Assessment of Kenya's capacity to effectively prepare for and respond to oil spill incidents

Stellamaris Ndeve Muthike
ASSESSMENT OF KENYA’S CAPACITY TO EFFECTIVELY PREPARE FOR AND RESPOND TO OIL SPILL INCIDENTS

By

STELLAMARIS MUTHIKE

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2018

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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: 18th September, 2018

Supervised by: Professor Ronan Long

Supervisor’s affiliation: Director, WMU-Sasakawa Global Ocean Institute
Nippon Foundation Professorial Chair
Ocean Governance & Law of the Sea

WORLD MARITIME UNIVERSITY
Title of Dissertation: Assessment of Kenya’s Capacity to Effectively Prepare for and Respond to Oil Spill Incidents

Degree: Master of Science

This dissertation assesses Kenya’s capacity to effectively prepare and respond to oil spill incidents and compares it to recommended international practice. The study is based on analysis of available data and questionnaires administered to personnel involved in oil spill preparedness and response in Kenya as well as International Organizations involved in oil spill response and training.

Globally sea borne trade has been increasing and this has reflected in Kenya where the country has embarked on expanding its shipping industry. This exposes the country to the risk of oil spill and further compounded by busy tanker route through the territorial sea and exclusive economic zone to the Middle East. Kenya is fortunate not have experienced a large oil spill incident previously. The country has ratified OPRC Convention and adopted national systems in effort to implement the provisions of the convention.

The findings show that Kenya put some measure towards giving full and complete effect to OPRC convention. The country has designated oil spill competent authority in preparedness and response. The Government in collaboration with oil companies has established an equipment stockpile in accordance with international requirements. Personnel from oil companies and government have been trained in oil spill preparedness and undertaken oil spill response exercise. However, the trainings and exercise were found to be inadequate to handle large spill. It was further found that Kenya has a draft National Oil spill response contingency plan and draft dispersant use policy. The country lacks specific regulations on oil spill preparedness and response.

This dissertation assesses whether Kenya is adequately prepared to handle large spill under the current response regime and gives recommendations on the key areas for improvement.

Key words: Oil spills, Preparedness, Assessment, Contingency Plan, Kenya
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<tr>
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<tbody>
<tr>
<td>CLC ’92</td>
<td>International Convention on Civil Liability for Oil Pollution Damage</td>
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<tr>
<td>EEZ</td>
<td>Exclusive Economic Zone</td>
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<tr>
<td>EMCA</td>
<td>Environmental Management and Co-ordination Act</td>
</tr>
<tr>
<td>EMSA</td>
<td>European Maritime Safety Agency</td>
</tr>
<tr>
<td>FUND ’92</td>
<td>International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage</td>
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<tr>
<td>GEF</td>
<td>Global Environment Facility</td>
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<tr>
<td>GIS</td>
<td>Geographical Information System</td>
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<td>ICS</td>
<td>Incident Command System</td>
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<tr>
<td>IMO</td>
<td>International Maritime Organization</td>
</tr>
<tr>
<td>IOGP</td>
<td>International Association of Oil &amp; Gas Producers</td>
</tr>
<tr>
<td>IOPC Funds</td>
<td>International Oil Pollution Compensation Funds</td>
</tr>
<tr>
<td>IOPS</td>
<td>Early Oil Pilot Scheme</td>
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<tr>
<td>IPIECA</td>
<td>International Petroleum Industry Environmental Conservation Association</td>
</tr>
<tr>
<td>ITOPF</td>
<td>International Tanker Owners Pollution Federation</td>
</tr>
<tr>
<td>KMA</td>
<td>Kenya Maritime Authority</td>
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<tr>
<td>KOT</td>
<td>Kipevu Oil Terminal</td>
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<td>KPA</td>
<td>Kenya Ports Authority</td>
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<td>LAPSSET</td>
<td>Lamu Port-South Sudan-Ethiopia-Transport</td>
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<td>MARPOL</td>
<td>International Convention for the Prevention of Pollution from Ships</td>
</tr>
<tr>
<td>MT</td>
<td>Marine Tanker</td>
</tr>
<tr>
<td>MV</td>
<td>Marine Vessel</td>
</tr>
<tr>
<td>NCTTCA</td>
<td>Northern Corridor Transit and Transport Coordination Authority</td>
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<tr>
<td>NEBA</td>
<td>Net Environmental Benefit Analysis</td>
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<td>Acronym</td>
<td>Full Form</td>
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<tr>
<td>NOCK</td>
<td>National Oil Corporation of Kenya</td>
</tr>
<tr>
<td>OPRC</td>
<td>International Convention on Oil Pollution Preparedness, Response and Co-operation</td>
</tr>
<tr>
<td>OSMAG</td>
<td>Oil Spill Mutual Aid Group</td>
</tr>
<tr>
<td>OSRL</td>
<td>Oil Spill Response Limited</td>
</tr>
<tr>
<td>PDU</td>
<td>President’s Delivery Unit</td>
</tr>
<tr>
<td>RMRCC</td>
<td>Regional Maritime Rescue Coordination Center</td>
</tr>
<tr>
<td>SwAM</td>
<td>Swedish Agency for Marine and Water Management</td>
</tr>
<tr>
<td>TEU</td>
<td>Twenty Equivalent Unit</td>
</tr>
<tr>
<td>UNCTAD</td>
<td>United Nations Conference on Trade and Development</td>
</tr>
<tr>
<td>UNEP</td>
<td>United Nations Environment Programme</td>
</tr>
<tr>
<td>USCG</td>
<td>United States Coast Guard</td>
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CHAPTER 1

1.0. INTRODUCTION

1.1. Background

Maritime transport plays a major role in facilitating international seaborne trade. According to the UNCTAD maritime review report of 2017, more than 80% of trade is carried by sea internationally. In 2015, 26.6% of the total seaborne trade was oil and oil products (UNCTAD, 2017). Global seaborne trade is projected to increase over the coming years due to population growth, emerging economies and economic growth in developing countries (European Technology Platform Waterborne, 2016; UNCTAD, 2005). It is estimated that by 2030 crude oil supply will rise from 38% to 63% (Lloyds Register, 2013). Increase in maritime traffic over the years has dramatically increased the risk of vessel source pollution from shipping (Tornero & Hanke, 2016).

Studies have also found that 24% of oil spilled into marine environment is caused by shipping and oil transportation activities and 80% results from normal shipping operations (Vanem, Endresen, & Skjong, 2008). In 2017, it was found that 7000 tons of oil were spilled into marine environment (ITOPF, 2017). Out of these, 5000 tons were caused by the sinking of a tanker in the Indian Ocean (ITOPF, 2017). Between 2010 and 2017 approximately 47,000 tons of oil were released into the marine environment from 10
incidents. Besides, the frequency of occurrence of oil spill incidents has been decreasing over the years (ITOPF, 2017).

On the other hand, it should be noted that the occurrence of one incident may have a tremendous effect on the environment. A well-known case in point is Deep Water Horizon, which occurred in 2010 due to explosion and sinking of offshore oil rig releasing 3.19 barrels of oil into marine environment resulting to substantial financial loss and damage to the marine environment (The Ocean Portal Team, n.d.; Ramseur, 2010). The enormous financial implication and severe damage to marine environment call for continuous improvement to reduce the number of incidents (Ramseur, 2010). Oil spills result from shipping operations including collisions, grounding, hull rupture, cargo stevedoring, bunkering, fire and explosions (Ng & Song, 2010; ITOPF, 2017). Other causes of spills include accidental spills from offshore drilling platforms, storage and regular maintenance activities (Environmental Pollution Monitoring Centers, 2016).

When oil spills occur in a marine environment, it may impact on marine organisms, shipping activities, tourism, industries, mangroves and saltmarshes, fishing and maritime culture. Oil penetrates into feathers of seabirds and fur of marine animals thereby affecting their floating capability and body heat retention (Dalton & Jin, 2010). The extent of impacts of oil spill depends on the quantity and characteristic of the oil spill, prevailing weather condition, site characteristic, timing (breeding or spawning time), its behavior in marine environment and oil spill response techniques used (ITOPF, 2017; Tornero & Hanke, 2016).

To ensure oil spill prevention, preparedness and response, the International Maritime Organization (IMO) has adopted international and regional regulations for ship-source pollution (Tan, 2005). The principal conventions adopted by IMO include Convention on the Prevention of Pollution from Ship (MARPOL), International Convention on Oil Spill Preparedness, Response and Cooperation (1990), International Convention on Civil

The OPRC Convention provides that parties to the convention should have a national system for responding immediately and effectively to oil spill incidents. Member states are required to designate a competent Authority for oil spill preparedness and response, national operational contact points and Authority in charge of requesting for assistance. The convention requires states to have a contingency plan on oil spill preparedness and response taking into account OPRC guidelines. The agreement requires states to maintain a stockpile of equipment, programme of exercise, communication plans and mechanism for coordination and mobilization of resources (IMO, 2018; Moller, 2003).


The IMO in conjunction with United Nations Environment Programme (UNEP) and other international organizations have supported the development of regional agreements and capacity building programmes in oil spill preparedness and response. The Indian Ocean sub-regional plan was developed in the East Africa region (Khalimonov, O., 1999; Ronald, 2011). The Western Indian Ocean developed an initiative, Western Indian Ocean Marine Highway Development, and Coastal and Marine Contamination Prevention Project, which ran for five years from 2008 to 2012. The project entailed development of contingency plans by countries in the region including Kenya, Tanzania, Comoros, Mozambique, Madagascar, South Africa and Tanzania (UNEP, 2017).
Kenya is a state party to various IMO’s instruments including the International Convention on Oil Pollution Preparedness, Response, and Corporation, 1990 (IMO, 2018) which is the backbone of the oil spill response.\(^1\) The Kenyan Constitution provides that every convention that Kenya ratifies forms part of Kenyan law (Kenya law, 2010). Moreover, it is common practice to implement the conventions to give them full effect of law and to ensure enforceability. In this case, the Merchant Shipping Act is the principal legal instrument that provides a legal basis in national law for conventions that Kenya has ratified pertaining to marine environmental protection.

The importance of the regional regime cannot be overemphasized as Kenya has experienced growth in seaborne trade with a record of over 1 million TEU and 27.23 million tons of cargo reported in the year 2016 at the Port of Mombasa. In addition, Kenya envisions to relocate its Kipevu Oil Terminal to an offshore terminal near Dongo Kundu. The new terminal is expected to have sufficient capacity to dock four vessels with a combined capacity of up to 200,000dwt. The discharge of heavy fuel oil, crude oil, DPK aviation fuel, Ago diesel, and PMS petrol will take place in this terminal (KPA, 2017). Kenya has started exploitation of crude oil in the inland well located in Turkana, which was first discovered in 2013. Studies conducted at the site indicate a capacity of 70,000 barrels of crude oil per day (the Irish Oil Major Tullow, 2017). The oil is currently transported to Mombasa storage facility, and there are plans to export through the Port of Mombasa to international markets (PDU, 2017).

Kenya lies in important shipping lane for tankers on route from South Africa to the Middle East, Europe and Asia. It is estimated that 500 trips are made along this route per year with 500 million tons of oil being transported (Raj H Prayag, 2014). Over the years, it noted that the number of a huge tanker and traffic of supertanker is on the rise (Raj H Prayag, 2014).

\(^1\) Date of accession by Kenya 21st July, 1999
1.2 Problem Statement

The risk of an oil spill occurring in Kenyan waters is high due to busy tanker route from the Middle East passing through Kenyan territorial sea and the exclusive economic zone. Pollution in the high seas may impact on Kenyan Exclusive Economic Zone (EEZ) by drifting of the slick (KMA, 2014). Other risks may result from the various container and tanker ships calling the Port of Mombasa, oil and port terminal operations, future Lamu Port, expansion of Port of Mombasa and increased offshore oil and gas exploration poses risks of oil spill incidents (KMA, 2014). The fact that Kenya has plans to export crude oil from Turkana through the port of Mombasa increases the risk of pollution during the loading of marine tankers (PDU, 2017). An illustrative example of the risk is demonstrated by an oil spill incident that arose in 2005 when the vessel Mt Ratna Shalini (5,5178 GT) punctured its hull while berthing at the Port of Mombasa oil terminal. About 200 tonnes of oil spilled into the sea. This oil spill spread on shoreline impacting on tourism, mangroves, port operations, fishing, and marine organisms. The report from the incident identified weaknesses in the current regime and recommended the need to review the existing regime for effective oil spill response in the future (CTX, 2005).

Clearly, the risk of oil spill thus remains a contemporary one and demands continuous evaluation and the development of appropriate responses by Kenya aligned with best international practices and treaty obligations.

1.3 Aims and Objectives of the study

1.3.1. Aims

Expansion of port and shipping sector, the proposed construction of Lamu Port, along with other future planned offshore oil terminal and offshore oil and gas activities, poses an increased risk of oil spill incidents in Kenya. The Kenyan Government has put some measures in place to address this risk including by ratifying OPRC 1990 and adopted a national system for preparing and responding to oil spill incidents. The aim of this research
is to assess and bridge the gaps in the current regime with a view to enhancing Kenyan capacity to prepare and respond to large oil spill incidents.

1.3.2. Objectives

The objectives of the study are as follows:

i. To assess the adequacy of the National Oil Spill Response Contingency Plan as a guide for oil spill preparedness and response in Kenya;

ii. To determine the appropriateness of response equipment and supporting resources;

iii. To identify the training needs for Kenya for effective oil spill preparedness and response;

iv. To evaluate the equivalency of current preparations and response regime to international standards;

v. To assess the challenges and barriers of effective implementation of OPRC in Kenya.

1.4 Key assumptions and potential limitations

The study on Kenya's capacity to adequately prepare and respond to oil spills reveals that this is a cross-cutting field with roles and responsibilities to oil spill response allocated to different government agencies, oil companies, and shipping agencies. It is assumed that the participants in the research will give information honestly and in a non-biased manner. In this context, the researcher believes that the criteria used to select the participants is appropriate and that they have all been involved in oil spill response, trained in oil spill response and exposed to the same set of conditions in oil spill response. The researcher assumes that the sample chosen for data collection gives a real picture of the larger community. It is also expected that the participants are willing to participate and have no hidden motive towards shaping the outcome of the research.
In general, information from these agencies is rarely published or updated on individual websites. As a result, it is a challenge for the researcher to retrieve all the necessary information for analysis for the purpose of the present study.

1.6 Research outline

The dissertation will comprise of seven chapters. Chapter one will cover the background of the study, stating the problems that Kenya is currently facing and provides the general justification for the need to research this particular topic. This chapter will also outline the aims and objectives, key assumptions and possible limitations of this study. Chapter 2 will review the literature from different authors on effective oil spill preparedness and response. Chapter 3 describes an overview of oil spill incidents, oil spill preparedness and response in Kenya outlining contingency planning, workforce, equipment, and sensitivity mapping. Chapter 4 will cover the methodology. Chapter 5 and 6 contains data analysis and discussion. Chapter 7 concludes the dissertation, recommending solutions to existing gaps and challenges in Kenya's capacity for oil spill preparedness and response. The final chapter includes a roadmap aimed at implementing the research recommendations.

1.7 Conclusion

From the above information, it is evident that the risk of an oil spill occurring in sea areas under the sovereignty and jurisdiction of Kenya is high. In realization of blue growth potential to fuel economic growth, Kenya is in the process of constructing a new port in Lamu and the relocation of its oil terminal to accommodate bigger vessels. Increases in seaborne trade from sea route to the Middle East further places the country at risk in case of an oil spill adjacent to the coast of Kenya. Accordingly, it is relatively easy to conclude that it is of paramount importance that Kenya should review its national systems to reflect the currents oil spill risks. Primarily the study comes down to one fundamental question: Is Kenya's current oil spill preparedness system fit for purpose and capable of responding to a major spill?
CHAPTER 2

2.0. LITERATURE REVIEW

2.1. Introduction

Much research has been conducted on effective oil spill preparedness and response (Chilvers et al., 2016; De Wolf, 2013; Ha, 2018; Manzer Communications, 2016). According to IPIECA-IOGP 2015, a successful oil spill response should have elements essential for oil spill response including: an incident management system; robust stakeholder involvement conversant with tactics and strategies to oil spill response; as well as an understanding of tiered response by oil spill responders and ethical decision making. It is important to note that regardless of strong oil spill preparedness, oil spill may still occur. The essential element is containing the spill and minimizing its environmental, social and economic impacts.

According to Moller 2003, different perceptions determine how oil spills are viewed and the level of contingency planning. Good oil spill preparedness leads to an effective response in case an oil spill occurs. The study notes that proper preparedness is hindered by other pressing demands in countries such as the lack of finance, human and institutional resources. The study also found out that countries are at risk of pollution not only by oil tankers calling their ports but also by tankers destined to other countries which transit through coastal waters (Moller, 2003). Effective response reduces public concerns in the event of an oil spill and optimizes on return on effort expended. The study review does
not however specify the areas of improvement in preparation for oil-pollution in regional seas (Moller, 2003).

Increase in petroleum activity has spurred new partnership collaborations and the creation of innovative technologies for future oil spill response. Despite the many networks and technologies adopted, there are many challenges experienced in the effort to achieve a fully functioning oil spill emergency preparedness (Knol and Arbo, 2014).

2.2. Key elements to successful oil spill preparedness

2.2.1. Regulations on oil spill preparedness and response

The manual on oil spill risk evaluation and assessment of response preparedness identify aspects of readiness including the following: legislation and regulation; contingency planning; response equipment and support resources; along with the need to conduct appropriate training and exercises. The 1990 OPRC Convention adopted by IMO encourages countries to put in place various legislation and regulation in support of oil spill preparedness. More specifically, the law should include provisions on oil pollution emergency plans, oil spill reporting procedures, regional and national preparedness and regional cooperation (IMO, 2010).

2.2.2. Incident Management system

A successful oil spill response entails an effective incident management system together with stakeholder engagement programme, that ensures good strategies and practices are put in place should an oil spill occur (IPIECA-IOGP, 2015). Effective incident management system involves establishing command and control to response activities. It incorporates integration of several organizations within the organization structure promoting efficient response (IMO, 2010). Notably, a team approach mainly consisting of experts from different organizations is more effective than individual organization structure for all the networks involved (Kurtz, 2008a).
2.2.3. Oil spill response contingency plan

The critical element to respond to particular oil spill incident is the existence of a contingency plan which is well tested and that links oil spill risks with the ability to respond taking into consideration the impacts to the environment. In addition, the plan should include scenarios matched with response strategy and capability consisting of a procedure for external assistance through a tiered approach. The contingency plan should be deliverable and capable of responding to the worst case scenario (Knol and Arbo, 2014).

2.2.4. Oil spill response community

Due to the complexity of the operation, there is need to incorporate expectations and priorities from all key players in the industry including oil companies, government agencies, shipping interests, and local communities to work together effectively towards achieving the common goal of managing and responding to a spill. Primarily, there is the need for government agencies and local communities to cooperate in effective communication, decision making, policies on response techniques and to set goals which are attainable (IPIECA-IOGP, 2015). However, the author did not include mechanisms for mutual and support agreements between industry and government agencies as well as different levels of preparedness. The literature points out that organizational networks should form the basis on which oil spill preparedness is carried out (Kurtz, 2008a). Consequently, there is a need to involve fishers in oil spill preparedness and response activities (Knol and Arbo, 2014).

2.2.5. Response techniques

To respond effectively to oil spills various oil spill response methods have been adopted including mechanical methods, chemical methods, bioremediation and in situ burning. New technologies are continuously evolving. For instance, the South Baltic Oil Spill
Response (SBOIL) has rolled out research on Biobind, an environmentally friendly technology for oil spill response (Nilsson, Dalaklis, Larsson, & Pålsson, 2018). The oil spill method adopted is tailored by the environmental conditions, type of oil and its impacts on marine organisms. Crucially, as is evident from the specialist literature, response capability to an oil spill response is closely interlinked to oil spill preparedness and effectiveness of oil spill response techniques (Wang, Liu, Yu, & Zheng, 2018).

2.2.6. Oil spill risk assessment

For proper oil spill preparedness, there is a need to conduct an appropriate risk assessment identifying possible scenarios and response strategies that can be adopted. Similarly, studies on the trajectory of spilled oil, estimation of environmental and economic damage caused by pollution and monitoring on the distribution of oil using remote sensing images are essential (IMO, 2010).

2.2.7. Oil spill response training

Oil spill response training forms the basis of ensuring that a well-prepared team is able to face an oil spill incident. In this context, the use of crisis simulations during drills provides an opportunity to practice emergency operation skills. Training simulations also aid in identifying the challenges that may be faced during the real incident and proposal of adopting strategies to overcome such problems. Additionally, it brings about interactions through communication that often results in establishing strong team bonds (Kurtz, 2008b; IMO, 2010).

Oil spill preparedness is limited to the internal working of the organizations. Organizations first responders and other networks should be adequately trained through crisis simulations, as the latter provide opportunities to practice oil spill response skills. Training builds trust among organization networks hence improving communication. Most of the research cites the inefficiency of backup resources in many organizations
(Kurtz, 2008a). From the past oil spill incidents, it is evident that volunteers usually play a vital role in oil spill response such as the significant spills in Europe from the Prestige and the Amoco Cadiz. In both instances, considerable work was undertaken by coastal communities in Spain, Portugal and France, which had to bear the full brunt of the environmental damage (European Union, 2003). There is considerable support for the view that there is a need for the volunteers to undergo regular training sessions and exercises for professionalism and efficiency in operation (IPIECA, 2015).

2.2.8. Effective communication

Future oil spill response needs to be proactive to influence the communication to the media and reporting. The response should provide the media with facts and increase the frequency with which information is relayed to influence themes and articles in print media (Chilvers et al., 2016). Lack of senior crisis communications professionals to work closely with senior management of a particular company to communicate to media may result to reputation crisis thus tainting the company's public image as a responsible corporate actor. A report citing a case study of Deep Water Horizon recommends on the importance of an intense crisis communication plan linked with a well-trained team to meet the demand during a crisis (GPO-Oil Commission, 2011). It is imperative for companies to employ senior communication staff on board to advise on the content to be delivered to the media and how it should be communicated (Manzer Communications, 2016).

During a crisis, stakeholders need to be fully informed, safe and connected to measures taken to remedy the situation. This can be achieved through timely, regular communication and honest reporting before, during and after responding to the incident. There is a need to report honestly on what is known and not known for credibility purposes. Communication before a response is vital as it safeguards the image of the company (De Wolf, 2013).
2.2.9. Tiered oil spill response approach

Prevention is regarded as the most important strategy in averting risks associated with any operations. Potential environmental impacts associated with oil spills scenarios can be achieved through the tiered approach of preparedness and response. This approach calls for the integration of oil industries, port and shipping, stakeholders and government agencies for cooperation and partnership. There are three tiers based on whether the level of preparedness and response is local, regional or international (IPIECA - IOGP, 2015).

Tier 1 mainly covers the operator's resource to respond to an oil spill within the area of its operation.

Tier 2 is larger than tier 1 and requires additional resources to respond to oil spill effectively.

Tier 3 calls for international assistance to supplement the efforts of tier 1 and 2 resources.

Resource required in each oil spill incident depends on the type of oil spilled, location, season and volume of oil spilled. Tier response capability is usually determined during the planning phase (IPIECA-IOGP, 2015).

2.2.10 Oil spill Modelling

There are different forms of oil spill modelling, which can form an important aspect of preparations and contingency planning. Thus, for example, Korea has developed globally acceptable models after experiencing large oil spill incidents with Hebei Spirit accident in 2009 (Ha, 2018). Korea adopted the national recovery capacity for effective oil spill response and maintained oil spill inventory for future incidents (Ha, 2018). Future models should be designed to factor in environment, social and economic factors as they may be negatively affected if an improper technique is applied. Monitoring of pollution status can
be achieved through surveillance, predictive modelling, and reports from response features and data (IPIECA-IOGP, 2015).

2.2.11. Sensitivity Mapping

Good environmental sensitivity mapping is key to oil spill preparedness. In particular, it will assist responders to know the most sensitive environmental areas, which are negatively impacted by spill and response options appropriate for specific shoreline types to avoid further damage. Marine pollution alerting system may be used to notify the lead agency of an oil spill incident (IMO, 2010).

2.2.12. Response resources

National response equipment at the national level should be large, effective, systematic, multifunctional with high maneuverability and capable of responding to the worst case scenarios. The response equipment should have a number of characteristics including: be easily mobilized; fast at spill recovery, emergency towing, fast storage, escorting and emergency transferring tanks. The personnel working at national response level should be highly qualified to respond to all major operations at sea, highly sophisticated, strong response capability and highly mobile (Song, 2008).

Lessons learned from past oil spill response have indicated that volunteers normally play a very vital role in major oil spill incidents. They can be deployed in various activities involving shoreline cleanups, messengers, language interpretation as evidenced in the Hebei Spirit incident in 2007 (European Commission, 2008). For quick and effective mobilization of response resources, there should be flexible organization structure, feasible mobilization procedure, proper handling of countermeasures, good coordination, and cooperation. The occurrence of a major incident will require an additional supply of resources from neighbouring countries. Effective coordination and cooperation is important for immediate assistance in the event of oil spill crisis. Significantly, industry
agreements are also key between government agencies and industries for local incidents requiring additional resources (Song, 2008)

2.3. Bilateral agreements with neighbouring states on oil spill preparedness

The occurrence of an oil spill may have a transboundary effect necessitating transnational cooperation and in some instances regional cooperation in response to such incidents. Transboundary oil spill incidents result from tanker routes destined to other countries, ships calling to ports or from offshore oil and gas exploration. Oil spill incidents present specific challenges when they occur in developing countries. The capacity to respond to larger oil spills and resources required may not be adequate despite the level of preparedness at the national level. A case in point relates to the Aragon oil spill incident, which occurred in 1989 concluded on the need for regional cooperation for successful oil spill response (Chazot & Rhodes, 2017). Regional cooperation, therefore, needs to be incorporated during the planning stage taking into consideration channels of communication, awareness-raising, and training at the regional level. Besides, bilateral agreements play an important role in providing an adequate, additional, sustainable and predictable way of implementation to complement national efforts in disaster preparedness (Chazot & Rhodes, 2017).

2.4 Lessons learned from responses to past oil spill incidents

Globally, various oil spill events have directly resulted in environmental degradation and destruction of marine biodiversity. Approximately 596 tanker spills have occurred between 1990 and 2017 (Wang, Liu, Yu, & Zheng, 2018). A well-known case relates to the Macondo oil spill in the Gulf of Mexico caused by an explosion led to release of hydrocarbon into the environment. The total cost to BP, environment and US Gulf Coast economy was approximately $36.9 Billion (Smith, Smith, & Ashcroft, 2011). After the Macondo spill, it was noted that neither industry nor government in the United States anticipated this risk. Proactive measures on safety investment, oil spill equipment and
practices did not move in tandem with the rate at which offshore exploitation was taking place. Regulations and oversight were also overlooked leading to their inadequacy. The government failed to anticipate, prepare and respond to such oil spill incident (Summerhayes, 2011). One of the recommendation by the EPA and BP after the Macondo spill noted the need for an adequate contingency plan, with adequate response and containment equipment, procedures, training and logistics (BP releases "lessons learned.". cover story, 2010; Summerhayes, 2011).

The case of Torrey Canyon which occurred off Southern Coast of United Kingdom spilled 115,000tons of crude oil into the ocean is also very pertinent in so far as it illustrates a number of points. First, no country was prepared to respond to the scale of this particular spill. Also, at the time, the UK government disagreed with various oil companies that offered to salvage the ship and contain the spill. Secondly, due to the use of wrong response strategy, at the end, 120 miles' coastline was contaminated. Thirdly, today cleanup efforts are still ongoing and the oil that was pumped into the quarry at Guernsey is currently being treated, five decades after the spill (DW, 2017). Because of chaotic and delayed response to this particular spill, it was deemed necessary for states to cooperate to face future disasters (Telesetksy, et al., 2017).

Additionally, on November 2002, oil tanker Prestige wrecked its hull spilling 63000 tons of heavy oil spilled into marine environment (Barros, Álvarez, & Velando, 2014). The oil contaminated about 900km of Spanish, Portugal and France coastline. After the Prestige incident, new strategies aiming to improve oil spill preparedness level were adopted by the maritime industry. The industry embarked on the ban of single hull tankers, IOPC fund was founded, traffic separation schemes were modified and new regulations adopted by the International Maritime Organization (Jorge Zaragozá, 2008).

After the Hebei Spirit oil spill response, it was recommended that there is need to develop and implement a robust communication system geared towards providing information to
the public. The system, in this case, can be used in relaying information to media and public on various decisions on strategies adopted in oil spill response and clean-up methods. The research also noted the need to have bunkers or tankers that can be used for storage of recovered oil in the deep sea in the event of severe weather conditions (European Commission, 2008).

2.5. Conclusion

From the literature review, it is important to note that successful oil spill response requires effective oil spill preparedness. First and foremost, the existence of appropriate legislation and regulations adopted and implemented at a national level form the legal basis for the duty to undertake appropriate oil spill preparedness and response. Secondly, there is a need to have a clear and detailed contingency plan for guiding response up to the worst case scenario. Thirdly, it is paramount to have a well-trained oil spill response team with clear, distinct roles. There should be well-established procedures on integrated volunteers into frontline response teams thorough joint training programmes. Fourthly, multi-sectoral organization structure for incident management is essential for effective planning and coordination.

Oil spill response can occur anywhere and at any time despite effective preparedness hence the need for anticipation. Oil spill response equipment and well trained first responders should be stationed at different stations for quick mobilization when the need arises. Government agencies should always anticipate the occurrence of large oil spills and review existing plan through oil spill response drills and exercises. Finally, it should be noted that good cooperation with neighbouring countries is essential in instances where the oil spill exceeds a country’s capability and capacity to respond.

This research will apply the literature review to improve the effectiveness of oil spill preparedness in Kenya.
CHAPTER 3

3.0. OVERVIEW OF KENYA'S OIL SPILL PREPAREDNESS, RESPONSE, AND COOPERATION

3.1. Introduction

Kenya is located in East Africa with approximately 582,650 km$^2$ in land area coverage. It borders Somalia and the Indian Ocean to the East, Uganda to the West, Ethiopia and South Sudan to the North and Tanzania to the South (Obura, 2001). The Kenyan Exclusive Economic zone extends up to 200 nm from the baselines with a total sea spatial coverage of approximately 221,778km$^2$ (Tychsen, 2006). This is approximately half the spatial size of the land area of Kenya.

Mombasa Port serves as a gateway to Eastern African region serving Uganda, Tanzania, South Sudan, Rwanda, Burundi, and Ethiopia. The number of vessels calling at the port of Mombasa has been on the rise making Mombasa Port the leading container port in Africa (KPA, 2017). Lamu Port, South Sudan, Ethiopia Transport corridor aims at bringing together Kenya, South Sudan and Ethiopia. One of the components of the project involves the construction of Lamu Port with 32 berths for large vessels. Crude oil and oil products pipeline will be constructed between Lamu and Isiolo (LAPPSET, 2017).
3.2. Overview of sea borne trade in Kenya

The fast growth of East Africa's economies has resulted in increased vessel traffic at the Port of Mombasa. In response to this, the port authorities constructed a second container terminal, refurbished existing berths and dredged its existing channels (KPA, 2017). In 2016, the Port of Mombasa handled 27.36 Million tonnes of cargo compared to 26.73 in 2015 which represented a 2.4% increase. In 2016, the port reported approximately 1.019 million TEUs placing the Port of Mombasa as the leading container Port in Africa (KPA, 2017). In 2016, almost 1705 vessels called the Port of Mombasa out of which 202 were tanker vessels (NCTTCA, 2017). In other words, Kenya has high tanker traffic and must plan accordingly to reduce the environmental risk of an oil spill. This is clearly evident when one examines the import and export of oil products from Kenya.
3.3. Oil and oil products import in Kenya

Petroleum products contribute to 30% of the total goods imported into Kenya in 2017 (NOCK, 2015). The country is highly dependent on petroleum for fuel besides biomass and electricity. Over the last decade, demand for petroleum products has risen prompting Kenya to import more for its expanding economy. It is estimated that the consumption of petroleum products will increase up to 12 million MT to meet Kenya's Vision 2030 (NOCK, 2018).

Currently, Kenya has two oil terminals, namely; Kipevu Oil Terminal and Shimanzi Oil Terminal. Kipevu terminal which is located on mainland Port Reitz can handle vessels carrying up to 100,000tons of oil. Kipevu Oil Terminal handles 90% of the country's import with other imports destined to other landlocked countries by road and rail. Kenya has plans to relocate the Kipevu Oil Terminal to the offshore terminal which will handle tanker capacity of up to 200,000 dwt (Port Storage Group, 2017; Trade Mark East Africa, 2016).
3.4. Oil Exploration and exploitation in Kenya

In 2013, Kenya discovered its commercial oil-deposits in Turkana and assessment reports indicated deposits of 750 million barrels of oil with a potential of 1 Billion barrels. The appraisal of the oil currently has produced 70,000 barrels of oil per day (Tullow, 2017). Kenya has rolled out the Early Oil Pilot Scheme (IOPS) geared towards establishing physical, logistical and commercial infrastructure for oil export that will enable Kenya to realize its full potential (PDU, 2017). The oil produced is currently being transported to Mombasa by trucks, and plans are underway to export the oil through the Port of Mombasa (Tullow, 2017). Kenya is also expected to expand its oil export business in the future, and plans are already underway to export the oil through Lamu Port upon completion of the port infrastructure (LAPPSET, 2017).

Other areas earmarked for future oil exploitation include Lamu, Anza, and Tertiary Rift Valley Basins (NOCK, 2017).
3.5. History of oil spill incidents in Kenya

Kenya has not experienced a major oil spill incident for the last ten years (OSMAG, 2017). The last incident occurred in 2005 when a single hull vessel MT *Ratna Shalini* while trying to berth at Kipevu Oil Terminal ruptured its hull. The ship was carrying 80,000MT of Murban Crude Oil. Approximately 300 MT was released into the marine environment (CTX, 2005; OSMAG, 2017).

Oil Spill response team deployed 650m long booms and used mechanical recovery with the application of dispersants in some areas. The oil spill impacted on 234 hectares of mangroves spreading on area 7.5km along the coastline. Some of the mangroves were completely destroyed while others were permanently damaged. The oil spill also impacted...
on fisheries and aquaculture. Compensation cost amounting to approximately U$ 9,000,000 was incurred during the incident (CTX, 2005).

3.6. Overview of Oil Spill Preparedness

3.6.1. International Instruments

Kenya has ratified the 1982 United Nations Convention on the Law of the Sea that obliges the country to adopt measures to prevent, reduce and control marine source pollution from among others ships, seaports, offshore installations and oil handling facilities (United Nations, 2018). The Convention provides for member states to ensure that pollution arising from its activities does not spread beyond the areas over which it exercises its sovereign rights (KMA, 2014).


The International Convention on Oil Pollution Preparedness, Response, and Cooperation (OPRC), 1990 provides for the crucial areas of cooperation between the oil industry and government in marine pollution response. The Convention requires member states to develop contingency plans, equipment stockpiling, research and development initiatives, training and exercise programmes as well as oil spill incident notification/ reporting procedures for shipping (Moller, 2003).

Civil Liability Convention provides for strict liability on the ship-owner and requires ship-owner to have compulsory liability insurance. The provisions of the Convention apply to member state territory, territorial sea and the Exclusive Economic Zone (EEZ). The importance of compensation was recognized in the past oil spill incidents including *Prestige and Hebei Spirit 2007* (Kiran & Krishna, 2010).
The International Convention on Civil Liability for Bunker Oil Pollution Damage, 1992 provides for compensation from oil spill incident as a result of fuel carried in ship bunkers. The owners of the vessels are required to maintain a compulsory insurance cover (Hill & Kulkarni, 2017).

The FUND Convention 1971-1992 was established to provide additional compensation to people affected by oil pollution incident. The convention is applicable in the exclusive economic zone and may be used for compensating responders involved in implementing preventive measures. Kenya has ratified the Fund 1992 protocol with compensation payable 135 SDRs and maximum benefit of 200 Million SDR (Kiran & Krishna, 2010).

Kenya is a signatory to the Nairobi Convention, a partnership agreement that is geared towards promoting health rivers, coasts, and oceans in the West Indian Ocean region. The Convention provides a legal basis for coordinating programmes among Contracting Parties aimed to protect the coastal and marine environment (UNEP, 2018).

3.6.2. National Legislation

The conventions that Kenya has ratified have become part of national law by virtue of article 2 of the Kenyan Constitution, which provides that every treaty that Kenya ratifies shall form part of the Law of Kenya (Kenya Law, 2010). Section 410 of the (Kenya Law, 2009) provides for the drafting of regulations on the conventions related to prevention of pollution from the ship. The legislation requires the Cabinet Secretary to make rules implementing conventions including OPRC ’90, CLC ‘92, FUND ‘92 as well as other conventions related to prevention of pollution from ships.

(Kenya Law, 2006) designates Kenya Maritime Authority as the competent oil spill response Authority. The law also provides for the development, coordination, and management of a national oil spill contingency plan for coastal waters. Kenya Maritime Authority is mandated to collaborate with other public agencies and institutions in the
prevention of marine source pollution, marine environment protection and response to marine incidents (KMA, 2014).

The Environmental Management and Coordination Act (EMCA), 1999 provides for states to develop regulations to provide or control and prevention of pollution of the marine environment from among others vessels used in coastal zones and from installations and devices used in the exploration or exploitation of the natural resources of the seabed and subsoil of the exclusive economic zone (Kenya Law, 1999).

3.6.3. National Oil Spill Response Contingency Plan

Kenya has adopted a national system for oil emergency preparedness to deal with oil pollution occurring in areas where it exercises its sovereign rights. In 2010, Kenya developed the National Oil Spill Response Contingency Plan. The plan outlines the list of actions to be taken in the event of an oil spill and different roles assigned to appropriate authorities. The plan also describes communication procedure to be followed including the list of contact person, oil spill inventory equipment and their location, contractors, suppliers, experts, and a map of sensitive areas. The document includes a procedure for compensation and recovery of oil spill damage costs (KMA, 2014).

Major oil companies in Kenya have formed an Oil Spill Mutual Aid Group with the aim of responding to oil spills within the Port of Mombasa. Each oil company is obliged to have an oil spill safety plan and maintain Tier 1 oil spill response equipment (ITOPF, 2017). The Tier 1 emergency response plans complement the national efforts and incorporate a section indicating linkage to the national plan. Kenya Ports Authority and other future port operators along the Kenyan coasts are required to maintain Tier 2 oil spill preparedness for responding to an oil spill within the Kenyan Ports. The level of activation of the tier response plan depends on the classification of the incident. The occurrence of Tier 3 response exceeding the country's capability will compel the Kenya Maritime Authority to seek for regional or international assistance. These can be done directly to
organizations or through oil companies which have subscribed to providing international assistance. The contingency plan is updated after every two years or after a significant incident (KMA, 2014).

3.6.4. Incident Command System

In preparation for oil pollution response, the National Oil Spill Contingency Plan includes the Incident Command System (ICS) which is headed by an Incident Commander. Kenya Maritime Authority is the Incident Commander for Tier 3 oil spill incidents. Below this, is an operation, planning, finance/ administration and logistics sections, which are headed by section heads (KMA, 2014).

The operation section is responsible for formulating initial response decisions, and all tactical activities involving oil spill equipment mobilization and deployment; contracting services; and some responders required an assignment. The section also assists the incident command team in the development of an incident action plan (KMA, 2014).

Planning section determines the oil spill response priorities and sensitive areas that need protection from further oil contamination. It also identifies the response method to be used dependent on the sensitivity of the area, weather conditions and properties of oil spilled. The section also evaluates, maintains, stores and share information during the incident (KMA, 2014).

The logistics section is responsible for contracting services and supply of equipment and facilities required for oil spill response. The finance/ administration section provides support to the Incident Command System. It documents services, contracts, expenditures, equipment losses and depreciation (KMA, 2014).
3.6.5. Response Coordination

Response coordination for oil pollution is through the Regional Maritime Rescue Coordination Centre (RMRCC). Whenever an oil spill incident occurs, it is reported by the public, maritime police, shipmaster or others agencies to RMRCC through a toll-free number (+110). The notification report to RMRCC is required to include the type and volume of the spill; location; source; sea and weather conditions; the state of the incident; and events and actions taken if any. The RMRCC then relays information to Kenya Maritime Authority, Director General, who confirms the report as received. The Director-General will further transmit the information to pollution control (KPA), harbor, County Government and any other relevant agencies. Incidents occurring at the port are reported immediately to harbor master, and the information is relayed to pollution control (KPA) and RMRCC, oil industries and other companies operating onshore facilities are required to report oil spill of any quantity. The report should include the type of discharge, volume, the source of the spill and the time when the spill occurred (KMA, 2014).

3.6.6. Oil spill Mutual Aid Group (OSMAG)

OSMAG was founded in 1992 to create a joint capability for responding to oil spill incidents in Kenya and establish procedures and policies requiring OSMAG members to undertake oil spill response. The non-profit society has approximately 63 members drawn from oil companies importing oil to Kenya. OSMAG maintains a Tier 2 oil spill response equipment stationed at the Port of Mombasa. This equipment undergoes regular inspection and testing in preparation for oil spill response (OSMAG, 2014a).

Oil spill responders are drawn from each member company to form the response action team. The team undergoes training and exercise in preparations for oil spill response. The response action team forms part of the national response action team (OSMAG, 2014b).
3.6.7. Capacity for oil spill preparedness and response

The plan requires that well-trained manpower is available for combating oil spill. Kenya has been coordinating oil spill response training and exercise regularly. The training has been organized at the county level, nationally and regionally. Participants trained are drawn from oil companies, government, and non-governmental agencies (KMA, 2014).

3.6.8. Dispersant Use Policy

The country has developed draft Dispersant Use Policy to guide in the application of dispersants in the event of oil pollution (KMA, 2008). The document addresses the conditions under which dispersants authorized and approved for use in oil spill response to minimize the damage the dispersant may have on the marine environment. The document requires approval for application of dispersants by Environment and Dispersant Advisors (EDAs) in areas less than 10m deep; marine protected areas and waters with mangroves, algae, coral reefs or seagrass which are less than 10m deep (KMA, 2008). All new dispersants to be adopted for use in Kenya is subjected to toxicity text and used according to the Material Safety Data Sheet (KMA, 2008).

3.6.9. Environmental Sensitivity Atlas for Coastal Areas of Kenya

Kenya has developed environmental sensitivity atlas which integrates the requirements of the National Oil Spill Response Contingency Plan. The Atlas provides ecological data on different sensitivities along the Kenyan shoreline to be used as a tool for risk assessment, clean up prioritization and in the selection of oil spill response techniques and methods. The Atlas shows how Kenya discharges international commitments in giving effect to the implementation of various conventions on prevention of pollution from ships including MARPOL 73/78, SOLAS 1979, OPRC 90, CLC 92 and IOPC 92 (Tychsen, 2006).
3.6.10. Regional cooperation

3.6.10.1. Agreement on the Regional Contingency Plan for Preparedness for and Response to major Marine Pollution Incidents in the Western Indian Ocean

The Western Indian Ocean has adopted a regional framework under OPRC 90, namely: The Nairobi Convention and its emergency protocol, the ‘Regional Contingency Plan for Preparedness for and Response to major marine pollution incidents in the Western Indian Ocean’ for preparedness and response to major oil pollution incidents affecting the region. This was based on the Memorandum of understanding signed by the countries in the region on the Implementation of the GEF Western Indian Ocean Marine Highway Development and Contamination Project in 2006. The countries involved are Comoros, Tanzania, South Africa, Kenya, Seychelles, Mozambique, and Mauritius (Ronald, 2011).

The agreement provides a legal basis for assistance to any signatory upon request in case of emergency. At the same time, it does not prevent the signatories from seeking aid from other states or international agreements. In accordance to Article 6 of the OPRC 90 convention, the plan recognizes the competent authorities for implementation of national oil spill response plan as respective national authorities for implementation of the regional plan. The plan designates national operational contact point or points responsible for receipt and transmission of oil pollution reports. The agreement provides for designation of Authority to act on behalf of the state in requesting assistance or to make a decision on whether to render assistance (Ronald, 2011).

3.6.10.2. Regional capacity-building programme

Regional workshops to build capacity on the implementation of the OPRC convention and OPRC-HNS protocol targeting the Western Indian Ocean region have been held at various locations in the Contracting Parties including Kenya. The agenda of the workshops include challenges faced in oil pollution preparedness and response, information exchange and sharing of knowledge of lessons learned from past oil spill response exercises or
response to oil pollution incident. Recently, UN Environment in Collaboration with the IMO has organized for a regional oil spill response training workshop, which was held in Nairobi in June 2018 (ITOPF, 2018).

Indian Ocean Commission played a role in the implementation of the GEF- Western Indian Ocean Marine Highway development and coastal and marine contamination prevention project. Two components of the plan covered capacity building for prevention of contamination of the marine environment and building capacity for regional and chemical response (Raj H Prayag, 2014).

3.6. Conclusion

A review of oil spill preparedness in Kenya shows that the country has made significant progress towards implementation of the provisions of the OPRC Convention and the HNS Protocol. Measures taken include adopting a national system addressing oil pollution preparedness and response. The country has also signed a regional agreement aimed at fostering a regional strategy in preparation to oil spill response.

However, it is important to note that the risk of oil pollution is high due to the growth of the shipping industry and coupled with crude oil export through the Port of Mombasa in the future. Since the last oil spill that occurred in 2005 from MT Ratna Shallini, there is a need to build capacity in anticipation of similar oil spills. Importantly, no regulation directly addresses the issue of oil spill preparedness in the country to ensure that it accords fully with international best practices. This dissertation aims to provide solutions to existing gaps to improve oil spill preparedness in Kenya.
CHAPTER 4

4.0. METHODOLOGY

4.1. Introduction

The research seeks to assess the status of current oil spill preparedness in Kenya to respond to a large oil spill, identify existing gaps and give recommendations on areas for further improvement. The chapter opens by setting-out the methods applied in data collection, analysis, and presentation of the results.

4.2. Sources of data

The data are derived from both primary and secondary sources.

4.2.1. Primary data

Primary data was collected using two sets of electronic questionnaires. One set of the survey was used to solicit the views of stakeholders involved in oil spill preparedness and response in Kenya. The target audience for this questionnaire is personnel who have participated in responding to oil spill incidents, response training or oil spill response exercise in Kenya. The sample was derived from stakeholder institutions including regulatory authority, government agencies, conservationists, oil companies and Oil Spill Mutual Aid Group (OSMAG). This questionnaire was designed to solicit their views on the effectiveness of oil spill preparedness and response in Kenya and what improvements are necessary to improve the current regime.
The second set of questionnaire questions was focused on the work of International Organizations involved in Oil spill preparedness and response. The participants were chosen based on their many years of experience in responding to oil spill incidents, providing expertise and technology in oil spill preparedness and response in the oil and gas industry. The organizations sampled included Oil Spill Response Ltd (OSRL), International Petroleum Industry Environmental Conservation Association (IPIECA), European Maritime Safety Agency (EMSA), United States Coast Guard (USCG), Swedish Agency for Marine and Water Management (swAM), International Tanker Owners Pollution Federation (ITOPF), IOPC FUND and Norwegian Coastal Administration. This was aimed at gathering their opinions on current trends in oil spill preparedness and response and seeks to advise on factors for consideration when reviewing the extent to which Kenya is giving full and complete effect to the implementation of OPRC convention.

4.2.2. Secondary data

The secondary sources of data included IMO publications, ITOPF publications, IPIECA publications, publications by WMU students, oil spill preparedness and response books and journals, reports from past oil spill incidents, publications by KMA and Kenya Government. This approach was used to review the literature on effective oil spill preparedness and response, as well as to review the current status of oil spill preparedness and response in Kenya.

4.3. Thematic and grounded analysis

The qualitative data collected were coded and further organized into themes. The themes were deduced from recurrence or emphasis of individual responses by the participants. In addition to this, the themes were analyzed in comparison with information gathered on the literature review on the essentials of sufficient oil spill preparedness and response. Coded data were then fed into google sheets and quantitative analysis used in analyzing
individual views through demographic grouping. Charts and texts were used for describing responses from the questionnaire. Data collected was further examined in comparison with OPRC guidelines on oil spill risk evaluation and assessment of response preparedness and international standards. The analysis was made with a view to identifying gaps which exist in the current regime and give recommendations for improvement.

4.4. Oil Spill Preparedness Model

The data was analyzed based on five fundamental elements of oil spill preparedness as stated in the manual on oil spill risk evaluation and assessment of response preparedness (IMO, 2010). These elements were deduced from the obligations of the OPRC ‘90 to member states in implementation of the Convention. These include legislation and regulations, contingency planning, response equipment and supportive resources, training and exercises. These elements are closely interconnected with one another as shown in Figure 1 below.
To assess oil spill preparedness in Kenya, a large oil spill incident is defined as an oil spill that exceeds 700 tons (ITOPF, 2017).

The researcher compared the status of implementation of these elements in Kenya with the recommended standards on OPRC guidelines on oil spill risk evaluation and assessment of response preparedness, as well as international standards.
CHAPTER 5

5.0 INTERNATIONAL ORGANIZATIONS’ BEST PRACTICES ON OIL SPILL PREPAREDNESS AND RESPONSE

5.1. Introduction

This chapter covers data analysis and discussions on data gathered from International Organizations. The basis of selection of the organization to participate in the research was based on the various roles they play including responding to oil spill incidents, training, mobilizing oil spill response equipment, compensation, prevention, implementing conventions and offering technical advice on implementation of oil pollution.

5.2. Organizations’ experience in oil spill preparedness and response

According to the research conducted, most of the organizations sampled have responded to more than 20 oil spill incidents annually with some organizations responding up to 50 incidents per year. The oil pollution incidents relate to different tier levels and occur in different regions of the world. (See figure 5).
5.3. Contingency Planning

Responding effectively to a spill will depend on the effort put into preparations by organizations and members involved in the response. Every oil spill incident is unique and presents in itself new challenges different from the past spills.

According to the research conducted, all the respondents acknowledged the need to have a plan to guide the process. Some of the respondents pointed out that the plan serves as a way of defining roles and responsibilities of the different entities involved, outlines response strategies and operational procedures to be adopted, as well as practical measures such as the inclusion of contact database of responders and suppliers.

Moreover, the researcher found out the need for several factors to be considered when reviewing an existing contingency plan. According to the analysis conducted 25% of the respondents recommended the need for risk assessment taking into account new and high-risk areas, which may result in potential oil pollution. The process should adopt simulations of worst-case scenario events, as well as scaling resources including human
resources and equipment required to mitigate such an eventuality. Information from high-risk areas should be detailed. When conducting the risk assessment, it is essential to assess the location of equipment stockpiles to new risk areas and their ease of mobilization. (see figure 6).

The researcher found out that 17% of respondents regarded definition of roles and responsibility as key when reviewing the plan. Each organization should be assigned a role they are familiar with and competent in. The review of the plan should take into account political decisions adopted within the review period for implementation. The review of the plan should take into account mapping out new sensitive areas as high-risk areas to oil pollution.

The researcher established that when developing a contingency plan, there is need to include sources of funds used for mobilization of resources with a well-outlined procedure on how the funds will be applied for oil pollution response. About 8% of the respondents recommended this. About 17% of the participants suggested that the plan should be exercised regularly and lessons learned from the exercises used to review it. Regular exercises enhance familiarity with the plan. The exercises should be conducted regularly
and to a satisfaction level based on the appropriate tier level. Exercising the plan helps to promote team coherence and strengthening the working relationships.

As part of the operational procedures, 17% of the respondents suggested allocation of resources based on the risk assessed. The plan should include a procedure for mobilization of resources in accordance with each response decision.

5.4. Oil spill response training

In all the analyses made, training remained a fundamental aspect to oil spill preparedness. Some of the respondents recommended that the country should train responders based on the worst case scenario. The training should include in-class training, tabletop exercise, and deployment exercise. The results suggested the need to have tailored courses ranging from operation to management. The respondents reiterated that the level of training should be appropriate for the risk identified and took into consideration national policies and response strategies adopted in the plan.

5.5. Effective Management of Oil spill incident

The researcher found that 27% of the respondents suggested on the use of the incident command structure for effective oil spill management. In case of international assistance is required the incident command system facilitates easy integration of foreign support in the response plan. Excellent leadership skills for people designated as incident commander(s) will determine the desired progress and outcome of the response. The results showed that 13% of the respondents recommended proper resource mobilization. The list of resources required should be reviewed at any given time to determine the resources to be deployed to the field and the backup stock available for deployment when needed (see figure 7).
The analysis indicated that 13% of the respondents preferred to have clearly defined roles and responsibilities. The roles and responsibilities should be assigned to each tier level and tested regularly through exercise. When defining roles and responsibilities, it is essential to take into account the planning of human resources required, their constant supply and working in shifts in case of extended operations. The results showed that 13% viewed the key issue of waste management as critical to spill management. The equipment and workforce should be matched to the scale of the spill. Mobilization efforts should be monitored and evaluated often for decision making to determine whether they are appropriate spill size and its severity.

Besides, some of the respondents indicated that proper coordination and effective communication is vital for effective management including action order and subsequent order meetings so that the parties involved understand clearly what they are required to do. In particular, meetings serve as avenues of sharing information on the chain of command, clearing roles and responsibilities, priorities of response among others. Proper
coordination relies on information received from meetings. Effective communication allows for appropriate response decisions to be made.

Some results indicated in determining appropriate response strategy as key to effective management. When deciding the response option to be adopted, priority should be given to methods with less waste generated, less expensive and legally acceptable in that country. Considerations should be made when choosing a particular response technique based on the Net Environmental Benefit Analysis (NEBA).

5.6. Regional cooperation

The researcher intended to find out the areas of collaboration that a country should maintain with its neighbouring states for effective oil spill response. According to the results, 18% suggested the need to have an agreement signed with its nearby states. Significantly in this regard the signing of OPRC 90 convention provides for the country to cooperate with its neighbouring states. Countries should have regional agreements on oil spill prevention and response that allows them to align their laws and strategies and share resources when an incident occurs (see figure 8).
The researcher found that 18% of the organizations sampled recommended the adoption of a joint plan. The country-specific contingency plans should be streamlined and form the basis of a joint plan capable of responding to transboundary oil spill incidents. The analysis also indicated resource sharing as one of the areas of cooperation. Stockpiles with compatible equipment should be on standby in case transboundary mobilization of resources is required. Responders should be mobilized from neighbouring countries to offer assistance when needed. The respondents also noted that custom arrangements for clearance of equipment should be efficient and straightforward, which will allow fast clearance of resources. Some respondents suggested joint training and exercises as a way of improving cooperation. They viewed exercise as a technique in sharing knowledge and maintaining the same level of preparedness. According to the respondents, both training and exercise should be conducted at least once annually. Regional meetings on oil spill response and preparedness could also be organized for this purpose.
5.7. Governance

The researcher sought to find out ways in which a country can improve its governance on oil spill preparedness and response. Approximately 33% of the respondents recommended legislation and enforcement as an effective way of improving governance. States should have specific legislation on oil spill response linked to education and enforcement capabilities. The OPRC Convention compels countries to develop an integrated national framework on oil spill response from an oil handling facility up to national and international levels.

Approximately 33% of the analyses showed that response strategies and policies should be tested quite often and evaluated based on the present risk. This is equally important as the risk may change in the future due to changes in economic activities. The contingency plans should be reviewed regularly including updating the information directory on lists of contacts and equipment.

About 16% of the results recommended on audit and evaluation as a strategy for enhancing governance. Existing contingency plans should be audited and verified by authorities and the exercises evaluated by independent experts. Some of the respondents highlighted on the need for strong commitment in implementing the findings from the audit and evaluation processes (see figure 9).
Nearly 8% of the respondents recommended the need to have a well-outlined compensation plan to guide compensation practices during oil spill response. Some of the respondents suggested that there should be close and constructive contacts between government authorities with responsibilities related to oil spill response.

5.8. Challenges in Oil Spill Preparedness and Response

Preparedness

The researcher found out that 9.1% of the respondents viewed identifying all the risks and finding the appropriate mitigation measures as a challenge. About 18% of the results indicated that many plans are overtaken by time and they do not reflect the current situation on the ground. Thus making them less efficient when certain risks occur. It was also noted that the plans are not updated and tested regularly through exercise. The results also showed that 18% respondents found that it’s a challenge training all of the responders to the requisite preparedness standard. One of the respondents indicated that in some cases effective training and regular exercise is lacking. In addition, real oil spill experience, and unforeseen circumstances cannot be simulated in the classroom environment, this therefore appears as a drawback to oil spill response. According to the results, 18% of respondents regarded logistics as a challenge. Notably, most oil spill response equipment
is not tested and maintained correctly. Oil spill response equipment is not always positioned to the high-risk area which may pose transport challenge (See figure 10).

Figure 10 Challenges faced in Oil spill preparedness

Approximately 18% of the respondents cited lack of coordination as a challenge. The results indicated that roles and responsibilities for the responders are not clearly defined. One of the respondents observed that due to this small units or organizations strike out on their own due to a lack of clear instructions from command on what to do and where to do it. The latter is obviously a command and leadership failure.

Response

The researcher intended to find out the challenges the International Organizations faced in responding to past oil spill incidents. About 46% of the respondents regarded uniqueness of the spill a problem as it occurs in different circumstance ranging from remote location, type of oil spilled, weather and sea state conditions. About 23% of the respondents cited logistics as a challenge. They indicated that in some areas, oils spill response equipment and personnel is not enough while others regarded deployment of oil spill equipment and personnel to the site of the incident a problem.
The results showed a lack of funds to recruit required staff, contractors and procure equipment. About 8% of the respondents viewed the lack of coordination of response experienced on many occasions during the response. The comments indicated that roles and responsibilities are not well defined, which creates confusion during response and consequently jeopardizing coordination. The results further demonstrated political interference, long lasting shoreline cleanup, waste management and lack of national policies on oil spill response.

5.9. Future trends in oil spill preparedness

The researcher sought to find out the emerging issues observed by International Organizations in oil spill preparedness and response over the years. This was to identify future trends that need to be factored into the current oil spill preparedness.

5.9.1. Evolution of oil industry

Approximately 18% of the respondents noted that the oil industry has evolved over the years. The oil industry is growing at a fast rate than the rate at which oil spill response expert number is increasing hence reduced spread of experts in the industry. This
reduction is attributed to automation, downsizing of companies and retirement. Some of the respondents mentioned the frequency of oil spill incidents is reducing over the years making the response skill to fade away. In addition, new people trained in oil spill response have not experienced real scenario.

About 6.3% of the respondents cited collaboration as one of emerging issues. The results indicated that most countries had adopted cooperation as a useful tool for oil spill response. Effective collaboration has been taken by the government and operators in the planning phase for cost efficiency, clarifying expectations and building relationships.

According to the results, 31% of the respondents mentioned that technology has advanced and that this needed to be taken into account in the acquisition and deployment of new resources. The findings noted that there is wider use of drones and unmanned aerial vehicles for situational awareness, remote sensing and monitoring during the response. More specific strategies and equipment have been adopted for oil spill response. One of the answers was that the size of tankers in growing and this might challenge the capability of the existing response system (See figure 12).
6.3% of the respondents mentioned data management and information sharing as one of the emerging issues. The amount of data collected during the oil spill operation is enormous. In future oil, preparedness should include a means to obtain, manage and retain even larger volumes of electronic file sizes. The industry has adopted the use of Geographical Information System (GIS) for information and data management.

Approximately 6.3% of the respondents highlighted public expectations as one of emerging issues. Oil spills are always newsworthy. The media landscape is changing and the use of mobile phone technology has made everyone a potential reporter. In preparedness, there is need to consider communication with stakeholders in a different manner than it is today.

5.10. Discussions

From the above research conducted from International Organizations on oil spill preparedness, it is evident that for an effective oil spill preparedness and response plan, several factors should be integrated together. Efforts made towards preparation for oil spill
response determines how successful the response will be in case of such an eventuality. Oil spill preparedness and response should be backed up with strong regulations relevant to oil spill response coupled with efficient management and command structures on the ground.

Similarly, every oil spill incident is always unique in nature. Accordingly, the challenges likely to be faced in future incidents are difficult to predict. However, preparing to respond to oil spill up to the worst case scenario enables a country to be capable of responding to an oil spill incident of any magnitude. It is essential to have a contingency plan matched with proper risk assessment based on simulation of the likely scenarios. The success of the plan as a guiding document is determined by how well the users of the document are conversant with and how often the material is reviewed and exercised regularly.

The existence of elaborate incident management structure makes coordination smooth during the operational response. The Incident Command Structure should be tailored to reflect the culture of that country. The incident command team should be drawn from various state and non-state agencies based on the resources they can offer for response including responders, personnel, equipment, and authority. The Incident Commander should be chosen based on strong leadership skills as this will determine how flexible and fast decisions will be made if needed.

Guidelines on different response strategies and techniques should be documented for fast decision-making on the response strategy to be adopted during the response. This should be linked to sensitivity mapping of the most sensitive areas that need to be protected or require fast response during an incident. A policy on application of dispersants guides their use of dispersants, especially on sensitive areas. Oil spill response equipment and responders should be matched to the likely worst-case scenario.

From this study, regional cooperation plays a significant role in the case of transboundary oil spill incident. Regional plan featuring the risk in the region should be developed and
domesticated by each country. Joint training, exercises should back the plans, and meetings to ensure the country is at the same level of preparedness. Record of equipment stockpile and contractors available regionally should be kept and availed for each country. The signing of the regional agreement on cooperation enhances the level of individual country preparedness.

As well, the results pointed out the need for good governance in oil spill preparedness. Oil spill legislation should be reviewed often to reflect the current risks and changes in the oil industry. Auditing the plan helps in pinpointing gaps that exist and give recommendations on areas of improvement for proper planning. Engaging experts to evaluate oil spill response exercise will advise on areas that need to be reviewed in preparations to response. Governance serves as the backbone to oil spill preparedness, and its success will influence the outcome of preparedness or response.

Future trends on oil spill preparedness are likely to impede measure already in place. The frequency to which oil spill incidents occur is decreasing, and this has resulted in a new category of oil spill experts whose experience is based on classroom training and simulations. This poses a challenge to oil spill response as the skills for people who have responded to real incidents fades away. There is also a loss of institutional memory. Use of technology for monitoring has resulted in the adoption of Unmanned Automated Vehicles for monitoring the extent of oil spill incident and operations. It is paramount that the UAVs should be tailored for the use of oil spill to avoid redundancy in the system and to becoming obsolete within a short duration. Importantly, ways of electronic communication and social media have made everybody a potential reporter. Therefore, unconfirmed sources of information can be reported before they are verified which may interfere with the operation process. the application of new technologies ought to be tailored for communication in contingency planning with a view to addressing this challenge.
Conclusion

Experience and lessons learned from the international Organization on past oil spill incidents are relevant for countries wishing to review their oil spill response systems in the future. Other countries may emulate successful response strategies applied in responding to previous oil spill incidents.

The lessons learned from this chapter are very relevant and applicable to challenges hindering effective oil spill preparedness in Kenya. Best practices applied by International Organization in oil spill preparedness and response will be used for the case of Kenya to assess whether the country is adequately prepared in the current regime to respond to large oil spill incidents. Emerging trends observed by International organizations are useful for future planning to adopt the oil spill preparedness to future challenges.
CHAPTER 6

6.0. EFFECTIVENESS OF OIL SPILL PREPAREDNESS AND RESPONSE IN KENYA (CURRENT REGIME)

6.1. Introduction

This chapter presents a summary of key findings on the part of research conducted in Kenya to solicit stakeholders' views on the effectiveness of the oil spill preparedness and response in the current regime.

The participants targeted by the research questionnaires were drawn from Government agencies, oil importing companies, conservationist and oil spill response group. The percentage representation of the participants is as indicated in the chart below.

*Figure 13 Stakeholder representation*
The participants were chosen based on their expertise drawn from participation in past oil spill response training and exercises. According to the results, respondents' roles included oil spill response, coordination of oil spill response, training responders, equipment maintenance, environment protection, mapping of the sensitive marine environment and dispersant testing.

6.2. Oil Spill response training exercise

The results indicated that 64% of the respondents have participated in IMO level 3 training, 21% have not been trained up to IMO level 3 training and 14.3% were not aware of their current level of training (See figure 14).

![Figure 14 Oil spill response training](image)

Besides, 57% of the participants agreed that the training was adequate while 35% disagreed with the adequacy of the training. About 7% of the participants were not sure about the relevance of the training they have attended so far (See figure, 15).
The researcher further analyzed the recommendations for future training from the respondents that felt that their current level of training was inadequate. About 58% of the respondents recommended regular training and exercises (See figure 16). The training should include more sessions to increase the number of people being trained. It was mentioned that training should be offered locally and tailored to the scenarios that are specific to Kenya. Some respondents cited that the training is not all-inclusive. Kenya has embraced the so-called Blue Economy and will host a major international conference in this regard in November 2018 (Government of Kenya, 2018). Accordingly, future training should include agencies participating in the blue economy project including Tourism Development Board, Ministry of Energy, Universities, Salt processing plants, and National Youth Service. Some respondents mentioned the need for both responders and trainers to undergo regular refresher training.

*Figure 15 Adequacy of training*
Figure 16 Ways of improving training

About 17% of the participants suggested that regular exercises with case scenarios derived from risks should be conducted more frequently. Some views indicated that more time should be allocated for deployment exercise than in-class training. The exercise should include an aspect of role play. The majority of the respondents (42%) preferred Tier 3 exercise conducted once a year while 35% favored quarterly (See figure 17).

Figure 17 Frequency of tier 3 exercise

6.3. Experience on oil spill response

The researcher intended to find out whether the participants have participated in responding to past oil spill incidents and the area they can recommend for future
improvement. In this context, the analyses showed that 57% have responded to previous oil spill incidents, while the balance of 43% respondents have never responded to any oil spill incident.

For the participants involved in past oil spill incidents, they mentioned the need to have well-defined roles and responsibilities of the oil spill responders. Besides, the results indicated the need to review and improve logistics on the number of responders and equipment for future response. Additionally, the reactions noted on the development of an elaborate waste management plan and designation of the final disposal site. Some reactions specified on the need to have legislation to back up the oil spill preparedness and response in Kenya.

Notably, the respondents suggested the necessity to increase the number of training on incident command system and review the current incident command structure that exists for proper coordination. The results also indicated the need to develop safety plans taking into consideration the safety of volunteers. Lastly, it was suggested that community should be trained and involved in oil spill response.

The results on areas of improvement for the future oil spill incident are as indicated in the chart below;
Kenya already has a draft National Oil Spill Response Contingency Plan developed back in 2010 and reviewed in 2014 to guide the oil spill response. Based on this plan, the researcher sought to gather stakeholders' opinions on how the plan could be improved as a guiding document to oil spill response. Of the respondents, 24% suggested that the plan should be updated regularly (FIGURE, 19). The plan should be reviewed taking into consideration other stakeholders like the beach management units that need to be incorporated. One of the respondents observed that the current Contingency Plan only concentrates at the Port of Mombasa despite the extensive extent of Kenyan coastline and the spatial size of the Exclusive Economic Zone.

Discovery of offshore oil and gas is an emerging risk, and the potential source of the spill as the country has plans to start exploration in the future. Other respondents indicated that the plan should be tailored to the Kenyan setting. Some of the respondents also noted that the plan has remained in draft form for many years and therefore it needs to be finalized to become a useful guide for oil spill response.
Quite a number of respondents (20%) felt that the plan should be shared with all the stakeholders involved in oil operation as well as those involved in marine environment conservation and blue economy growth. Responsible authorities should conduct awareness creation programmes for relevant stakeholders at national and county governments. Stakeholder roles and responsibilities could be refined during the sensitization workshop. Approximately 16% of the respondents felt that the plan should be exercised and tested regularly. The results also indicated that 12% of the participants proposed on the need to enact a law to base the draft National Oil Spill Response Contingency Plan. The responsive body should be resourced and empowered with suitable equipment and responders. Other results suggested on cascading the existing contingency plan to the community level and conducting training tailored to improving the Incident Management System.

6.5. Adequacy of existing oil spill response measures

In the implementation of the OPRC convention, Kenya has put some measures in place in preparation for oil spill response. The researcher needed to find out the extent to which
Kenya is implementing these measures. The researcher used three elements as a measure for assessing adequacy. These included equipment, training, and personnel. The result showed that 35% of the respondents felt that the measures were not adequate, 35% of the respondents were not certain, and 28% agreed they were sufficient as shown in Figure 20 below.

Figure 20 Adequacy of response measures

In support of their views, 30% of the respondents felt that more training is needed for new responders as well as to enhance the skills and expertise of existing responders. Due to frequent changes in personnel in OSMAG member institutions, there is a need to ensure regular review of OSMAG members and new officer representative institutions in the body undergo training. The findings also indicated that 23% of the respondents suggested the purchase of more equipment. Oil Spill Mutual Aid Group (OSMAG) needs adequate equipment to be able to respond effectively to oil spill incidents. Quite a number of respondents mentioned that some oil spill responders are not ‘fit for purpose’. In addition, the turnaround for the trained responders is low in Kenya despite it being a high-risk area. Other responses indicated that Kenya had not experienced a large oil spill so far and the
scenarios used for response exercise are based on past small incidents. The latter perhaps explains the current level of training, expertise and resources.

![Figure 21 Measures to improve oil spill preparedness](image)

Accordingly, there is a need for more preparedness in responding to a large incident. Some of the respondents expressed the view that national legislation was inadequately in providing a solid legal basis for addressing oil spill response. Some findings recommended the need to benchmark the law on best practices in other countries that have faced, or may face in the future, similar incidents to Kenya.

### 6.6. Challenges that hinder effective oil spill preparedness in Kenya

The researcher intended to find out from the stakeholders the problems that impede effective oil spill preparedness in the current regime. From the analyses conducted, 25% of the respondents mentioned inadequate training as the major challenge in oil spill preparedness. The training offered currently is not all inclusive and local community is not involved in most of the training. Information is not cascaded from top leadership to community level.
About 17% of the respondents cited inadequate funds as one of the major hindrances to the development of a fit for purpose system with suitable resources and training. The budget that the government has allocated for oil spill response is low and this will be a challenge if a massive spill occurs in Kenya. Some of the respondents recommended that the National Treasury should set up a financial kitty for responding to both marine and inland water spill. About 10% of the respondents cited lack of laws and regulations explicitly designed to address oil spill preparedness and response. The National Oil spill response document has remained in draft form for many years due to lack of control to back up the plan.

![Challenges to effective oil spill preparedness and response in Kenya](image)

**Figure 22 Challenges to effective oil preparedness and response**

The chart above shows 17% of the respondents cited lack of proper coordination as one of the challenges to oil spill preparedness and response. Some of the respondents indicated that there is no clear chain of command in oil spill response. Besides, Kenya lacks proper stakeholder engagement and coordination programmes in preparation for oil spill response. A relatively high number of stakeholders are not actively involved in training and exercise, and they are mostly mobilized at the time of the incident. Vitally, it was mentioned by several respondents that proper inter-agency collaboration is also missing.
Nearly 14% of respondents mentioned ineffective logistics as one of the challenges. The number of responders and equipment currently in place for oil spill preparedness is limited. The equipment and responders are concentrated in specific areas, for example, Mombasa and Nairobi and this may pose a challenge in deployment if a spill occurs in other areas. Other respondents suggested on inadequate planning. Most stakeholder roles and responsibilities are currently overlapping. There is a lack of proper records on sensitive resources within the marine environment and this is compounded by the absence of sensitivity maps, which in many instances have not been updated.

6.8. Discussions

The statistics show that Kipevu Oil Terminal handle tankers with a deadweight of up to 80,000 tons. The risk is likely to be high as the country has plans to relocate its oil terminal to offshore terminal with up to 200,000 deadweights (Trade Mark East Africa, 2016). From this, it is evident that oil spill preparedness and response remains critical. The analysis results above show gaps that exist in the current oil spill response and preparedness regime in Kenya. This means the current system is not fit for purpose and considerable more needs to be done to prepare for future oil spills effectively.

6.8.1. Oil spill response training and exercise

The results indicated the level of training is inadequate, the number of trained personnel few and only concentrated on certain parts of the country. According to the IMO 2010, the expertly prepared nation needs to have a group of trained professional responders who understand their roles in the contingency plan and a group of untrained but available personnel to argument the response in times of crisis. From the research results it is evident that the latter aspects aspects are currently missing in the current regime and will pose a challenge to Kenya in responding to large oil spill incident that will require a large number of responders. It is important to note that in the current regime, the number of responders
is concentrated in certain parts which means that more time and logistics will be required to deploy the responders to the site of the oil spill incident if it happens in another region.

In the current regime, the training is not comprehensive, and several key state, non-state and local communities are not involved in the training. In this context, it is worth emphasizing that in most cases first responders are usually the local community (fishers), shipping agents, clearing and forwarding, etc. Taking note of the Hebei Spirit where 11,000 tons of oil was spilled, 200,000 people mostly volunteers were involved in oil spill response (The Hong Kong Special Administrative Region, 2007). If an incident of such magnitude happen today such some responders will be required which doesn't exist. Nonetheless, Kenya has rolled out the Blue Economy concept to fuel its economic growth which has brought in new users of the Ocean. The new actors need to be trained because they may be called upon to respond to the oil spill.

From the analyses, it was evident that quite a number of respondents have been trained up to IMO level 3. The ITOPF Manual on Contingency Planning for Marine Spills recommends that training programmes should be developed to take into account marine and shoreline response teams and any other interested party. In case a massive oil spill occurs today it will be difficult to address the challenge since IMO levels of training are not adequately factored in current training programmes. In addition to this, gaps exist on tailored courses for management and responders.

Likewise, the training which has been offered in the past, draw case study scenarios from other countries whose environment differ from the uniqueness of Kenya's needs and operational settings. Accordingly, it becomes a challenge for trainees to comprehend and relate to possible situations back home. Some of the respondents mentioned the less time that is allocated for such training. This means that the content delivered during the training is minimal. From a practical point of view, this shortcoming can only be solved by
reviewing the number of sessions to be conducted or increasing the time allocated for each session.

From the analysis, it was also evident that regular exercise on oil spill response should be conducted with case scenario specific to Kenya’s needs. These will aid in sharpening the skills responders have in oil spill preparedness. The role played during the exercise can be used define the roles and responsibilities of various stakeholders that they are expected to play a part during the actual spill. Using case scenario based on a Kenyan setting will aid the trainees to brainstorm and come up with strategies for a response that can be adopted in the actual spill. Oil spill response exercises help to build a working relationship, which brings about team coherence. The training should be conducted regularly and more, so the Tier 3 exercise owing to various high-risk scenarios which exist.

6.8.2. Experience in oil spill response

Based on the results, it was evident that quite many respondents have not participated in responding to actual oil spill incident. This is because Kenya has not experienced significant oil spill incidents since the 2005 MV Ratna Shalini spill. These means for new personnel's knowledge and skills on oil spill response is based on class training and response exercise. These may pose a substantial operational challenge where deployment is required for an actual oil spill to contain and recover the oil. It is also important to note that as years pass, some of the personnel that had experienced real oil spill response have retired, hence the practical skills in the field are slowly fading away.

6.8.3. National Oil Spill Response Contingency Plan

The researcher found that the National Oil Spill Response Contingency Plan is ineffective as a guide for oil spill preparedness and response in Kenya. New developments have taken place in Kenya including the expansion of the Port of Mombasa; the relocation of KOT; the ongoing construction of the new Port in Lamu; expansion of Kenyan shipping business
among others. Further to this, Kenya has launched oil exploration in Turkana and crude oil, which is currently transferred to a storage facility in Mombasa. The country has plans to export crude oil through the Port of Mombasa in the near future. Several offshore blocks have been earmarked for future oil exploration within offshore waters where Kenya exercises its sovereign rights. These means that the higher risk areas have emerged, which were not taken into consideration at the time the contingency plan was developed and by the latest review and updating of the plan in 2014.

It is also important to note that some oil companies have joined the oil import business, which means more personnel have been trained oil spill response whose contacts do not reflect in the contingency plan. The contractor already listed in the plan may have changed over time and need to review to include new reflectors.

The National Oil Spill Response Contingency Plan has remained in draft form since it was first developed and published. A crucial oversight is that it has not been gazetted by the Cabinet Secretary, Ministry of Transport, Infrastructure, Housing, Urban and Development(Kenya) as an official document to guide in oil spill response.

6.8.4. Legislation

The results indicated that no laws and regulation that have been developed specifically to address issues of oil spill preparedness in Kenya. However, as seen above in Chapter 3, Kenya has ratified a number of conventions addressing oil spill preparedness, response, cooperation and compensation applicable in case of an oil spill incident. According to the Kenyan Constitution, every convention or treaty that Kenya ratifies it automatically becomes a law of Kenya. The conventions are not adequately useful as they need to be domesticated and implemented at a national level, tailored to Kenyan settings, sanctions, and penalties that have been developed for non-adherence.
In addition to this, Kenya has not ratified the OPRC-HNS protocol and Intervention in the High Seas Convention, 1969 which allows coastal states to intervene in case pollution in the high seas is likely to cause pollution in waters where the country exercises its sovereign rights. This may be important given the nature of tanker traffic in sea areas adjacent to the Kenyan EEZ.

6.8.5. Incident Command System

Currently, there is no clear chain of command to be followed in case of an oil spill incident in Kenya. From an operational perspective, this will undoubtedly pose a major challenge to Kenya in coordinating different stakeholders, mobilizing equipment and communication. The current chain of command that exists is concentrated in one organization and does not take into consideration other stakeholders that may supply resources including responders, equipment, funds, and security to be part of the incident command team.

6.8.6. Oil spill response equipment

The researcher found that some oil spill response equipment already exists stored at the Port of Mombasa and owned by Kenya Ports Authority and the Oil Spill Mutual Aid Group (OSMAG). Many Tier 1 stockpiles are also stationed at various depots by oil companies. However, the oil spill equipment that exists so far is not adequate for responding to a massive spill. The oil spill response equipment is stationed at one point thus challenging oil spill response efforts that occur in a different location with reference to the extensive coastline and need to mobilize equipment urgently.

6.8.7. Sensitivity mapping

Kenya has already done sensitivity mapping along its shore based on the sensitive areas. The maps were developed back in 2006 and have not been reviewed since then. Lots of urban and industrial developments have happened along the Kenyan coastline which point
towards the pressing the need to review and update the maps. It is important to note that the sensitivity mapping should be closely linked to ecosystem valuation in case compensation is required which had not been done so far.

6.9. Conclusions

In conclusion, the research demonstrates unequivocally that the current oil spill preparedness and the response is not adequate for responding to a massive oil spill incident in case it happens in Kenya today. There exist many gaps which may hinder effective oil spill response. Lots of challenges have been discussed above, which need to be solved for effective intervention. In the previous chapter on International Organization best practices, the organizations have faced similar challenges that Kenya is currently faced. Their recommendations on how to tackle problems can be applied to Kenya's case to address the challenges that the country is now facing for effective response.

It is paramount that Kenya needs to strengthen its marine spill response capability through recommendations envisaged in the next chapter. These will also aim towards achieving UN sustainable Goal #14 (life below water).
CHAPTER 7

7.0. CONCLUSIONS AND RECOMMENDATIONS

7.1. Conclusion

This study was undertaken with the aim of assessing the effectiveness of oil spill preparedness and response in Kenya in the current regime. Kenya is party to Oil Pollution Preparedness, Response, and Cooperation (OPRC), 1990. The research findings in previous chapters were to determine the extent to which Kenya is giving full and complete effect to the implementation of this convention.

The analysis and findings demonstrated that effective oil spill preparedness and response in Kenya is lacking under the current regime. Ostensibly, there are two major weaknesses revealed by the results of the research. In the first instance, this is because the country does not have an official document to guide in oil spill preparedness and response. The present document is still in its draft form since it was developed back in 2010. Besides, few numbers of personnel have been trained in oil spill response and out of the number trained only a few have been trained up to IMO level 3. According to results analyzed from International Organization, most of the respondents indicated that oil spill responders should be trained including at all IMO levels.

Secondly, it is evident that the country does not have specific laws and regulations which specifically address oil spill preparedness and response. The rules that mandate oil spill
response is currently fragmented. Kenya is facing various challenges in the implementation of the OPRC convention which include lack of training; inadequate governance; weak budgeting by the government for oil spill preparedness and response; insufficient oil spill response equipment and personnel; and lack of contingency plan to guide in oil spill preparedness and response.

Given the above, Kenya needs to bridge the gaps that exist in the current regime for effective oil spill preparedness and response and for implementation of OPRC, 90 which Kenya is a party.

7.3. Recommendations

Based on the general study, analysis and finding of this research, effective oil spill preparedness and response in Kenya is inadequate. Therefore, the researcher recommends the following in order to address existing gaps:

1. There is the need for Kenya to develop regulations specifically for oil spill preparedness, response, cooperation, and compensation. The regulations should be anchored under section 410, of the Kenya law 2009. The regulations should be derived from the conventions that Kenya has ratified including OPRC ‘90, CLC ‘72, FUND ‘92, the Bunkers Convention and other relevant conventions related to oil spill preparedness, response and compensation in the future.

2. Kenya needs to finalize the draft National Oil Spill Response Contingency Plan, validated through a stakeholder workshop and gazetted by the Cabinet Secretary. This will provide an official document to be used as a guide to oil spill preparedness, response and compensation.

3. There is a pressing case to review the current incident command structure taking into consideration the need to include organizations which can offer resources (oil spill response equipment, personnel, funds, expertise, and security) to be part of
the incident command team. The structure should be developed in a way that will allow for smooth coordination and communication.

4. In the effort to strengthen capacity on oil spill preparedness, there is the need for the country to establish Marine Spill Research and Training Center to be hosted by Kenya Maritime Authority. Kenya law designates KMA as a competent oil spill response Authority and is recommended that the center needs to collaborate with other agencies with oil spill response resources.

5. There is need to develop a tailored training curriculum for the various levels of responders to marine spills accustomed to local scenario as with the case of Korea Marine Environment Research and Training Institute has developed curriculum tailored specifically for Korea.

6. It is paramount that Kenya needs to increase the number of personnel to be trained on oil spill response including local community, humanitarian organization, police, military and the National Youth Service. This can be witnessed for the case of Korea where their training programmes includes volunteer.

7. Kenya has not ratified the OPRC-HNS Protocol and International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties 1969. Kenya needs to ratify these for future incidents that may require Intervention in the high seas or involves Hazardous Noxious Substance.

8. There is the need for more research and development programmes geared towards developing guidelines on ecosystem valuation and a review and updating of environmental sensitivity maps.
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ANNEXES

Annex I: Questionnaire for Kenya on Oil spill preparedness and response

My name is Stellamaris Muthike and currently undertaking a Master’s of Science in Maritime Affairs Specializing in Ocean Sustainability, Governance and Management at World Maritime University. As part of my master’s degree programme, I am conducting research on Dissertation Topic “Assessment of Kenya's capacity to effectively prepare and respond to oil spill incidents”. The research involves data collection which will provide information on preparedness, response and management of oil spills in Kenya.

Because you have been involved in oil spill response from your organization, I’m inviting you participate in filling this questionnaire which won’t take much of your time. Findings for this questionnaire will be used to improve oil spill preparedness and response in Kenya.

Date

Personal Information

Name

Email address

Organization

designation
1. *What is your role in oil spill preparedness?*

2. *Are you aware about the National Oil Spill Contingency Plan?*
   Yes ( ) No ( )
   
   If yes, what do you think should be done to improve the National Oil Spill Contingency Plan as a guide document to oil spill response?

3. *Has your organization participated in any training on oil spill response?*
   Yes ( ) No ( )
   
   If yes, is the training adequate?
   Yes ( ) No ( )
   
   In your opinion what do you think should be done to improve future trainings?
4. What is your organization's role in oil spill response?

5. Has your organization participated in oil spill response drills and exercise?
   Yes (   )       No (   )

   If yes, what areas can you recommend for improvement?
6. How often do you think Kenya should conduct oil spill exercises and drills for Tier 3 oil spill?

Comment

7. What factors do you think hinder effective oil spill preparedness and response in Kenya?
8. Further comments

Thank you
Annex II: Questionnaire International Organizations

**Oil Spill Preparedness and Response**

My name is Stellamaris Muthike and currently undertaking a Master’s of Science in Maritime Affairs Specializing in Ocean Sustainability, Governance and Management at World Maritime University. As part of my master’s degree programme, I am conducting research on Dissertation Topic "Assessment of Kenya’s capacity to effectively prepare and respond to oil spill incidents”. The research involves data collection which will provide information on preparedness, response and management of oil spills in Kenya.

Because your organization has many years of experience in providing expertise and technology in oil spill preparedness and response in oil industry, I am inviting you participate in filling this questionnaire which won’t take much of your time. Findings for this questionnaire will be used to improve oil spill preparedness and response in Kenya.

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**Personal Information**

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<th>Name of Contact Person</th>
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9. What role does your organization play in oil spill preparedness and response?

10. What factors need to be considered when improving existing oil spill response plan?

11. What is the minimum stock pile of equipment that a country should keep in preparation to oil spill response?
12. What level of oil spill response training should a country maintain for effective oil spill response?

13. What are the critical success factors for effective management of oil spill incident?
14. Which areas of cooperation would you advise a country to maintain with its neighboring coastal States in preparation to oil spill response?

15. Briefly comment on good practice in oil spill preparedness and response

16. Briefly advise on how a country can improve its governance in oil spill preparedness and response

17. Based on your expertise in oil spill preparedness and response explain the challenges faced in oil spill preparedness
18. Briefly comment on how to overcome the oil spill preparedness challenges

19. Based on your expertise in oil spill preparedness and response explain the challenges faced in oil spill response

20. Briefly comment on how to overcome the oil spill response challenges

21. What are the future trends in oil spill preparedness and response?

22. Further comments

Thank you