information flow and transparency[18].

The Professor from Copenhagen University participating in the research interview mentioned that the contingency plan of Mauritius was not effective and it was not followed accordingly, although the accident is well documented. Furthermore, Mauritius has the responsibility as a nation where shipping lines have in their territorial water. The higher the likelihood that an accident will occur, Therefore, coast guards should play through all sorts of scenarios on a regular basis. In addition, he gave his opinion on establishing a regional dialogue on pooling equipment for beach clean-up when an oil spill accident occurs. So, there could be entities, according to him, such as the Ocean Commission or the Southern African Development Community, which could take the lead[19].

5.3 Stakeholders Involved in Oil Spill Response and National and International Framework

5.3.1 Analysis of Stakeholders Affected by the MV Wakashio Oil Spill

A representative from ITOPF (International Tanker Owners Pollution Federation) informed researchers that when technical experts are on site, they provide consultation to locals, private sector parties, or hotel or tourist related industries who were affected by the mv Wakashio Oil Spill for possible claims or compensation. During the compensation process for victims, he mentioned that rather than a financial perspective, a technical perspective is used to assess the damage. According to him, the following victims are prioritized: the fishing industry and community, and hotel or tourist-related businesses with coastlines. He affirmed that when technical expertise shares their assessment and information, it is not biased and explained openly to both

[18] First Transcript

[19] Twelfth Transcript

the government and the shipping company involved, as well as their insurance company.

The Fishing Community

The community had a devastating impact from the incident on their economic and social structure. This view is shared by the Deputy Director of Shipping Lines in Mauritius and a representative from ITOPF (International Tanker Owners Pollution Federation).

The researcher takes following excerpt of the interview given to media by UNDP's Resident Representative for Mauritius and Seychelles. According to Serumaga, essentially the incident has affected the blue economy of Mauritia which is around 20 per cent of the Mauritian economy, and the south-eastern coast relies heavily on fishing and tourism. Following the oil spill, coastal and marine activities were stopped for a time and southeast coast of Mauritius were closed to the public to allow for clean-up. Fishing activities were suspended, and some fishermen were unable to maintain their boats and fishing equipment, resulting in additional repair costs and loss of equipment. And in many cases, fishing families did not have alternative sources of income[20]. UNDP report stated that in the southeast coastline of the island, where 12 village council areas were impacted by the oil spill and there are 630 registered fishers in the area and hundreds of people fish for subsistence and are not formally recognized through any registration process are present also. However, the effect on women who are mostly unregistered fisherwomen as only 35 female fishers are registered in Mauritius as per the list of registered fishers for 2019. Out of the 35, more than half operate in the area impacted by the oil spill (UNDP Report on Oil Spill of Mauritius, 2021). According to Rambaree, this disaster affected the livelihood of thousands of people from the southeast coast of Mauritius and Government of Mauritius had to put

[20] Eight Transcript

up a food distribution programme for those in need, and a monthly solidarity grant of MUR. 10,200 (roughly $257) is being paid from August 2020 to fishers, fishmongers and pleasure craft licensees/operators/workers from the southeast region to compensate for the stoppage of sea activities after the oil spill (Rambaree,K, Rambaree, B., 2021).

Tourism.

According to Serumaga, to consider that in the year 2019 alone, the tourism industry contributed 8.1 per cent of Mauritius' GVA [gross value added], with spill overs estimated at above 20 per cent of GVA. More than 1.4 million tourists visited the island that year, generating earnings of up to MUR 63 billion ($1.8 billion). The oil spill threatened domestic and international perceptions around the country's main tourist attractions, including sandy beaches and unique biodiversity. Prime Minister Pravind Jugnauth has declared the country's approximately 1.3 million inhabitants rely heavily on tourism, which has already been hard-hit by the COVID-19 pandemic in 2020 and has been affected by the oil spill. On the other hand, the closure of public beaches also affected several dependent businesses and many people now rely on alternative livelihoods such as cash for work through the cleaning exercise, government financial support and support from non-governmental organizations, community organizations, neighbours and friends[21].

Coastal Community

A representative from the UN mentioned in an interview that there are health effects from the oil spill. In collaborating with the World Health Organization, it was able to

[21] Eight Transcript

diagnose the impact of the crisis on people's health. These health effects can include allergic reactions, skin rashes, and so on[22].

According to Rambaree as stated in his research, "following the oil spill and the clean-up operation, public concern with how the government organized the disaster response brought widespread protests in the country. On 29 August 2020, approximately 100,000 people joined a peaceful march in the capital to protest against the government (Cassimally, 2020; DW, 2020). This was the biggest demonstration Mauritius has seen in forty years (DW, 2020). Another protest took place in the southeast on 12 September 2020. Protesters and critical commentators have deplored the delay in actions as the ship ran aground, as well as a lack of transparency in the response of the government to the disaster. They were concerned that late actions might have exacerbated the negative impact on the environment. The spilled oil has been found to have caused damage to mangroves and coral reefs, and there are concerns over the effect on marine mammals, since forty-seven dead and dying dolphins and whales had drifted ashore by 31 August 2020 (Degnarain, 2020b)"(Rambaree, K., Rambaree, B., 2021).

5.3.2 Stakeholder Response Analysis, Current Status, and Ways Stakeholders Address the Situation

National Level

The Deputy Director of Shipping Lines in Mauritius, who also worked as a member of the National Crisis Committee of the Wakashio Oil Spill while participating in the interview, gave an overview of the crisis to stakeholders involved in the response. The Ministry of Environment enforces National Oil Spill Contingency Plans (the annual SCP), which is a public document. Moreover, the Environmental Protection Act was instrumental during the crisis. Then, the Mauritius Port Authority, which is fully equipped to oversee their operations and resources, oversees the supply chain and

[22] Third Transcript

manages the National Coast Guard, who possess tugs and booms. Mauritius, unlike other states, does not possess a navy; instead, the role is played by the Mauritian Coast Guard, who is part of the police department. These parties have become actively engaged in the National Oil Spill Contingency Plan[23].

1. Ministry of the Environment
2. Mauritius Port Authority
3. The Mauritian Coast Guard and Police Department

The officer from the National Coast Guard of Mauritius who conducted the research interview provided a brief overview of the National Coast Guard, which the researchers believe is necessary for analyzing their role as a stakeholder. The National Coast Guard (NCG) is a specialized unit of the Mauritius Police Force (MPF) which was established in 1987 and is headed by the Commissioner of Police and Commandant of NCG, who is responsible for administration and operations. The Commandant NCG reports to the Commissioner of Police. The NCG Act 1988, Section 6 (1) (b) defines the duties of the NCG and the protection of the maritime zones; Section 12 (1) (g), the powers of the NCG in the prevention of maritime pollution[24].

In addition, the officer elaborated on the role of the Ministry of Environment, Solid Waste Management and Climate Change (MESWMCC), which leads the National Oil

[23] Second Transcript

[24] Available on: http://muelex.govmu.org/portal/sites/muelex/files/coast.pdf

Spill Contingency Plan (NOSCP), which was made under the Environmental Protection Act (EPA 2002)[25].

Community Role

An officer from the National Coast Guard of Mauritius noted that the opportunities for overcoming the oil spill crisis were community and local. People from all around came together as one and started to manufacture artisanal booms with sugarcane straws to trap the oil near the shores. NGOs were mobilized for the shoreline cleanup. It was also a challenge to manage 100 volunteers and NGOs, especially to ensure that those involved in the operations are accounted for that all health and safety precautions are followed due to COVID protocols[26].The Mauritius Red Cross supported the creation of booms from dry leaves and plastic bottles, including in Bois des Amourettes, about 15 minutes from Mahébourg with 100 volunteer participation (Mauritius: MV Wakashio Oil Spill Flash Update No. 3, OCHA 2020).

An activist who was interviewed for research explained that there were lots of volunteers who joined together and started making booms to protect the coast from the oil spill.

During the interview, the person from the NGO mentioned that civil society assisted in operating skimmers to pump out oil, and people who are more familiar with the lagoon and the sea were helping the coast guard manage the response.

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[25] Available on: https://www.mra.mu/download/TheEnvironmentProtectionAct2002.pdf

[26] Tenth Transcript

International Level

The United Nations

According to the UN representative, the government of Mauritius had requested assistance from them since they are the ones who coordinate the work of all the different UN agencies in Mauritius. They had initiated a joint response from the UN between UN OCHA, UN Environment and the International Maritime Organization.

"The United Nations (UN), under the leadership of the UN Resident Coordinator, continues to support the immediate response. UNDP, through regular programs on the environment, has allocated 200,000 USD and is mobilizing support to communities through the GEF Small Grants Programme. The International Maritime Organisation (IMO), together with the UNEP/OCHA Joint Environment Unit, has deployed an oil spill expert, and IMO is supporting the Government by providing technical advice on oil spill response issues and in the coordination of assistance. In addition, UNDP is providing technical support on issues related to the environment, oil spills, and impact assessment. UNESCO's Oceanographic Institute is supporting remote mapping, WHO is supporting public health regulations, IOM is analyzing risks to populations, UNODC is supporting forensic investigation and providing legal support, UNOSAT has activated the Space Charter and is providing satellite imagery and analysis, and OCHA is providing disaster response coordination expertise. International financial institutions, including the African Development Bank, the World Bank, and the International Monetary Fund, have agreed to offer technical support. More information about support from UN agencies and other partners will be shared as the response evolves." (Mauritius: MV Wakashio Oil Spill Flash Update No. 3, OCHA 2020)

The UNDP

UNDP coordinates its contribution with the rest of the UN system. UNDP worked with IOM to provide on-site technical support for rapid assessment of the socio-economic impact of the spill on households and to gather relevant information to aid response planning. On a day-to-day basis, UNDP worked closely with the Ministry of

Environment, Solid Waste Management and Climate Change and the Ministry of Blue Economy, Marine Resources, Fisheries and Shipping. The UN Resident Coordinator leads the UN system response to the Wakashio oil spill disaster[27].

The Deputy Director of Shipping Lines in Mauritius discussed with the researcher the aid they received from their neighbouring countries: Reunion Island (French territory), India, France, the UK, and Japan. He also noted how foreign aid was delayed and postponed due to the COVID-19 pandemic[28].

5.4. Lessons Learnt from the MV Wakashio Oil Spill

5.4.1 Lessons from the mv Wakashio's Preparedness and Planning Challenges

- Monitoring Exclusive Economic Zone and spread the early warning system to the zone. This was mentioned during the interview of the professor from Copenhagen University who expressed his opinion, which is that Mauritius coastal guards ignore the message of vessel accidents in the economic zone[29].
- Regularly updating contingency plans
- Act swiftly during the emergency phase without wasting time.
- Establishing and understanding legal provisions
- Providing resources, technology, and aids for beach clean-up on a regular basis

[27] Eight Transcript

[28] Second Transcript

[29] Twelfth Transcript

- Cleaning marine sensitive areas with extra care and using appropriate techniques

- Prepare for planned or predicted risks such as environmental impact with relevant resources to mitigate it, and claims and plaintiffs with relevant technological facilities or law and regulations within the country for transparency.

5.4.2 Future Plans and Recommendations for MV Wakashio Stakeholders

Technology, Development and Research

In the interview, the IMO (International Maritime Organization) special representative to Mauritius for the Wakashio incident described his experience in the oil spill field in thirty-five years. He mentioned that during his tenure at the UK government, the team responsible for research and development for spills and spill response would deliberately spill oil into coastal areas for research purposes. This is an environmental offense in contemporary society, but it was different back then. He said that learning was instrumental as different oils evolved and dissolved differently. Also, this research method invented oil spill methods currently in force. Unlike in the past, during oil spill incidents, the number of external issues such as logistics and communications issues is relatively low. Also, unlike digital cameras, in the past the timeline got dragged due to 35-millimetre cameras, whose photographs developed months after the incident.

Incident Command System

The officer from the National Coast Guard of Mauritius gave his view on the NCG, which is a major stakeholder in the NOSCP. Their future plan is structured based on the Incident Command System (ICS) and the roles and responsibilities of various organizations are defined. The NCG is part of the Evaluation Cell, Logistics Cell and Operations Cell. The Operations Cell is headed by the Commissioner of Police and the Commandant NCG is the On-Scene Commander (OSC) for Operations at Sea. The

NCG is a member of the Scientific Advisory Team (SAT) of the NOSCP and participates in the planning phase during a spill. The NCG may advise on the best response strategies based on inputs received such as drifts, currents, tides, wind directions, etc. With regards to preparedness, the NCG has set up a Pollution Response Team (PRT) which is composed of qualified responders trained to respond to oil spills at sea. The main responsibilities of NCG PRT are to maintain and operate oil spill equipment, to carry out regular drills and training in pollution response, to participate in pollution response at sea, to participate in national, regional and international drills and exercises, and to build capacity and capability. Moreover, NCG exercises with various friendly navies and Coast Guards include table top, FTX, and deployment of equipment and assets[30].

5.4.3 Lessons Learned from Other Nations

East Timor-DNTM

The officer from the Maritime Administration in East Timor gave his view on the National Contingency Plan under way in East Timor. As an officer of the National Directorate of Maritime Transport (DNTM), their main focus is to prepare the National Oil Contingency Plan and coordinate with relevant stakeholders in the country to be involved in the implementation process. In addition, the DNTM is also responsible for collaborating with neighboring countries in the region, such as Indonesia and Australia, for possible financial aid, and for the ratification and implementation of the OPRC Convention. The convention, according to the officer, is not enough to support the Small Island Developing States (SIDS). The reason is the lack of technical expertise available for these small islandic nations to effectively implement their oil spill management. Furthermore, the country is considered highly vulnerable to oil spills because around 90% of the Timorese population live in the coastal area of the

[30] Tenth Transcript

country, and investments in Dili, the capital of the country, are continuously growing in coastal and marine tourism areas[31].

In Papua New Guinea,

The Member of Papua New Guinea (PNG) National Maritime Safety Authority gave his opinion in a research interview. The PNG National Maritime Safety Authority's oil spill contingency plan is covered under one of our National Marine Pollution Acts, referred to as the National Marine Pollution Preparedness and Response Act. However, members expressed that there is a lack of drill or mock response action to test out the contingency plan, and it is not enough to determine whether the plan is effective or not. Educating decision makers on the risks associated with oil spills will add more meaning and value to the issue of oil spill response and contingency planning. While the organization does put in some effort, also, preparedness needs to be promoted and given high priority, so in any event that an oil spill occurs, deployment will become more effective. In the Pacific, regional contingency, which is PACPOL, requires regional corporations between countries to determine how response can be managed in the event that spills become Tier 3. In addition, the MOU with Australia through its Australian Maritime Safety Authority (AMSA) allows the deployment of Tier 3 response equipment from the Australian Maritime Oil Spill Centre (AMOSC)[32].

Thailand

The researcher interviewed a representative from ITOPF (International Tanker Owners Pollution Federation) who started his work on site after the end of the emergency phase, starting in early September. The representative had experience in Thailand and he shared it for research purposes. Thailand had a port spill in Bangkok,

[31] Eleventh Transcript

[32] Seventh Transcript

which is relatively smaller compared with Mauritius. In that case, their contingency plan worked defiantly. Coincidently, prior to six months after the incident, Thailand had training, so when the incident happened, they were fairly refreshed on what they needed to do. In addition, due to its smaller scale, it was obviously a lot easier to deal with in comparison to a shoreline impact like Wakashio[33].

5.5 Chapter Conclusion

An oil spill inevitably causes damage to the local and/or regional environment, wildlife, habitats, etc., and to the livelihoods of people. The project phase of the incident requires a lot of expenses for clean-up, and they may increase if the oil spill occurs in or near a sensitive wetland. This is the case related to Wakashio. According to Etkin, oil spill clean-up response costs varied on a variety of factors, most notably, location, oil type, spill size, and clean-up strategy, making it difficult to develop a universal per-unit cost factor. Moreover, clean-up strategy also plays a very large role in determining clean-up costs (Etkin,1998a). In addition, in relation to Wakashio, its proximity to environmentally, economically, and politically sensitive locations greatly impact its response costs and strategies. It is noted that small island nations do not possess an integrated approach to prevention and remediation that accelerates early-warning protocols and technologies implemented in the first few hours of the emergency phase. The emergency phase was lagging, which is crucial to the outcome of remedial efforts in the project phase.

[33] First Transcript

6.0 Conclusion and Recommendations

6.1 Conclusion

Island nations are vulnerable to oil spill risks due to their limited resources, dependency on tourism or fishing industries, and lack of mechanisms to mitigate and prevent such incidents. Therefore, the research aims to examine how an island nation processes planning, preparation, and response to an oil spill accident.

In order to achieve the aim of the research, the researchers, after careful consideration, selected the recent oil spill incident in a small island nation, MV Wakashio, Mauritius, as a special reference. Mauritius, a small island nation of 1.3 million people, located 500 miles off the east coast of Madagascar in the Indian Ocean, faced an ecological disaster on 25th July 2020.

The purpose of this study is to understand the planning, preparedness, and responses of island states to oil spills and what the challenges they face are, and how to address those challenges. For that, the research identifies three research questions: (a) what are the challenges faced by small island states and developing states in planning, preparedness, and response to oil spills? (b) How has Mauritius been affected by the MV Wakashio oil spill? (c) What are the lessons learnt from the MV Wakashio oil spill? By using the case study approach as a research strategy, the research conducts in-depth analysis using a single incident.

The significance of the research is that planning for oil spill disasters involves learning from previous events, and this is especially challenging because consequences are conditional upon the small island nations' particular geographic, ecological, societal, and temporal contexts in which the disaster occurs. Therefore, the research fills a research gap in handling oil spill incidents in small island nations. The scope of the research is limited to small island nations and case study referral to MV Wakashio. Also, the significant limitation is the unavailability of some reports due to confidentiality and those that were not made available as publications. Moreover, the

researchers could not do an onsite field visit to understand the impact of the oil spill accident. However, it is essential to keep in mind that although this disaster provides an essential information source for anticipating future events, not all lessons may be transferrable across all regions alike.

By using a qualitative research method using primary and secondary findings, the research analyzed research questions thoroughly to understand the research problem. The research depends on the literature corpus to systematically analyze the factors and linkages that would influence the consequences of a potential oil spill. The literature corpus the research used consisted of event case studies across different geographic areas. Several previous oil spills in small island states are prominent in the literature of the research, which include the 2019 Oil Spills in the Solomon Islands and the Oil Spills in Papua New Guinea in 2012.

Figure 6: Conceptual framework (Source; Author)

Using primary data collected through open-ended semi-structured interviews, the research unpacks the project and emergency phase of the accident, stakeholder behaviour, the claim process, and risks associated with it. Eleven people were

interviewed from the government, community, intergovernmental organizations, non-governmental organizations, and activists. By using thematic analysis methods, the themes for analysis are created. After initial analysis, the themes have been identified and a conceptual framework was made. Figure 06 shows the conceptual framework. The themes are divided into two, namely, risks and stakeholders.

The risks identified in the research are further elaborated as planned risks related to having a contingency plan and unplanned risks. At the end, the research analysis shows the gap and its impact on the environment, the social and the economy of the nation. Key factors or variables influencing the contingency plan were COVID-19, inaccessibility to the shoreline, weather and tide waves, nature of the oil spread, low-sulfur fuel oil, and human behaviour. The impacts were identified in several domains related to the environment, including marine physical environment, marine biology, human health and society, the economy, and policy. Twelve village council areas were impacted by the oil spill, and there are 630 registered fishers in the area, and hundreds of non-registered belong to the affected areas. In addition, approximately 1.3 million inhabitants who rely heavily on tourism have been hard-hit by the COVID-19 pandemic and oil spill.

The research shows the contingency plan is educating stakeholders and the community, not limited to running drills. In addition, the successful operation of the oil spill management and clean up depend on individual leadership decision making and behaviour. In the case of Mauritius, they had to depend on a contingency plan they made in 1990, which shows that the country has not updated or periodically reviewed the plan. Nearly 400 booms had been deployed to protect sensitive areas, and a command post had been established to monitor the situation (OCHA,2020). It is noted that the local population, non-governmental organizations (NGOs), and community service groups responded quickly and actively participated in restricting the spread of oil spills in different ways, using different manual methods to control the spill and remove oil from the sea surface and along the coast. Also, it has been reported that

hundreds of Mauritian citizens hurriedly set up locally made booms with sacks filled with straw and other materials to control the spread of oil.

The sector that was gravely affected by the disaster is the fishing industry. Fisheries and aquaculture are an important part of the Mauritius economy, accounting for about 1.5% of the GDP. In addition, the residents affected by the disaster are approximately 48,000 Mauritians living in 17 coastal villages along the 30 km shoreline. Other than these stakeholders, by analyzing the research, it is noted that Ramsar Wetland and Blue Bay Marine Park are contaminated by low-sulfur fuel oil, causing a grave ecological disaster. The research provides information on contingency plans, their importance, the compensation process, and the challenges that come from them.

The research concludes that small island nations do not possess an integrated approach to prevention and remediation that accelerates early-warning protocols and technologies implemented in first few hours of the emergency phase. The project phase of the incident requires much expenses for clean-up and it may increase if oil spill occurs in or near a sensitive wetland. This is the case related to the mv Wakashio. The emergency phase was lagged which is crucial to the outcome of remedial efforts in project phase. In addition, in relation to the mv Wakashio incident, its proximity to environmentally, economically, and politically sensitive locations greatly impact its response costs and strategies and it has been noted contingency plan for oil spill had not created with pandemic being a variable (see Figure 7 as a summary of the incident).

Vessel Name: mv Wakashio **IMO No**: 9337119 **Length**: 300 m **Width**: 50 m **Draught**: 8.7 m **DWT**: 203130 **Fuel On-board**: 3,800 tons of Low-Sulphur fuel oil and 200 tons of diesel (at the time of incident)	**Flag**: Panama **Crew**: 20 **Owner**: Nagashiki Shipping **Charterers**: Tokyo-Mitsui O.S.K. Lines, Ltd **Insurer**: Japan P&I Club **Voyage**: Lianyungang, China to Tubarao, Brazil **Incident Date:** 25th July 2020 **Location:** Southeast coast of Blue Bay in front of Point d'Esny
Response: - Mauritius government activated NOSCP on 26th July 2020 - On 5th of August, the vessel began flooding and sinking and the Prime Minister declared a national environment emergency and requested international assistance.	
Response Equipment Used Booms – Approx. 15.9 km (HI Sprint Booms, Near shore Booms, River Booms) Skimmers – Disc Skimmers Heli Skimmers Absorbent Dam	**Ships assisted** MT Elise and MT Tresta Star French Naval Vessels Champlain INS Nireekshak
Local community /NGOs: Local community and NGOs responded quickly actively participated in oil spill management process, specially rigging large quantity of artisanal booms	
International Assistance : France ,Japan ,India UK, Australia	**International Organisation** : UNDP,UN OCHA,IMO ,UNEP,UNODC, ITOPF,IOM
Impacts: Fisheries Tourism (long term)	**Compensation and Liabilities**: -US $ 250000 to 50 Fishermen (by ship owner) -US $ 9 million over the next few years (P&I Club) -MOL Charitable Trust" (the Trust) 800 million Yen (US $ 7.2 million) - MUR 5100 (Approx. US $ 122) for registered fishermen monthly by Mauritius government
International Conventions Apply Bunker Convention 2001 LLMC 1976	**Challenges Faced** Sulphur Fuel COVID-19 Lack of accessibility to shore line

Figure 7: Summary of the mv Wakashio incident (Source; Author)

6.2 Recommendations

Based on the conclusion, the research recommends conducting a socio-economical and human health impact study of oil spill disasters.

- It is recommended to conduct a policy level post-disaster intervention and determine which interventions are essential in reducing losses from a possible spill event.

- It is recommended to make policy and planning aimed at reducing the likelihood of oil spills, providing effective emergency response, and facilitating recovery.

- Based on the conclusion, the research recommends conducting a comparative study of oil spill accidents that occurred during and before the COVID-19 pandemic.

- For further research, it is recommended to develop a model which can provide scenarios of potential oil spill impacts in particular localities.

- It is recommended to conduct further research on the impacts of low-sulphur fuel in different marine environments and recommend responses.

- It is recommended to conduct further research on the impact of the institution of health measures such as quarantine, travel restrictions, delayed logistics etc., on oil spill response and guidance on accounting for such measures in oil spill contingency plans.

- It is recommended to conduct further research on the challenges of small island states in preparing for and responding to oil spills.

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Appendices

Appendix A: Time line of the mv Wakashio incident (Source: safety4sea, 2021)

Date	**Incident**	**Remarks**
04th July 2020	The Panamanian-flagged MV Wakashio departs from Lianyungang, China, bound for Tubarão, Brazil, with 20 crew on board and no cargo, but having 3,894 tons of low-Sulphur fuel oil, 207 tons of diesel and 90 tons of lube oil on board.	
14th July 2020	Stopped in Singapore for fuelling	
23rd July 2020	mv Wakashio entered into the EEZ of Mauritius	
25th July	The ship ran aground at Pointe d'Esny, a known sanctuary for rare wildlife.	
26th July 2020	The government of Mauritius activated National Oil Spill Contingency Plan	
31st July 2020	The advance team of the salvage company arrived on site by airplane.	It required a longer time than a normal dispatch due to require PCR testing
04th August 2020	The second team of the salvage company arrived on site aboard the salvage boat	The ship-owner arranged salvage operation began, but was hampered by adverse weather.
05th August 2020	A minor oil slick was observed surrounding the vessel	It was still assumed that the country's contingency plan was sufficient and that 'the risk of oil spill was still low.

06th August 2020	The vessel began flooding and sinking. It then split into two and spilled at least 1,000 tons of oil into the Indian Ocean	Mauritius authorities were trying to control the spill.
07th August 2020	Prime Minister Pravind Jugnauth declared a national environment emergency.	*Mauritius government said "this is the first time that we are faced with a catastrophe of this kind and we are insufficiently equipped to handle this problem.*" Then Mauritius called for international help once the scale of the emergency became apparent and quickly overwhelmed the resources and capacity of the country's national contingency plan
08th August 2020	Two supporting tankers, MY Elise and MT Tresta Star arrived close to mv Wakashio	Two tankers were used to get the pumped out fuel from mv Wakashio
08th August 2020	Extent of the slick seen around the protected Ile aux Aigrettes islands and heading toward the historic Port City of Mahebourg	
09th August 2020	Deployment of the handmade oil protection booms along the Mahebourg Waterfront and around the Blue Bay Marine Park	Thousands of volunteers in Mauritius gathered handmade oil protection booms which made out from dried sugar cane leaves
11th August 2020	Oil slick has expanded to almost ten times its original size since the vessel first started leaking heavy oil into the coastal waters on 6th of August. Further, the front of the vessel rising out above the water as the crack along its hull widens.	Synthetic Aperture Radar (SAR) satellites showed that the size of the oil slick and high resolution satellite image from Planet revealed the crack of the hull
12th August 2020	3000 tons of fuel were removed from the ship with the help of helicopter and to another ship also owned by Nagashiki Shipping.	

12th August 2020	IMO announces it has deployed an expert, jointly with the UN Office for the Coordination of Humanitarian Affairs (UN OCHA),	To support the Government of Mauritius by providing technical advice on issues related to oil spill response.
15th August 2020	The ship breaks in two with 166 tons of fuel on board	Waves 4.5 meters high hinder clean-up.
19th August 2020	Refloating operation of the forward part of the hull was completed	
19th August 2020	NGO Greenpeace warns of the severe environmental consequences after the government's decision to sink the front part of the vessel.	
22nd August 2020	Operations to sink the forward part of the ill-fated vessel are completed, despite environmental concerns.	
23rd August 2020	The first clean-up equipment sent by MOL, has arrived in Mauritius	
26th -28th August 2020	At least 40 dead dolphins gradually wash up on Mauritius's shore	Suspicions that the oil spill is to blame
28th August 2020	Government of Mauritius declared the area from Trou d`Eau Douce to Le Bouchon ban on fishing, swimming and all other marine activities	
29th August 2020	Thousands of people demonstrate in Mauritius over the government's handling of the incident	

08th September 2020	The Panama Maritime Authority, collaborating in the accident investigation, issues the first official statement, attributing the grounding to wrong charts	
11th September 2020	MOL announced to provide long-term contributions to the environment and the society of Mauritius	With the support and cooperation of experts and organizations with specialized knowledge of environmental restoration and protection, and working closely with the government of Japan
05th November 2020	Japanese ship-owner, Nagashiki Shipping, appoints Chinese salver, Lianyungang Dali Underwater Engineering, to start the removal operations for the stern of the ship.	
18th December 2020	Japanese MOL, the charterer of the vessel, releases internal investigation report on the incident	Identifying the crew's unsafe behaviour probable cause of the incident, and issues a series of safety measures to prevent such incidents in the future. The measures announced aim, among others, to address the lack of safety awareness and boost ship operation quality
21st June 2021	MOL has established the "MOL Charitable Trust" (the Trust) in the Republic of Mauritius	As part of its benevolent and philanthropic actions to support activities for the public benefits of Mauritius and its people to address the impacts of the oil spill

Appendix B: Interview Guide

(1) Could you explain the specific role of your organization in oil spill contingency planning, preparedness, response, and co-operation.?

(2) Could please describe involvement of your organization in liabilities and compensation process?

(3) Would you like to share your experience in managing any previous oil spill, especially in island states? And also, your experience in Wakashio incident

(4) Would you mind sharing effectiveness of the Mauritius oil spill contingency plan during the Wakashio incident?

(5) Could you please describe the challenges you faced during mv Wakashio incident?

(6) Based on the mv Wakashio experiences what measures could be taken to overcome contingency plan implementation issues?

(7) Could you explain your perspective in regional and international cooperation during this Wakashio incident?

(8) Would you like to comment on the international conventions regarding the oil spills preparedness and response and legal regime for oil pollution damage?

(9) What is your opinion on the adequacy of current international instruments addressing oil spills such as Wakashio incident and States?

(10) Could you explain your perspective about why Island States are not able to effectively manage the oil spills after having the oil spill contingency plans and the complying all the international instruments/ conventions regarding the oil spills

Appendix C: Personnel mobilized during the m.v. Wakashio incident

Country/ International Organization	Experts	Designation	Area of Expertise	Arrival Date
France/Reunion Island	Body Jacques	Commander of Frigate - Liaison Officer	Evaluation, needs assessment, strategic response development for short, medium and longer terms, preparation of deployment and response plans	07-Aug-20
France/Reunion Island	Abeilard Anton	Expert DMSOI - POLMAR - Ministry of Ecological and Solidarity Transition	Advise the NCGs, SMF and other relevant actors on deployment on site	07-Aug-20
France/Reunion Island	Lortet Alan	Master - Anti-pollution cell of the naval base - French Navy	Advise the NCGs, SMF and other relevant actors on deployment of resources on site (land and sea)	07-Aug-20
France/Reunion Island	Bailly Gaelle	Captain	Expert from CEPPOL - Center of Practical Expertise in Antipollution Control	17-Aug-20
France/Reunion Island	Lesven Bruno	Civil	Expert from CEPPOL – (Center of Practical Expertise in Antipollution Control)	17-Aug-20
Japan	Imai Ken	Senior Director of Japan International Cooperation	Advise the NCGs, SMF and other relevant actors on deployment	11-Aug-20

		Agency (Assistant Team Leader)	of resoures on site (land and sea)	
Japan	Takechi Keiji	Coast Guard Officer, Expert on Oil Spill	Advise the NCGs, SMF and other relevant actors on deployment of resoures on site (land and sea)	11-Aug-20
Japan	Otsuka Hisashi	Coast Guard Officer, Expert on Oil Spill	Advise the NCGs, SMF and other relevant actors on deployment of resoures on site (land and sea)	11-Aug-20
United Nations	Gelas Pierre	UN Office for Coordination of Humanitarian Assistance	Assess, evaluate and develop strategic response for short, medium and long term	11-Aug-20
United Nations	Masibo Helen	UN Office for Coordination of Humanitarian Assistance	Environmental and social impact assessment team	11-Aug-20
United Nations	Sommerville Matthew	Independent oil spill expert deployed by International Maritime Organisation/UNEP/OCHA	Environmental and social impact assessment team	11-Aug-20
United Nations	O'connell David	UN Office on Drugs and Crimes	Environmental and social impact assessment team	11-Aug-20
United Nations	Nallainathan Amalraj	International Migration Organiation	Environmental and social impact assessment team	11-Aug-20
United Nations	Bogdan Silviu Danila	International Migration Organiation (IOM)	Environmental and social impact assessment team	13-Aug-20
United Nations	Kwenin Charles	UN IOM Regional Director		13-Aug-20

India	Das Amitava	Commandant	Advise the NCGs, SMF and other relevant actors on deployment of resoures on site (land and sea)	16-Aug-20
India	Siddiqui Arif Iqbal	PSE(P)	Advise the NCGs, SMF and other relevant actors on deployment of resoures on site (land and sea)	16-Aug-20
India	Raj Prem	PSE(P)	Advise the NCGs, SMF and other relevant actors on deployment of resoures on site (land and sea)	16-Aug-20
UK	Dr Suzanne Ware	Chair of England's Pollution Response in Emergencies		20-Aug-20
UK	Dr Phillippe Bersuder	Senior analytical chemist		20-Aug-20