2014

Review of South Africa's marine pollution prevention measures, particularly those regarding vessel-source oil pollution

Sibusiso Rantsoabe
World Maritime University

WORLD MARITIME UNIVERSITY

Malmo, Sweden

REVIEW OF SOUTH AFRICA's MARINE POLLUTION PREVENTION MEASURES, PARTICULARLY THOSE REGARDING VESSEL-SOURCE OIL POLLUTION

By

SIBUSISO RANTSOABE

South Africa

A dissertation submitted to the World Maritime University in partial

Fulfillment of the requirements for the award of the degree of

MASTER OF SCIENCE

In

MARITIME AFFAIRS

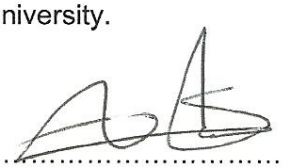
(MARINE ENVIRONMENTAL AND OCEAN MANAGEMENT)

2014

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, are not necessarily endorsed by the University.

(Signature): 

(Date): 22 SEPTEMBER 2014

Supervised by: Professor Neil Bellefontaine

World Maritime University

Assessor:
Institution/Organisation:

Co-assessor:*

ii

Acknowledgements

First of all I would like to give praise to God almighty, without whom I would not have been able to garner the strength for such an enormous task as this. I would like to thank my supervisor, Professor Neil Bellefontaine, for his guidance, his patience and for always being able to lift me up, as well as my specialization head Professor Larry Hildebrand for direction and guidance during the development of the topic. My special thanks to Dr Tidings Ndhlovu for his support. Special thanks are also reserved for the library team for the excellent service they provided me during the writing of this dissertation.

I would also like to thank my family for the sacrifices they made to allow me the opportunity of studying at the World Maritime University. Last but not least I would like to thank my sponsors for granting me this wonderful opportunity to further my studies at WMU. I would like to thank The Department of Transport, The South African Maritime Authority, South African Maritime Safety Authority, Department of Higher Education and Training and The National Skills Fund. Without my sponsors I would never been able to fulfil the dream of studying at WMU.

Abstract

Title of dissertation: **Review of South Africa's marine pollution prevention measures, particularly those regarding vessel-source oil pollution**

Degree: **Master of Science in Marine Affairs**

South Africa lies in one of the world's busiest shipping lanes. The peculiar waters of South Africa serve to explain the treacherous sailing conditions. The large traffic volume transiting around Cape Horn and the large number of ships sailing towards the country's ports makes the coast vulnerable to oil pollution. It is with this view in mind that the author of this dissertation will review South Africa's Marine Pollution Prevention Measures, particularly those regarding vessel-source oil pollution, with emphasis on the operational level.

This dissertation will review and analyse national marine pollution prevention measures related to vessel-source oil pollution. Roles and responsibilities of different stakeholders will be investigated and analysed. The roles of the DEA and SAMSA will be critically reviewed with emphasis on their legal mandates regarding oil pollution prevention and responses. The status of Conventions will be examined, as well as their enactment into domestic law. A major maritime nation, Sweden, will be studied for purposes of gap analysis and review of the lessons that South Africa can learn on vessel-source oil pollution measures.

TABLE OF CONTENTS

List of Tables

List of Figures

List of Abbreviations and Acronyms

CLC	Civil Liability Convention
CO2	Carbon Dioxide
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
EEDI	Energy Efficiency Design Index
HFO	Heavy Fuel Oil
IMCO	Inter-Governmental Maritime Consultative Organization
IMO	International Maritime Organization
IOPC	International Oil Pollution Compensation Funds
MARPOL	International Convention for the Prevention of Pollution from ships
NOX	Nitrogen Oxides
OILPOL	Oil Pollution Convention of 1954
PAH	Polycyclic Aromatic Hydrocarbon
PBT	Persistent Bio-accumulation and Toxic Compounds
PIB	Poly-iso-butylene
RSA	Republic of South Africa
SAMSA	South African Maritime Safety Authority

SANCP	South Africa's National Contingency Plan for the Prevention and Combating Pollution from Ships and Offshore Installations
SEEMP	Ship Energy Efficiency Management Plan
SOX	Sulfur Oxide
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
HELCOM	Helsinki Commission
MLASA	Maritime Law Association of South Africa
SLAR	Side-Looking Airborne Radar
IR/UV	Infrared/Ultraviolet Line Scanner
FLIR	Forward looking infrared

Chapter 1. INTRODUCTION

1.1 Background

The tendency for mankind to overstate the ocean's assimilative ability has generally led to exaggerated claims about Marine pollution. Because of the oceans' vastness, they are often perceived as bottomless pits (Nybakken, 2001). The oceans cover almost three-quarters of the earth's surface area, and are comprised of 1.3 billion km3 of water (Global Ocean Commission Report, 2014). Little wonder that mankind believed that its assimilative ability was infinite and its resources were inexhaustible.

The Law of the Sea Convention defines marine pollution as:

the introduction by man, directly or indirectly of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality of use of sea and water and reduction of amenities (UNCLOS, 1982).

Recently, marine environmental protection has been elevated on the agenda to become the most important ecological issue of modern times. With the emergence of environmental consciousness capturing the world's attention, so has protection of the marine environment (Tan, 2005). This has not only largely been due to new knowledge regarding marine pollution but also to people's greater awareness of the oceans' ecosystem service and economic value (Beaudoin and Pendleton, 2012). The oceans

are the world's largest ecosystem and have a central role in supporting all life on earth. They provide a wide variety of services and resources that support humans (Global Ocean Commission Report, 2014). As such, preservation of these resources has become paramount for the survival of humankind.

Because they make the headlines, major oil spills are the most known form of marine pollution, although major oil pollution disasters involving tankers account for only 10% of oil pollution of the marine environment (IOI, 2010). Over the last few years, issues like rising sea levels and ocean acidification have climbed up the list. The oceans are becoming more acidic as their PH continues to drop. The general consensus amongst the world's scientists is that acidification of the oceans is largely due to Greenhouse gases (Husley, 2012). Microplastics have also gained attention from scientists over the last few years. It was discovered that, with repeated exposure to wave action, saltwater and solar radiation, plastics break down into microplastics that continue to exist in the marine environment for years (International Ocean Institute, 2010). Most problems related to the oceans are of anthropogenic origin. Anthropogenic sourced marine pollution includes discharges from land-based sources, ships, atmospheric deposition, ocean dumping and offshore oil and gas installations (Tan, 2005:.3).

Indeed, 80% of discharges into the marine environment are land-based marine pollution (Global Ocean Commission, 2013). Land-based sources of marine pollution can be further divided into point and non-point sources. Point sources include industrial effluent pipes, industrial stack emissions and municipal sewage and waste water pipes with non-point sources originating from diffused sources such agricultural runoffs.

A lot of resources have been committed by the international community to curbing land-based marine pollution, particularly since the strain that is exerted on the marine environment by anthropogenic pollution is beginning to show in many coastal waters around the world. Population growth and rapid economic development are the major drivers. The increasing strain on the marine environment is becoming apparent with

more and more hypoxic areas discovered in many coastal waters around the world. Around 500 hypoxic zones have been reported around the world and are currently threatening areas of critical ecological importance (STAP, 2011). Hypoxia results from nutrient over-enrichment of coastal waters through a process called eutrophication.

Vessel-sourced pollution is by no means an insignificant contributor to marine pollution. Global trade continues to grow and, with the global merchant fleet seating at over 50,000, vessel-source-pollution cannot be ignored (International Ocean Institute, 2010). The impact of ships on the environment is considerable. Major vessel source pollution consists of garbage, air emissions, sewage, ballast water, and accidental and operational oil pollution. Oil and cargo residues leave traces in the marine environment, while air emissions have introduced high values of sulphur oxides, nitrogen oxides and particulate matter (Vidas and Schei, 2011).

Ballast water is another issue that is currently high on the list of not only the shipping fraternity, but also marine environmentalists worldwide. There is strong evidence showing that certain species have been transferred from one region to another through ship's ballast water (Vidas and Schei, 2011). Studies in Europe have revealed that more than 1,000 non-indigenous aquatic species have been recorded across Europe's coastal waters. The species were also found in the navigational inland waterways used by ocean-going vessels. These species have been problematic as they have a negative effect on indigenous species through predation and competition which leads to changes in the ecosystem (Vidas and Schei, 2011).

Vessel-source pollution continues to be a threat to the environment. Major oil spills are not the only culprits but operational discharges, which include a deliberate element, are a continuous threat as well. Major oil spills will make the news and often resources including oil spill responses are put in place immediately to prevent damage or further damage to the environment. However, with deliberate oil spills that can occur

anywhere, and with culprits escaping detection, the effects of these types of pollution can be devastating to the marine environment.

1.2. Objectives

South Africa lies in one of the world's busiest shipping lanes. South African waters are known to provide some of the world's treacherous sailing conditions, with vessels prone to encountering structural damages, thus making the waters vulnerable to oil pollution. It is with this in mind that the author will review South Africa's Marine Pollution prevention measures, particularly those regarding vessel-source oil pollution with emphasis on the operational level.

The objectives of this dissertation are:

1. To review and analyse National Marine Pollution Prevention Measures that are related to vessel-source oil pollution;

2. To summarize and assess the responsibilities of different stakeholders, mainly the South African Maritime Authority and The National Department of Environmental Affairs regarding marine oil pollution by ships;

3. To review and analyse South Africa's National Contingency Plan for the Prevention and Combating of Pollution from Ships and Offshore Installations (SANCP). In addition, the author will establish whether relevant IMO Conventions have been ratified; and,

4. To compare and contrast South Africa's situation with one of the major Maritime nations regarding Marine Pollution Prevention Measures.

1.3 Methodology

The methodology used for data collect is qualitative methods. Structured interviews with relevant stakeholders, namely, the Department of Environmental Affairs, the Department of Transport and the South African Maritime Safety Authority, including its wing, the Maritime Rescue Coordination Centre were conducted.

Sweden was chosen for the purposes of gap-analysis. The criterion was to identify a major maritime nation with a coast and maritime traffic that is almost similar to South Africa. The aim will be to look at Sweden's oil pollution management and enforcement measures to mitigate against vessel source pollution. Good practices will be identified and considered as possible recommendations for South Africa to adopt.

1.4 Organization of the dissertation

The study will begin with a broader and general outlook into marine pollution, followed by vessel-source marine pollution. Different types of vessel-source marine pollution and their effects on the marine environment will be discussed including the regulation regime pertaining to vessel-source marine pollution will be discussed.

The dissertation will then examine vessel-source oil pollution. Operational and accidental oil spills will be described and discussed, including the fate and effects of oil pollution on the marine environment. Major oil-spill disasters will be identified, with their impact and effect on the marine environment briefly discussed.

South Africa's marine pollution prevention measures particularly those dealing with vessel-source oil pollution will be reviewed and analysed. Ratification of relevant IMO and international instruments pertaining to oil pollution will be ascertained. Major oil spill incidents, response and effects on the marine environment will be discussed. Legislation and policies will be tabulated and reviewed. The role of different

stakeholders in ocean governance, particularly related to marine pollution, will be reviewed. Lastly, a major maritime nation for gap analysis will be identified and recommendations given.

CHAPTER 2. VESSEL-SOURCE POLLUTION AND ITS EFFECTS

2.1 Pollution

Maritime transport has always been important to people around the world. In the early development of modern maritime transport, ships were used for passenger travel. However, that market was out-competed by the advent of air travel. Ships are still vitally important as they carry goods and the number of merchant vessels grew significantly with industrialization and continues to grow (IOI, 2010). The current global trade volumes could not be met without the use of maritime transport. Currently around 90% of global trade is carried through the sea by the International maritime community (Vidas and Schei, 2011).

Over the years, ships have polluted the marine environment in many forms. Even though tanker disasters tend to take the limelight, there are different kinds of vessel-source pollution which have been found to be equally devastating to the marine environment (IOI, 2010). International trade through maritime transport is responsible

for many negative effects on the environment. Maritime transport not only pollutes the sea but also land and air. Ships, regardless of whether they are at sea or in ports, in their normal operations release harmful emissions into the atmosphere through their exhaust systems. The fact that ships are manned by human beings means that domestic waste is generated by default. Cargo also poses its own conundrum as well as paints used on the ship's hull (Vidas and Schei, 2011). Ships other than tankers nowadays carry various hazardous cargoes which pose a threat to the ocean. There have been many efforts over the years from the maritime community to put together instruments that ensure the ocean and the whole marine environment is preserved and protected (Tan, 2005).

The nature of international maritime transport makes it a trans-jurisdictional industry and has led to the maritime industry establishing its own regulations. The regulations governed by the international maritime industry have been intense over the years. The result has been a decline in the amount of oil and other pollutants entering the oceans from ships. It is estimated that between 1973 and 1989 the decline in oil and other pollutants entering the oceans from ships was 75% (Tan, 2005).

2.2 Type of vessel – source pollution

Apart from oil pollution, ships generate different kinds of pollution in both the marine environmental and the environment in general. Ships carry noxious and harmful substances, contaminated ballast water, sewage effluent, domestic and industrial litter, air pollution and anti-fouling paints on their hulls (Gold, 2006). Selected types of marine pollution currently considered as major environmental issues will be discussed, including their effect on the marine environment.

2.2.1. OIL POLLUTION

Vessel-source oil pollution can be split into operational and accidental discharges. Operational discharges emanate from normal shipboard operations i.e. engine rooms and cargo tanks cleaning, while accidental discharges emanate from maritime accidents, including major oil spills (Gold, 1998). Pollution through tanker accidents has been on the decline since the early 1970s and 1980s. Oil spills and, in general, oil inputs into the ocean by tankers have been reduced by 63% from the highs of the 1980s. Over the same period, oil released from tanker accidents has gone down by 75% and from tanker operations by 90% (Nellemann, Hain and Alder, 2008). The effect of oil pollution will be discussed in chapter 3.

2.2.2 GABBAGE (SOLID WASTE)

Like households, ships generate a lot of domestic waste and a considerable amount of waste from cargo operations. The shipping industry is a major source of marine litter in the oceans. Regulations do allow for certain types of waste to be discharged at sea under certain conditions which might be contributing to the problem of vessel-source pollution. Enforcement at sea is difficult and almost impossible, thus ships can dispose of waste in the high seas without repercussions (Vidas and Schei, 2011). Over 110,000 tonnes of garbage in the United States of America is from ship generated solid waste. This includes items that make up household waste such as glass, wood, rubber and packing material (Molnar and Koshure, 2009).

There are many forms of solid waste produced by ships, including plastics. Plastics are becoming a major environmental issue with scientists increasingly concerned about the potential impact of releases from plastic debris of persistent bio-accumulation and toxic compounds (PBTs). PBTs are credited with many health problems in marine life including endocrine disruptions, mutagenicity and carcinogenicity. The major sources of plastics are land-based, although maritime transport is also a significant contributor. In the East Asian region and Southern North Sea, for instance, shipping is listed as a

significant contributor of plastic found at sea. On the shipping front, cruise liners, merchant shipping and recreational boats are the major culprits. Plastics are not biodegradable and are buoyant, remaining in the marine environment for years. Through photo-degradation and abrasion, they do, however, break down into smaller pieces which are termed microplastics (particles up to 5 millimetres in diameter). The danger with microplastics is that they can be consumed by the smaller families of marine life (UNEP, 2011; Wabnitz and Nichols, 2010). Plastic has been found in guts of leatherback turtles blocking the passage of food. The logical assumption is that turtles mistake plastic for jellyfish (Mrosovsky, Ryan and James, 2009).

2.2.3 ALIEN AND INVASIVE SPECIES

2.2.3.1 Ballast water

Apart from cargo tanks and bunker fuel tanks, ships are equipped with ballast water tanks. Ballast water is taken in especially if the ship is not fully laden or not carrying cargo all. This water is used to improve the ship's stability and sea keeping.

Ballast water which is collected in another region is often discharged before the ship reaches its next port. Clearly, this water can serve as a vector for the introduction of alien and invasive species into the new environment (Molnar and Koshure, 2009).

There are other means by which alien species can be transported from one region to another, including natural means, but shipping by the nature of its trade is the major contributor as depicted in Figure 2.1. In an example that is often cited, the pacific acts as a migration barrier for migration through natural means. The reason is that the zooplankton larval phase is too short to allow natural means distribution across the pacific. However, ships crisscross the oceans enabling them to transport species from one ocean to another. The majority of the species are said to die during the voyage, but a number survive, making it into the new environment. A ship's ballast water can contain millions of organisms which, if taken in the context of busy waterways and busy ports, can translate to astronomical figures. These alien and invasive species may

threaten native species, altering habitats and affecting ecosystem function (Gollasch and Nehring, 2006).

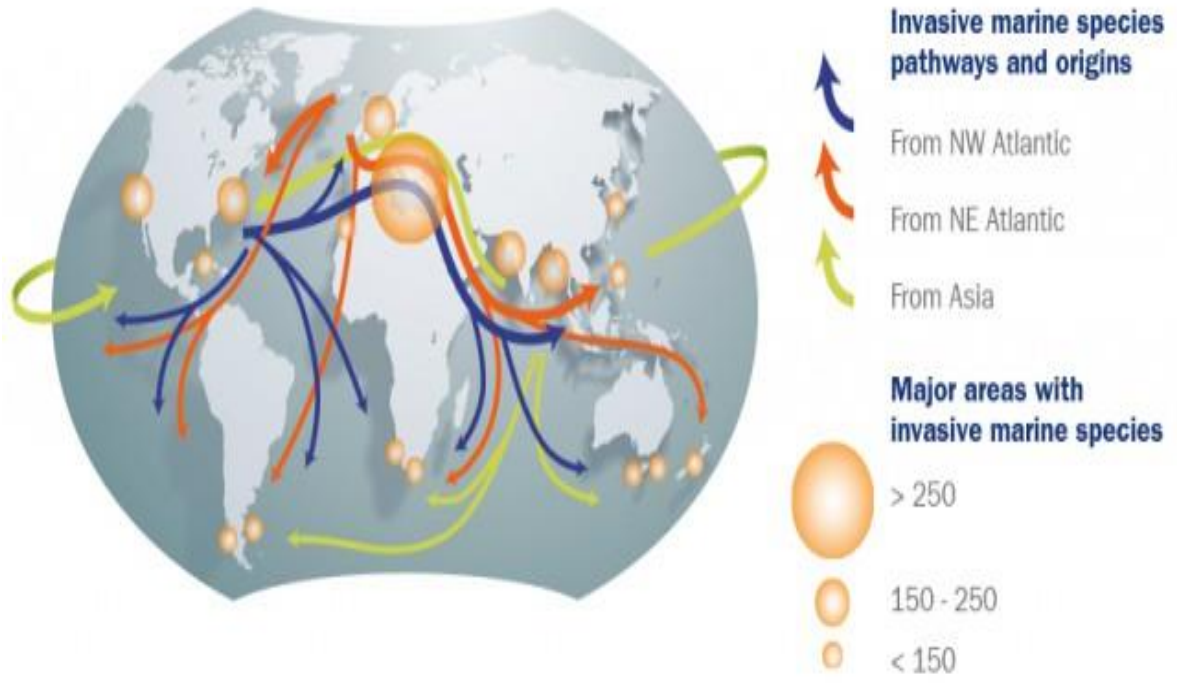


Figure 1: Invasive species pathways through shipping (Source: Dockwise)

As a result of the negative impact to local ecosystems, the introduction of invasive species in some areas has led to economic loss with fisheries collapsing. Clogging of water-intake systems in power plants - has also led to increased maintenance costs (Vidas and Schei, 2011).

2.2.3.2 BIOFOULING

Another form of alien and marine invasive species' introduction to foreign environments is called biofouling. Organisms attach themselves to a ship's hull and are transported from one region to another. Species mostly involved are both calcareous and non–calcareous; they attach themselves to the hulls of ships. They not only affect the marine environment but are considered a nuisance as they slow down the ship by increasing drag (Potters, 2013).

2.2.4 WASTE WATER AND CONTAMINATED BALLAST TANK RESIDUES

Ships produce black and grey water, the former being sewage effluent while the latter is water from kitchen sinks, showers and galleys. Sewage effluent from ships is less diluted than municipal sewage as there is less water involved. Modern ships have sewage treatment plants, holding tanks or a disinfection system on board. Discharge of sewage from plants at sea is regulated by MARPOL. Even before regulation, it was standard practice to discharge sewage away from coastal areas. Sewage effluent may contribute to eutrophication in busy coastal lanes, affecting the ecosystem which, in turn, can affect fisheries, coastal livelihoods and tourism. Grey water contains residues from detergents which can be toxic to marine life. Busy coastal lanes with protected bays and areas of low tidal exchange are the most vulnerable as polluted water may be consumed by species like shellfish leading to food safety problems (Molnar and Koshure, 2009).

Residues from cargo tanks which have been used for ballast purposes are also a source of marine pollution. A recent example is the case involving 4,000 dead birds (around 18 species altogether) that were washed up on the coast of the English Channel in early 2013,covered with a sticky substance. Polyisobutylene, commonly referred to in the maritime industry as PIB, was later identified as the sticky substance that covered the seabirds and affected their mobility, rendering them unable to feed.

This oil additive is released into the sea during tank-cleaning and during discharges of polluted water from tanks. Until recently, it was permissible to release PIB into the sea under determined conditions as per MARPOL (UK Chamber of Shipping, RSPB, MCS, RSPCA, The Wild Life Trust, 2014). Polyisobutylene is a hydrophobic substance which, when in contact with water, coalesces into a waxy glue-like formation. Various seabird species which dive into the water for food are particularly vulnerable. After a concerted effort from wildlife conservation organizations and maritime organizations to push for a total ban of PIB, IMO agreed to reclassify it. The IMO's Working Group on the Evaluation of Safety and Pollution Hazards of Chemicals has since agreed to classify high-viscosity PIB as category x for carriage by ships. This means that PIB will be prohibited for discharge at sea. Effective implementation is projected for 2016 (UK Chamber of Shipping, RSPB, MCS, RSPCA, The Wild Life Trust, 2014).

2.2.5 EMISSIONS

Merchant ships generally use Heavy Fuel Oil (HFO) for engine propulsion. HFO is a blend of refinery residue. HFO is considered dirty oil because of lack of refinement. It emits high concentrations of Sulphur Oxide (SOX) and Nitrogen Oxide (NOX), particulate matter and Carbon dioxide (CO2). Shipping total fuel consumption was estimated at 369 million tonnes in 2007 and was predicted to rise to 486 million tonnes by 2020 (Vidas and Schei, 2011). CO2 emissions in this same period were estimated at 1,015 million tonnes, meaning that shipping in general contributes 3.3% of global emissions. In 2007, international shipping contributed 870 million tonnes, corresponding to 2.7% of the global total. Looking from outside shipping, this might seem like a small percentage; however, this industry has a lot of room for improvement which includes among others substitution of Heavy Fuel Oil with cleaner fuel (Bazari and Longva, 2011).

2.2.6 Antifouling paints

Ships use anti-fouling paints in their hulls which prevent marine organisms from attaching to the hull and affecting the speed of the ship by increasing drag, resulting in higher fuel consumption. Anti-fouling paints containing tributyl tin (TBT) were the preferred choice for painting the underside of ships from the 1970s. They were regarded as effective biocides (Tan, 2006).

TBT is arguably the most toxic substance ever to be introduced into natural waters deliberately (Steward and Thompson 1994; Molnar and Koshure, 2009). TBT causes imposex in mollusks which leads to rapid population decline as reproduction is inhibited (Molnar and Koshure, 2009).

2.2.7 Noise

Noise pollution is normally associated with the noise ships make while in port. However, recent studies and cases have shown that noise from ships while at sea has negative impacts on marine mammals. In March 2000 a pod of whales suffered traumatic injuries and became stranded in the Bahamas. A total of 14 beaked whales and 2 minke whales were stranded and 6 of the beaked whales died. The cause was later traced to the US Navy's use of mid-range sonar. Studies on the effects of anthropogenic noise on mammals like beaked whales are continuing (Cox, Ragen, Read, Vos and Baird, 2006).

2.3 Legal regime and international instruments

The maritime industry was already conscious of the considerable negative impact of ships on the marine environment as early as the beginning of the 21st century. By the 1970s, environmental consciousness within the industry was gaining momentum and culminated in the establishment of the International Convention for the Safety of Life at

Sea (SOLAS) in 1974 (Vidas and Schei, 2011). However, the revolution had actually begun a few years earlier in 1926 during the International Conference in Washington. The conference that was attended by representatives of 13 maritime States produced the first international convention relating to oil pollution of the marine environment. The convention might not have been ratified but was a step in the right direction (Gold, 2006).

Several attempts were made in subsequent years at regulating vessel source pollution but none were successful. In 1948, a Maritime Conference was convened in Geneva by the UN and the Inter-Governmental Maritime Consultative Organization (IMCO) was established. IMCO was the precursor to the International Maritime Organization (IMO) (Tan, 2006). The rising world economy in the 1950s which came with huge demand for oil prompted the stakeholders to look at the pollution problem again. In 1954, another milestone was reached with the conclusion of the International Convention for the Prevention of Pollution of the Sea by Oil (OILPOL) (Gold, 2006).

In 1958 and 1960, the UN Conference on the Law of the Sea was held. Marine pollution did not feature much on the agenda during both conferences. The subsequent UN Conference on the Law of the Sea held in 1973 and 1982, resulting in the United Nations Convention on the Law of the Sea (UNCLOS), saw the elevation of the marine pollution issue. In the 1970s, there was growing consciousness about marine pollution with a number of international conferences aimed at protection of the marine environment by regulating vessel-source pollution. In 1973 an instrument to combat marine pollution, the International Convention for the Prevention of Pollution from Ships (MARPOL 73), was established. MARPOL was to become the flagship marine pollution Convention. It came out of IMCO International Conference on Marine Pollution held in the same year. MARPOL superseded the regime established by OILPOL 54 and MARPOL unlike OILPOL 54, which dealt only with oil, covered all aspects of pollution from ships (Tan, 2006).

The International Convention on the Control of Harmful Anti-fouling Systems on ships was adopted in 2001.This Convention prohibits use of harmful organotins in antifouling

paints and establishes a mechanism to prevent the potential future use of other harmful substances (IMO, 2001). In 2011 the IMO member States agreed on technical regulations aimed at reducing shipping CO2 emissions and entered into force in January 2013 as an amendment to MARPOL. The measures consist of a system of energy efficiency design index (EEDI) for new builds. The IMO EEDI is expected to ensure an estimated 25-30% reduction in emissions by 2030. There is also the Ship Energy Efficiency Management Plan (SEEMP) to be used by all ships. The SEEMP relates to operational measures that can be taken to reduce CO2 emissions during operation of ships currently in service (ICS, 2013). Establishment of Emission control areas in North America and Europe sees giant steps towards cleaner ships.

The maritime industry under the IMO has adopted a number of self-regulatory instruments over the years, with the ship owners feeling the pinch. The instruments demand huge capital investments and the cost of compliance has become a major part of the business of shipping. The measures to reduce Greenhouse Gas emissions and the Ballast Water Management Convention will result in increases in costs amounting to trillions of US dollars. The shipping industry needs to be commended as these measures are the first to be adopted industry wide (ICS, 2014).

2.4 Summary

Ships have a major impact on the marine environment. They produce a variety of pollutants ranging from litter, to greenhouse gases and ballast water. In the beginning, oil pollution by tankers was seen as the only main threat and the maritime States' early deliberations focused solely on it. However, in the 1970s environmental consciousness gained momentum, culminating in the adoption of MARPOL, which has a wider scope covering all aspects of technical pollution by ships.

The establishment of IMCO, the precursor to the IMO, propelled the development of self-regulatory instruments by the maritime Nations working with the shipping industry.

Shipping being a trans-jurisdictional industry needed a supranatural body to govern and regulate its operations. The IMO, a specialized agency of the United Nations with 170 member States, has filled that gap. The instruments adopted over the years have ensured that the impact on the marine environment is minimized. Notwithstanding this, it is important to note that the complicated nature of ocean governance as envisaged by the Convention on the Law of the Sea makes enforcement difficult.

The shipping industry continues to grow, and more ships are being built, which might mean more threats. However, the outlook is more positive as new builds are set to fall in line with EEDI; ships of the future are expected to be more environmentally friendly.

CHAPTER 3: VESSEL-SOURCE OIL POLLUTION

Whenever vessel-source pollution is mentioned, oil pollution springs to mind. Indeed, oil pollution of the marine environment has been the subject of many International conferences and conventions for almost a decade. The spectacular sinking of a tanker spilling thousands of tonnes of crude oil will always grab the public and law makers' attention and the condemnation of the shipping industry never ends. However, in practice, vessel-source oil pollution is not the major source of pollution in the ocean. Big oil tanker disasters account for 10 percent of global marine pollution (IOI, 2010). Vessel-source oil pollution can be divided into operational and accidental discharges.

3.1 Accidental discharges

Accidental discharges were perceived early by the maritime nations as the major threat to the marine environment. As tankers were getting bigger and crude oil demand grew, the thought of a major disaster involving an oil tanker weighed heavily on the minds of the maritime states. Shortly after World War I, the United States and the League of Nations sought an international agreement on measures to combat vessel-source oil pollution. However, it was not until 1926 that the first convention relating to oil pollution of the sea was introduced (Gold, 2006). This was the beginning of concerted efforts to combat vessel-source oil pollution, which continued well into World War II and beyond, and culminated in the conclusion of the International Convention for the Prevention of Pollution of the Sea by Oil (OILPOL).

As mentioned in chapter 2, oil pollution of the oceans has been on the decline from the 1970s and 1980s. From the highs of the 1980s, oil spills and general discharges by tankers have been reduced by 63% and, significantly, over the same period, oil released from tanker accidents has gone down by 75% (Nellemann, Hain and Alder, 2008).

3.1.1 MAJOR OIL TANKER DISASTERS

Accidental discharges from ships cannot only happen through tanker disasters, but also through cargo ship accidents that cause the release of bunker oils. The amount might seem relatively small, but an accident occurring in coastal waters can have a huge impact on the marine environment. There have been a number of big oil tanker disasters, some big by volume of oil released and others by impact on the marine environment. During the period 1970 to 2013, approximately 5.75 million tonnes of oil was lost due to tanker incidents (ITOPF, 2013).

Some of these accidents were a catalyst for the development of maritime safety and environmental protection regulations/conventions. A selected number of the major oil pollution disasters will be discussed below (and for a full list see Figure 2).

Major oil spills since 1967 (quantities have been rounded to nearest thousand)

No	Name	Year	Location	Size (tonnes)
1	Atlantic Empress	1979	Off Tobago, West Indies	287,000
2	ABT Summer	1991	700 nautical miles off Angola	260,000
3	Castillo de Bellver	1983	Off Saldanha Bay, South Africa	252,000
4	Amoco Cadiz	1978	Off Brittany, France	223,000
5	Haven	1991	Genoa, Italy	144,000
6	Odyssey	1988	700 nautical miles off Nova Scotia, Canada	132,000
7	Torry Canyon	1967	Scilly Isles, UK	119,000
8	Sea Star	1972	Gulf of Oman	115,000
9	Irenes Serenade	1980	Navarino Bay, Greece	100,000
10	Urquiola	1976	La Coruna, Spain	100,000
11	Hawaiian Patriot	1977	300 nautical miles off Honolulu	95,000
12	Independenta	1975	Bosphorus, Turkey	88,000
13	Jacob Maersk	1993	Oporto, Portugal	88,000
14	Braer	1993	Shetland Islands, UK	85,000
15	Aegean Sea	1992	La Coruna, Spain	74,000
16	Sea Empress	1996	Milford Haven, UK	72,000
17	Khark 5	1989	120 nautical miles off Atlantic coast of Morocco	70,000
18	Nova	1985	Off Kharg Island, Gulf of Iran	70,000
19	Katina P	1992	Off Maputo, Mozambique	67,000
20	Prestige	2002	Off Galicia, Spain	63,000
35	Exxon Valdez	1989	Prince William Sound, Alaska, USA	37,000
131	Hebei Spirit	2007	Taean, Republic of Korea	11,000

Figure 2: Major oil spills since 1967 (Source: IOPF)

i. In 1967, *Torrey Canyon*, carrying almost 120,000 tonnes of crude oil, grounded off Scilly Island in the UK. The area of the spill covered an arc of 321 km. At the time, it was the largest oil spill in maritime history and had unprecedented media coverage and garnered a lot of public interest. The

magnitude of the disaster, coupled with extensive media coverage, played a role in influencing public opinion (Gold, 2006).

ii. The grounding of the *Exxon Valdez* in 1989, which spilt about 36, 000 tonnes of oil (crude) in Alaska's Prince William Sound, caused devastating damage to the marine environment. This incident might not seem huge in comparison to the tonnes of oil released by other big maritime disasters, but it occurred in a very sensitive area. It is estimated that 250,000 seabirds, 300 harbour seals and 900 bald seals were killed and marine life continued to suffer years after the disaster (National Research Council, 2007). This incident had a great influence on the improvement of maritime navigational aids as well as phasing out of single hull tankers. MARPOL was amended after the incident and double hull designs were introduced. Single hull tankers are expected to be phased out by 2015 (ICS, 2014). Exxon's total costs for compensation payments of about US$ 5 billion are still the subject of litigation even today. Exxon is also believed to have spent a similar amount on the clean-up operations. The cost of this incident has been very high to the marine environment as well as the maritime industry (ICS, 2014).

iii. The largest of the oil spill disasters involving a tanker in history was the *Atlantic Empress* incident in 1979. The Atlantic Empress was a Very Large Crude Carrier (VLCC), with a deadweight (DWT) of 250,000. It collided with another VLCC the *Aegean Captain* off the coast of Trinidad and Tobago. There were 26 lives lost as well as 287,000 tonnes of crude oil released to the marine environment. The spill never reached shore and as a result of the explosions that followed the collision, most of the oil was burnt off (Read, 2011).

iv. The *Prestige,* carrying 77,000 tonnes of crude oil, was severely damaged in a storm off the Galician coast of Spain. The ship later split in two and sank

spilling tonnes of crude oil which drifted onto Galician beaches and France. The tanker continued to discharge oil for weeks after sinking. The environmental damage was immediate (García-Mira, Real, Uzzell, Juan and Pol, 2006). Prior to sinking and having realized the ship was leaking oil, the Prestige had sought refuge to allow discharge of cargo; however, authorities in both Spain and Portugal denied it docking rights. The stricken tanker could not survive the rough seas and eventually met its fate. This disaster drew a lot of media and public attention in Spain, especially since the public was directly affected as the oil reached beaches. There was an outcry at how this incident had been handled as many felt it could have been averted by allowing the stricken vessel into Port (Pulido, 2007).

The demand for energy continues to grow and the tanker fleet continues to grow. In 2010 the growth in energy commodities demand saw the tanker trade volume reach 2.767 million tonnes. The increase in demand in 2010 stimulated the new build and second hand market (Lun, Himola, Goulielmos, Lai and CHENG, 2013). The amount of seaborne oil has increased by an estimated 50% from the late 1980s to now. Common sense dictates that the sea is more vulnerable now than during the period between the 1970s and the late 1980s because of increased fleet numbers and capacity. However, the opposite seems to be true as we have seen a dramatic decrease in the number of serious incidents involving tankers, especially in the last decade as depicted in Figure 3.2 (ICS, 2014).

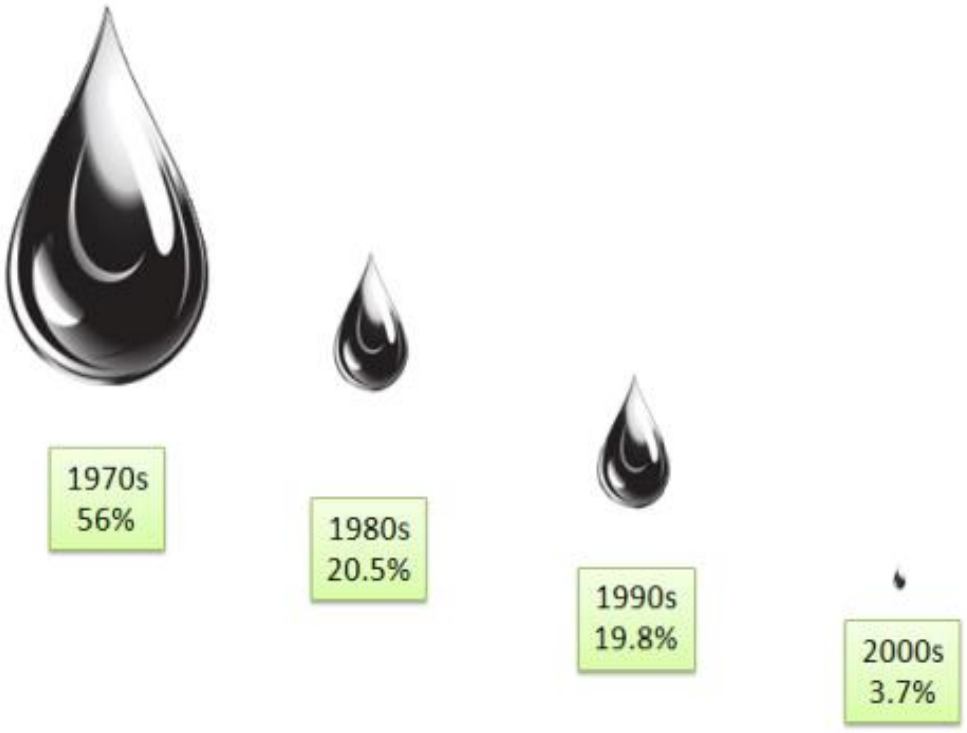


Figure 3: Oil spill per decade as percentage of the total spilt between 1970 and 2009 (Source: ITOPF)

3.2 Operational discharges

Maritime disasters may be described as events, while operational discharges are a daily occurrence. Operational discharges can be attributed to human error, poor maintenance and deliberate illicit acts. They may stem from broken hoses, defective valves, leaks from manifolds and flanges. Poor manning of bunker stations may be the cause of oil spills during bunkering (Alexopoulos and Dounias, 2003).

Deliberate discharges are increasingly becoming a major concern. The United Nations Environment Programme (UNEP-Regional Seas Programme) states that oil discharges

from engines, which gather in bilges from day to day operations, rank as some of the worst types of pollution. This is mainly because such waste is steady and “occurs everywhere” (UNEP, 2014).

Marine pollution through operational oil discharges is estimated at 207,900 tonnes per year (bilge and fuel oil sludge + oily ballast residue-fuel tanks + cargo tank washing). These discharges consist of oil/oily water collecting in engine room bilges that are discharged deliberately at sea. Residues from fuel tanks, cleaning and cargo tank washing are also highlighted in the figure mentioned above (GESAMP, 2007).

Coastal states spend huge amounts of money on surveillance and enforcement of regulations related to operational discharges. It is important to note that as much as human error and poor maintenance are one of the causes of operational discharges, intentional discharges remain major contributors. Unscrupulous crew members deliberately discharge oil at sea as well as in coastal waters hoping not to be detected. Some of these discharges occur during the night when they are difficult to detect. These discharges often remain undetected until sea birds, penguins or other marine life are washed up in coastal areas. It is for this exact reason that coastal states spend huge capital on this issue. To prevent operational discharges requires manpower, advanced technology for surveillance and sampling equipment, including surveillance planes and vessels. Not all coastal states are able to provide such defences and, as a result, the coastal waters are vulnerable to operational discharges. In the Baltic Sea, huge resources have also been allocated to combating ship-source oil pollution. Through the Helsinki Commission, the region conducts regular aerial surveillance that has resulted in a significant decrease in illegal discharges, with ships aware that their illicit polluting activities can be detected (Brusendorff, Korpinen, Meski and Stankiewicz, 2014).

3.3 Effects of Vessel - source oil pollution on the marine environment

Oil pollution has an impact on the marine environment. The effects can be both immediate and long term. Other than directly impacting the marine environment, oil pollution can also affect coastal livelihoods. Oil can affect the marine environment by physical smothering, chemical toxicity and, in the long term, loss of key organisms can cause ecological changes and, indirectly, through habitat loss, result in elimination of species that are very critical for sustenance of the ecology (ITOPF, 2013).

3.3.1 SHORT TERM EFFECTS

Oil spill effects are influenced by a number of factors, not just the quantity, but the weather, season and location of incident are also some of the major factors. For instance, a small spill in terms of tonnage in close proximity to a highly sensitive area like a Marine Protected Area or bird breeding colony can have detrimental effects.
Other than being toxic to marine life, polycyclic aromatic hydrocarbons, the components in crude oil, are also difficult to clean. Oil can choke animals and stick to the animals' bodies and plumage of birds. Oil slicks can cause breakdown in seabird and mammals' thermal insulation. Sticking to birds' plumage also inhibits mobility thus affecting ability to feed (Hulsey, 2012).

Birds, including penguins, are normally the first prominent casualties during an oil spill. They normally prompt a huge response involving clean-up operations and evacuation. These costs may run to millions of dollars. In 1989, the *Exxon Valdez* spilled about 37,000 tonnes of oil in the sensitive marine environment of Alaska's Prince William Sound. An estimated 250,000 seabirds and 2,000 sea otters, including unaccounted fish and other marine life, were killed (National Research Council, 2007).

However, spills of small tonnage have caused more damage than those regarded as disasters because of the factors alluded to earlier. UNEP GPA (2014) reported that,

although the 2,000 tonnes of oil spilled by the *Apollo Sea* when it sank off South African waters in 1994 was a relatively small amount, in reality, it impacted 10,000 penguins. In 2000, the *Treasure* spilled half the amount of oil as the *Apollo Sea* but had double the impact with over 20,000 penguins covered in oil and a further 20,000 evacuated.

3.3.2 LONG TERM EFFECTS

Polycyclic aromatic hydrocarbons (PAHs), the components of crude oil, are known to exist in the sediment and marine environment long after an oil spill. Hydrocarbons in the long term cause physiological and behavioural disruptions in certain marine species which include altering the reproductive capacity (Hulsey, 2012).

The coastal communities also suffer long term economic effects as fishing grounds might take long to recover. Thomas Shirley, the chair of biodiversity and conservation at the Harte Research Institute, which is studying the impact of Deep Horizon spill, states that entire generations of shrimp, crab, oysters and other commercially important marine life were likely to be wiped out and may require decadal recovery times. The impact is not only felt by the ecosystem, but the economy will also be affected for years to come. The demand for seafood harvested from the Gulf was likely to be affected because of consumer perceptions related to oil spills (Yale Environment 360, 2010). In case of the *Exxon Valdez* disaster, long term effects to the ecosystem were discounted since rapid recovery was touted. Contrary to these claims, evidence from scientific research conducted over the years has demonstrated that not all affected species and ecosystem recovered rapidly. Protracted recovery is particularly evident in near-shore food webs. Sea otter recovery rates in areas that had the greatest oiling and sea otter mortality were highest. Recovery was non-existent up to year 2000 (Bodkin, 2012).

3.4 Legal Regime

Oil Pollution was the catalyst for all maritime regulations. The first International Conference on Marine Pollution was held in 1926 in Washington. The conference which was attended by 13 maritime nations produced the first International Convention on Oil Pollution of the Marine Environment. Even though the convention was not successful, it provided an important platform for future conventions. Following the establishment of IMCO in 1948, maritime nations converged again under its umbrella to deliberate on regulations of oil pollution. In 1954, an important convention was concluded called the International Convention for the Prevention of Pollution of the Sea by Oil (OILPOL) (Gold, 2006).

The United Nations held its first UN Conference on the Law of the Sea in 1958, and another in 1960. The United Nations Convention on the Law of the Sea (UNCLOS) resulted from conferences held in 1973 and 1982. The Convention spelt out responsibilities regarding marine pollution. In 1973, the International Convention for the Prevention of Pollution from Ships (MARPOL 73) was established after IMCO's International Conference on Marine Pollution held in the same year. MARPOL replaced OILPOL 54 with its expanded scope (Tan, 2006).

Subsequent to the *Torrey Canyon* disaster in 1967 which polluted over 190 km of the United Kingdom coastline with costs estimated at over $5 million, the first set of conventions dealing with liability and compensation were established. In 1969 the International Convention on Civil Liability for Oil Pollution Damage (CLC 1969) was established and entered into force in 1975. The International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (1971 Fund Convention) was established in 1971 and entered into force in 1978. This Convention established the International Oil Pollution Compensation Fund (1971 IOPC Fund) which provides a second tier of compensation in respect of damage exceeding the liability under the 1969 CLC. Compensation was subject to an overall monetary cap per incident (UNCTAD, 2012).

The 1992 CLC and 1992 Fund Convention improved on the previous Conventions by increasing the maximum amount of compensation, as well as widening the relevant geographical scope of application of the Conventions. These Conventions entered into force on May 30, 1996. Following the incident involving the *Erika* in 1999, it was apparent that the compensation amounts needed to be increased further. In 2000, the compensation levels available under the 1992 Conventions were raised by 50% by way of tacit amendments that came into force in 2003. It is important to note that even though most of the original Contracting States to the 1969 CLC have adopted the 1992 CLC and denounced the 1969 Convention, some States have not done so. As a result, the 1969 and 1992 CLC co-exist (UNCTAD, 2012).

The vessel-source oil pollution regulatory framework today not only deals with pollution of the environment, but also involves liability and compensation. It has been developed into a robust and highly regulatory framework.

3.5 Summary

Vessel-source oil pollution continues to be a major problem. It is encouraging though to note that the maritime industry has over the years worked towards minimizing its impact. As the statistics have revealed, the number of oil spills and major incidents has decreased despite the increase in trade and size of vessels. This positive development can be attributed to the well developed and robust legal framework that exists in the maritime industry.

Operational discharges continue to be a problem that unfortunately requires huge resources to combat. The shipping industry has taken commendable steps in showing commitment towards climate change mitigation. The maritime industry, through the IMO, has shown commitment towards decreasing Greenhouse Gas emissions.

CHAPTER 4: VESSEL-SOURCE OIL POLLUTION (SOUTH AFRICA)

4.1 Background

South Africa is the 9th largest country in the continent of Africa. It has a land area of 1.2 km3. South Africa has a coastline of about 3000km making it the second longest coastline in Africa after Somalia. If the vast waters which include the territorial waters and the Exclusive Economic Zone (EEZ) are taken into account, South Africa ascends to be the largest country on the continent (SAMSA, 2013). In the words of the South African Maritime Safety Authority;

> *South Africa occupies a geo-strategic position, a maritime choke point, in the Southern Hemisphere, being surrounded by 3 great oceans - the Indian South Indian, Atlantic, and Southern Oceans (SAMSA, 2013).*

South Africa lies in one of the world's busiest shipping lanes with around 12,000 ships visiting the countries' 8 ports annually. In addition, thousands of ships transit through South African waters to various destinations (see Figure 4). The coast is home to some of the most pristine areas which are rich in biodiversity. The coast is also known for providing some of the world's roughest sailing conditions, making it vulnerable to oil pollution (SAMSA, 2013). There is little wonder that the south-western Cape coast is

referred to as the "Cape of Storms" and the south-east coast, as the “Wild Coast” (Mearns, Olivier and Jordaan, 2012).

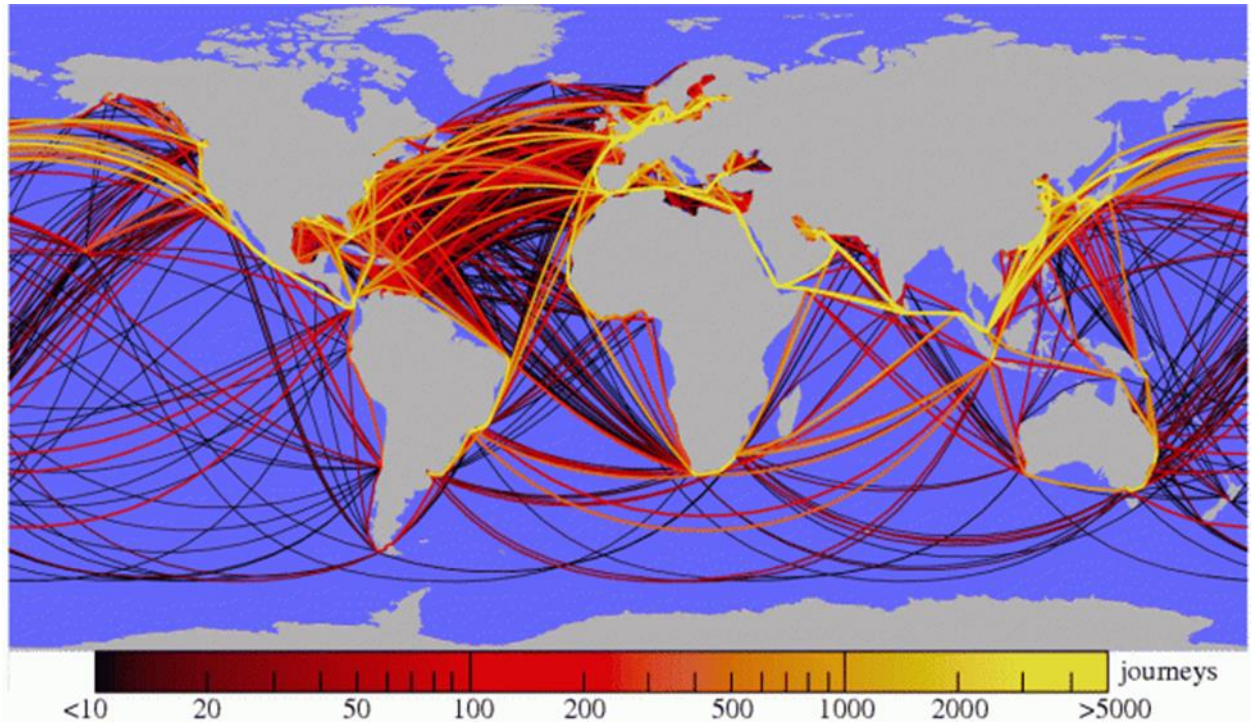


Figure 4: Shipping routes (source: Bernd Blasius)

South Africa has high levels of both terrestrial and marine biodiversity. In fact, 10,000 species of marine plants and animals have been recorded in South Africa. This equates to almost 15% of the known global marine species. The coastal conditions in themselves are highly diverse in terms of weather, productivity and oceanographic variability among others (DEA, 2014). According to Tunley (2009), there is a total network of 22 Government Gazetted Marine Protected Areas (MPA) in South Africa. The country has one MARPOL Special Area off the Southern waters. The Special Area is located in a busy shipping route and protection of the marine environment is ensured

by prohibiting discharge of oil or oily water residues into the sea from vessels of 400 gross tonnage and above (Tunley, 2009).

4.2 Major vessel-source oil pollution incidents in South Africa

There have been a number of vessel-source oil pollution incidents within South African waters over the years, some involving huge amounts of oil and others with less oil spilled but far greater impacts on marine species. According to GESAMP (2007), between 1997 and 2007 there was a slight increase in estimated accidental oil spills in South African waters, although the total estimated number of oil spills each year has remained below 20,000 tonnes. Figure 5, puts into perspective the Castillo de Bellver disaster when compared to other major international oil pollution disasters. Below is a selected list of the major oil spills both in tonnage of oil spilled and effect on the marine environment and life. The example below highlights the fact that it is not only large crude carriers that are a threat to the marine environment but bunker oil from other cargo carriers, when grounded in sensitive areas, can cause problems. Below is a list of some of the major incidents to have occurred in South African waters in the last 30 years (GESAMP, 2007).

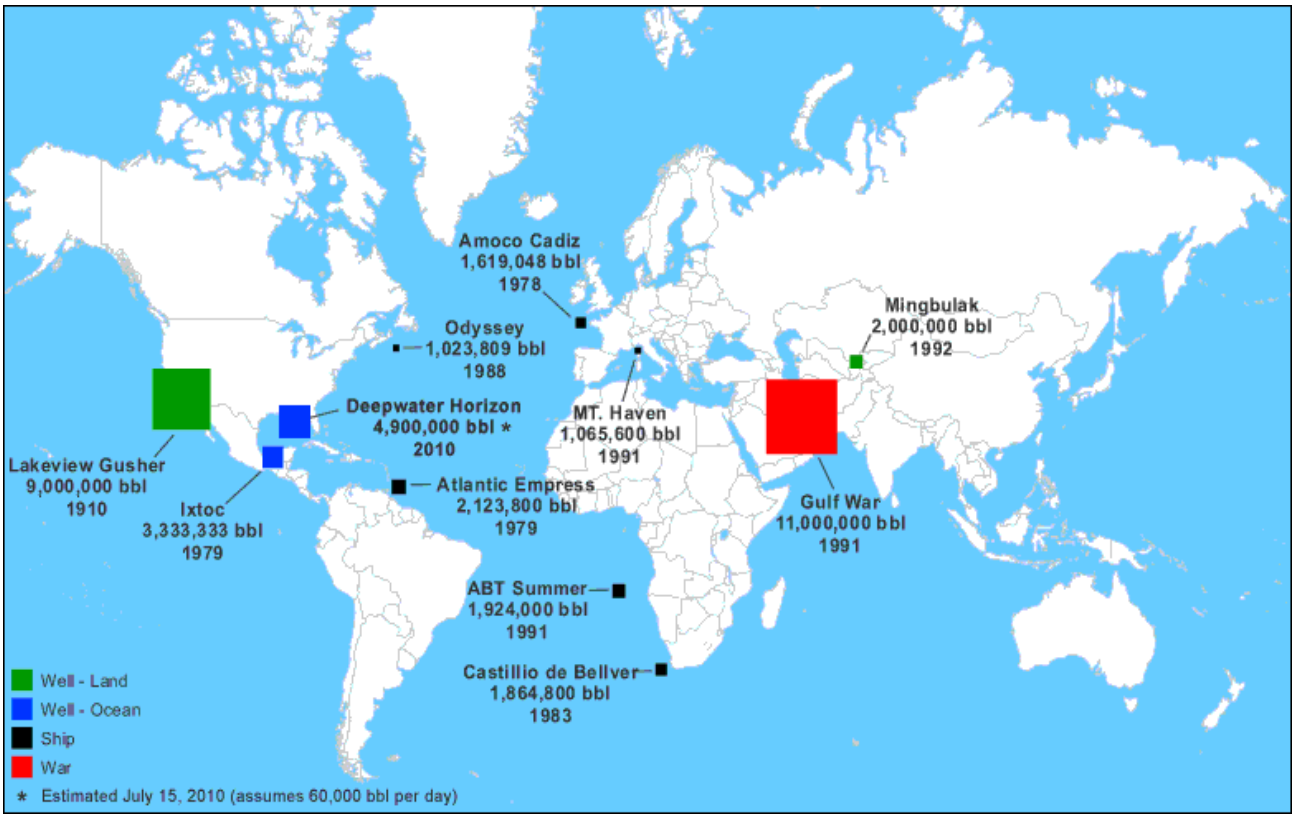


Figure 5: World's major oil pollution disasters – all sources (Source: Geology.com)

4.2.1 CASTILLO de BELLVER

On 06 August 1983, the *Castillo de Bellver* laden with 267,000 tonnes of oil caught fire (GESAMP, 2007). This was South Africa's biggest oil spill to date and one of the world's top 5 maritime disasters involving tankers (see Figure 4.2). The ship was 112 km North-West of Cape Town when it caught fire. The flame engulfed ship drifted off-shore and later broke in two. The stern section with an estimated 100,000 tonnes of oil remaining in its tanks sank 24 miles off the coast in deep waters. The remaining bow part was towed further away from the coast where it sank. Of the total amount of oil on board, approximately 50 – 60,000 tonnes were spilled into the sea or evaporated during burning. It is reported that the oil had initially drifted towards the shore but a wind shift

subsequently drove it offshore (ITOPF, 2010). The prevailing weather conditions at the time of the incident and position of the ship prevented oil from reaching the coastline.

4.2.2 APOLLO SEA

The circumstances surrounding this incident were bizarre and contributed to the delayed response that resulted in a loss of life and pollution of the marine environment. On the evening of 22 June 1994, there were reports of a suspected oil spill when heavily oiled African Penguins were discovered ashore on Dassen Island which is situated North West of Cape Town and is a seabird breeding colony. Oil was also discovered on the shoreline around the Island. This baffled the authorities as there was no reported incident in the area. For at least 3 days after the discovery, the evacuation of the penguins was not possible because of extreme weather conditions. The weather also delayed responses and any containment efforts. It was not until after a week that the source of the pollution was identified. By that time the oil slick had reached some of Cape Town's favourite beaches as oiling of the rocky shoreline and sandy beaches were observed. The source was identified as the Chinese-owned bulk carrier the *Apollo Sea* laden with 124,000 tonnes of iron ore, which had sailed from Saldanha Bay on the 20th June 1994. Apparently some 4 hours after departing Saldahna Bay, the ship suffered a serious fracture and sank spilling its 2,400 tonnes of bunker heavy fuel. Around 1,000 penguins were oiled and half of them died. There was no “May day” call sent from the ship, thus resulting in the environmental damage and, most unfortunately, the loss of all her 36 crew (Moldan, 1997).

4.2.3 M/V TREASURE

In 2000, the bulk ore carrier *MV Treasure* sank North of Cape Town between Dassen Island and Robben Island. These islands support the largest and 3rd largest colonies of African penguins. An estimated 1,400 tonnes of oil was released into the sea. While this seems like a small amount, the incident soon developed into a major disaster (Barham

et al, 2006). The *Treasure* had earlier sought refuge in Cape Town after experiencing flooding in its number 4 cargo hold. The ship was refused shelter and ordered to sail 50 miles offshore. Unfortunately, after just 10 miles it sank (Devanney, 2009).

This resulted in one of the biggest penguin evacuations in history. As a result of the spill, about 19,000 African Penguins, the majority from Robben Island and Dassen Island and a few from around Saldahna Bay were covered in oil. These birds were taken to the rehabilitation center run by the Southern African Foundation for the Conservation of Coastal Birds (SANCCOB) where they were washed, cleaned and fed. Unfortunately, and despite all attempts to save them, close to 2,000 penguins died at the rehabilitation center (Barham *et al*, 2006). The oiled penguins constituted 20% of the total species population. The number of affected penguins was even higher and estimated at over 40,000. About 20,000 penguins that were not covered in oil were removed from the polluted area and relocated 800 km away to Port Elizabeth (Crawford, 2000).

4.3 Vessel source-oil pollution (Legal Regime)

This section will look at Conventions dealing directly with oil pollution, in terms of prevention, compensation and response. Conventions related to safety, which is also vital in marine environmental protection have been deliberately excluded.

4.3.1 LEGAL REGIME (Conventions and regional treaties)

The table below lists International Conventions including Regional treaties relating to oil pollution that South Africa is party to or should be party to.

TABLE 1: Status of Conventions

Convention	**Year Ratified/Acceded**	**Domestic Legislation/Policy or aim of the convention**
1. MARPOL 73/78	1984 (exc IV & VI)	Marine Pollution (Prevention Of Pollution from ships)(Act 2 of 1986)
2. OPRC	2008	SANCP complies with OPRC
3. CLC 1992	2004	Merchant Shipping 2013 -(Civil Liability Convention) Act -(International Oil Pollution Compensation Fund) Compensation Act
4. IOPC Funds 1992	2004	Merchant Shipping 2013 -(International Oil Pollution Compensation Fund) Administration Act -(International Oil Pollution Compensation Fund) Contribution Act

5. INTERVENTION 1969 & Protocol 73	1986	Marine Pollution(Intervention) (Act.No.64 of 1987)
6. UN Law of the Sea convention - UNCLOSC 82	1997	Maritime Zones Act (Act 15 of 1994)
7. London Convention 1972 & 1996 Protocol	1972 ratified in 1978 1996 ratified 1998	-Dumping at Sea Control Act 73 of 1980 -NEMA: Integrated Coastal Management Act 24 of 2008
8. Nairobi Convention	2002	Convention for the Protection, Management and Development of the Marine and Coastal Environment of the East African Region and related Protocols
9. Abidjan Convention	2002	The Convention for Cooperation in the Protection, Management and Development of the Marine and Coastal Environment of

		the Atlantic Coast of the West, Central and Southern Africa Region
10. Bunker Convention 2001	Not a party	n/a

Data source: SAMSA, DIRCO, (Yuen & Kumssa, 2011), IMO and Parliament of South Africa.

Key:

1. SANCP - South Africa's National Contingency Plan for the Prevention and Combating of Pollution from Ships and Offshore Installations

2. NEMA - National Environmental Management Act

3. MARPOL 73/78 - International Convention for the Prevention of Pollution from Ships.
4. OPRC 90- International Convention on oil Pollution Preparedness Response and Cooperation.

5. CLC 92 - International Convention on Civil Liability for Oil Pollution Damage.

6. IOPC Fund 92 - The International Oil Pollution Compensation Funds

7. BUNKER 2001- International Convention on Civil Liability for Bunker Oil Pollution Damage

4.3.1.1 MARPOL 73/78

South Africa has ratified MARPOL and only ratified 4 annexures, namely; Annexure I, Annexure I & II, Annexure III & Annexure V in 1984. Annexure IV and VI, have not been acceded to. The 4 annexures have been enacted into domestic legislation through the Marine Pollution (Prevention of Pollution from ships) (Act 2 of 1986). However, the matter regarding Annexure IV & VI is currently with parliament after the Portfolio Committee on Transport at a seating on 29 July 2014 recommended that the Annexures be acceded to and sent to parliament for processing. In suggesting to the committee that they approve the two annexes, Ms. Phumelele Ngema, the Parliamentary Law Advisor, stated that:

> *the two annexes were not a deviation from the other four annexes of the Convention. "They both fit into the existing legislative framework"*. (Parliament of RSA, 2014).

4.3.1.2 OPRC

South Africa ratified the International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC 90) in 2008. South Africa's National Contingency Plan for the Prevention and Combating of Pollution from Ships and Offshore Installations is currently being amended to ensure full compliance with OPRC 90. The country was already partly compliant with OPRC through:

i. Designation of SAMSA

ii. Designation of Maritime Rescue Coordination Centre - MRCC (part of SAMSA)

iii. Smit tugs on standby

vi. The formulation of the South African Contingency Plan for the Prevention and Combating of Pollution from Ships and Offshore Installations (Personal interview [4], August 03, 2014).

4.3.1.3 CLC CONVENTION AND IOPC FUND CONVENTION

South Africa had enacted the earlier version of CLC into domestic legislation. However, even though the country acceded to the CLC and IOPC 92 in 2004, it has taken over 8 years to enact the latest amendments into domestic law. The delay in enacting the amendments has arguably deprived the country of making claims under the new Conventions' updated limits which ensure much higher compensation. South Africa was fortunate since there were no major tanker incidents during the period (Cliffe Dekker Hoffmeyer, 2013).

The act was finally signed into law during the writing of this paper. However IMO Consultants in their Mission Report to South Africa recommended that the proposed bills for implementation of both the CLC and the Fund Convention be put on hold. The reasons were not substantiated; however, it can be assumed that it was influenced by the proposed Merchant Shipping Bill which was to bring together the fragmented maritime legislation in South Africa. The recommendations were challenged by The Maritime Law Association of South Africa (MLASA). Their primary concern was the lack of transparency regarding the recommendations and the cumbersome process (over 8 years) by which the Bill saw the light of day. The MLASA further argued that delaying the bills will deprive the claimants, in the event of a major tanker pollution incident, their rights to claim against the Fund. In their view, this will leave the South African government vulnerable to litigation (Buabeng and Staniland, 2014; MLASA, 2014).

4.3.1.4 BUNKER CONVENTION

South Africa, along with Australia, Canada, Finland, Norway and Sweden, made a joint submission to the 75th session of the IMO's Legal Committee on the need for a bunker convention. The submission was partly motivated by the UK P & I Club's report (Analysis of Major Claims 1993). The report stated that when it comes to pollution claims regarding incidents, half the claims involve ships not carrying oil cargo (IMO, 2001). Interestingly South Africa has not ratified the Convention. South Africa is not a party to the Convention.

4.3.1.5 INTERVENTION CONVENTION

The Intervention Convention and the protocol were ratified in 1986 and the law enacting it into domestic law is the Marine Pollution (Intervention) Act 64 of 1987.

4.3.1.6 UNITED NATIONS CONVENTION ON THE LAW OF THE SEA (UNLOSC)

South Africa ratified the convention in 1997. The country also actively participated in the establishment of the International Seabed Authority. The Maritime Zones Act (Act 15 of 1994) conforms to the regulation with regards to the limits of the territorial sea, contiguous zone, exclusive economic zone and continental shelf (DIRCO, 2006). All the relevant maritime boundaries are defined under the same Maritime Zones Act, ICM Act and National Environmental Management Act (Act No. 107 of 1998) (NEMA) (DEA, 2014).

4.3.1.7 NAIROBI AND ABIDJAN CONVENTIONS

South Africa acceded to both the Nairobi Convention and the Abidjan Convention in 2002. South Africa's location at the junction of two oceans was the reason for participating in these two regional programmes/conventions. Both conventions are

concerned with issues of protection, management and development of the marine and coastal environment. Of interest to this study is the fact that both have protocols concerning co-operation in combating pollution in cases of emergency (OECD, 2013).

4.4 Major Role Players (Legal mandates, operational cooperation)

In terms of vessel-source marine pollution, and particularly oil pollution, there are two major players: the Department of Environmental Affairs (DEA) and the Department of Transport (DOT) through its agency the South African Maritime Safety Authority (SAMSA).

4.4.1 THE DEPARTMENT OF TRANSPORT (DOT) – SOUTH AFRICAN MARITIME SAFETY AUTHORITY (SAMSA)

SAMSA was established in 1998 under the South African Maritime Safety Authority Act 5 of 1998 and is accountable to the Minister of Transport. SAMSA's stated mission is;

to promote South Africa's maritime interests and development and position the country as an international Maritime Centre while ensuring maritime safety, health and environmental protection (SAMSA, 2013).

The legal authority for prevention of vessel-source marine pollution rests with the Department of Transport which implements the MARPOL Convention, amongst other international agreements and domestic legislation. SAMSA, a special agency of the DOT, is mandated under the South African Maritime Safety Authority Act (Act No. 5 of 1998) (SAMSA Act) to deal with matters pertaining to marine pollution by vessels. The DOT and SAMSA administers all the relevant Acts pertaining to marine pollution prevention from ships (Personal Interview [1], June 24, 2014).

After the establishment of SAMSA in 1998, the administration of the Marine Pollution (Control and Civil Liability Act 6 of 1981) was designated in terms of the schedule to the SAMSA Act No. 5 of 1998. There is, however, a split mandate with regards to prevention and combating of oil pollution in terms of the Act. Regarding oil pollution and response, the mandate is divided between the Department of Environmental Affairs (DEA) and DOT. SAMSA is the agency responsible for the supervision of salvage, oil trans-shipment and lightering operations while oil is still within the vessel. SAMSA is also responsible for negotiating with owners and insurers of the vessel concerned (ITOPF, 2008). In terms of section 52 of the SAMSA Act, the DEA is responsible for combating oil pollution. SAMSA, however, remains the overall designated authority responsible for marine oil-pollution prevention measures, including administration of marine oil pollution legislation. It is in this light that SAMSA has been afforded the lead agency role and overall responsibility for responding to pollution from ships as stipulated in South Africa's National Contingency Plan for the Prevention and Combating of Pollution from Ships and Offshore Installations (SANCP). SAMSA is also responsible for the overall implementation of the plan, and delivers its mandate through its 9 business centers (see Figure 6). The National Port Authority is responsible for spills designated as tier 1 happening within the ports (DOT, 2007).

Figure 6: SAMSA –Business centres (SAMSA)

SAMSA also runs the Maritime Rescue Coordination Centre (MRCC) which is operational 24 hours 7 days a week. As the lead agency, SAMSA, through the MRCC, receives distress calls and takes necessary steps to ensure prevention of pollution. SAMSA's policy is to ensure that oil is contained within the ship until the ship can be towed or refloated to a relatively safe place. The assessment is conducted jointly by the MRCC and SAMSA. If it is not possible to move the ship without placing the environment at risk, SAMSA ensures that oil is contained and, when safe to do so, transferred to another ship or other means of containment. It is important to note that the safety of life is a priority during decision-making and the salvage process (DOT, 2007; Personal Interview [2], July 25, 2014; Personal Interview [3], July 03, 2014).

SAMSA manages a deep-sea salvage tug stationed permanently on the coast. This is a key in the armoury for prevention of pollution on behalf of the Department of Transport.

The salvage tug is readily available to remove by towing any ship polluting or ship deemed a risk. SAMSA's mandate in oil pollution prevention and response can be summed up as being responsible for prevention or containing oil while it is in the vessel. SAMSA is also responsible for flag state, coastal and port state inspection, ensuring that vessels are seaworthy and pose no threat to the environment. The DEA, on the other hand, is responsible for combating oil pollution once oil has been released at sea (DEA, 2014; DOT, 2007).

4.4.1.1 Sea Watch and Response - MRCC

The Maritime Rescue Coordination Centre (MRCC) was inaugurated in 2007 and falls under one of SAMSA'S business units, the Centre for Sea watch and Response (SAR). The MRCC's role in oil pollution prevention is one of an alerting post to agencies that deal with prevention and combating pollution. If it detects pollution activity, it communicates the information to the relevant authority, which in all likelihood is its mother body SAMSA or the Department of Environmental Affairs. The role of the MRCC in accident prevention is thus limited. MRCC monitors the coast via the Automatic Identification System (AIS), but it cannot detect oil pollution. Detection of vessels is also limited to those vessels that carry the system. However, in the case of an accident, a report is presented to the relevant official at SAMSA, depending on the coast where the incident has occurred. A joint assessment is conducted on the best way to contain the oil spill (Personal Interview [3], July 03, 2014).

MRCC in itself does not have any assets such as surveillance aircraft or patrol boats. While it does have surveillance technology for vessel traffic monitoring in the form of AIS, it cannot detect pollution. In South Africa, these assets are lodged with private organizations, as well as other government organizations and other government departments. Even when the MRCC becomes aware of any illegal deliberate discharges, it does not have any enforcement powers. As indicated earlier, it can only

act as an alerting post by communicating with relevant units within SAMSA (Personal Interview [3], July 03, 2014).

SAMSA has not conducted any emergency drills in the last few years since there have not been many incidents to warrant activating the plans (Personal Interview [2], July 03, 2014).

4.4.1.2 Incorporation of international Instruments to domestic legislation

SAMSA also acts as the technical agency to the DOT in terms of the development of regulations pertaining to maritime transport. It facilitates incorporation of IMO and other international instruments into domestic legislation and this is accomplished through SAMSA's Centre for Policy and Regulation (Personal Interview [2], July 03, 2014).

4.4.2 THE DEPARTMENT OF ENVIRONMENTAL AFFAIRS (DEA)

The Department of Environmental Affairs' (DEA) constitutional mandate is to:

> *Ensure the protection of the environment and conservation of natural resources, balanced with sustainable development and the equitable distribution of the benefits derived from natural resources."(DEA, nd)*

The department administers legislation, policies and programmes related to environmental, protection, conservation and pollution. Some of the relevant legislation and programmes among others are National Environmental Management Act (Act No. 107 of 1998) (NEMA), Integrated Coastal Management Act (No. 24 of 2008) and South Africa's National Coastal Management Programme. When it comes to vessel-source marine pollution, the DOT and SAMSA administer all the relevant acts. The DEA does provide environmentally-related input where appropriate (Personal Interview [1], June 24, 2014).

In terms of section 53 of the SAMSA Act DEA is responsible for combating oil spills. It takes charge as soon as oil is released into the environment, and is responsible for coordinating the response action concerning containing and clean-up of oil pollution. The objective is always to ensure that action taken does not leave the environment in a far worse situation then it would have been if no action was taken. In conjunction with SAMSA the DEA approves, oversees and coordinates all activities on site, including other role players (DEA, 2014).

For several years, the DEA operated an aerial surveillance service that provided support during oil spill incidents. The service also included routine patrols of the shipping lanes to look out for any illicit acts of operational discharges that were in contravention of MARPOL. According to a senior officer within the department, the service is currently under review to take account of new platforms/technologies, among other things. At the height of the programme, surveillance aircraft would take photographs of the oil slicks and hand them to SAMSA which, in turn, instituted the relevant legal action i.e. penalties and fines (Personal Interview [1], June 24, 2014).

The Department has a joint oversight on 6 vessels which were handed over to the Department of Agriculture, Forestry and Fisheries (DAFF). Four of the vessels are patrol vessels and the remaining two research vessels. The primary function of these vessels is to conduct scientific research that will inform decisions on sustainable use of natural resources as well as enforce fisheries laws. Apart from their fishing patrol duties, the vessels are equipped to provide sea rescue and have oil slick breaking capabilities. In addition, the vessels carry oil dispersant chemicals used during oil pollution incidents. However, administrative issues have meant that these vessels have not been able to fulfil their duties since they have been idle and docked for most of the time between 2012 and 2013 largely because at some point the management of the fleet was handed over to The South African Navy by DAFF. The arrangement hit a snag

and never really took off until the contract expired (Parliament of RSA - Research Unit, 2014).

4.4.3 SOUTH AFRICA'S NATIONAL CONTINGENCY PLAN FOR THE PREVENTION AND COMBATING POLLUTION FROM SHIPS AND OFFSHORE INSTALLATION (SANCP).

The purpose of the national contingency plan is:

> *To outline national policy for responding to a pollution incident originating from vessels and thereby minimizing detrimental effects on the environment* (DOT, 2007).

The plans' fundamental and primary aims are to:

(a) Protect human health and safety;
(b) Minimize detrimental environmental impacts; and
(c) Provide for the restoration of the environment, as nearly as is practicable, to pre-spill conditions.

In the event of an incident, a response should be formulated according to the following priorities:

(a) Human health and safety;
(b) Natural environment;
(c) Commercial resources; and
(d) Amenities (DOT, 2007)

These priorities can be re-prioritized based upon the circumstances surrounding the incident as the plan appreciates the fact that no two incidents are exactly the same. However, safety of life remains the number one priority during each and every incident.

The plan was formulated due to historical facts surrounding maritime incidents, prevailing oceanographic conditions, weather conditions and maritime traffic. The prevailing conditions and traffic in transit or into South Africa's ports poses a risk of oil pollution through accidents and operational discharges (DOT, 2007).

The plan's strategy is determined by the requirements of the Marine Pollution (Control and Civil Liability) Act 6 of 1981 and the South African Maritime Safety Authority Act 5 of 1998. The Marine Pollution (Control and Civil Liability) Act 6 of 1981 main purpose is:

To provide for the protection of the marine environment from pollution by oil and other marine harmful substances, and for that purpose to provide for the prevention and combating of pollution of the sea by oil and other harmful substances; to determine liability in certain respects for loss or damage caused by the discharge of oil from ships, tankers and offshore installations; and to provide for matters connected therewith (DOT, 2007).

The South African Maritime Safety Authority Act 5 of 1998 determines the roles of the major role players and responsibilities of the DEA and SAMSA. The plan does not only deal with oil pollution, but also other harmful substances as per the Marine Pollution (Control and Civil Liability) Act 6 of 1981. See (Table 2) for duties for SAMSA under SANCP.

Table 2: SANCP- DEA and SAMSA duties (Source: SANCP)

South African Maritime Safety Authority	Department of Environmental Affairs
• Take overall charge of the co-ordination of the prevention and/or combating of an incident	• Co-ordinate and implement coastal environmental protection and clean-up measures;
• Take control of the technical aspects of shipping casualties;	• Control the use of the pollution combating vessels and surveillance aircraft;
• Supervise oil transhipments;	• Control the use of oil spill dispersants;
• Prosecute parties guilty of the deliberate discharges of oil;	• Maintain and supply oil dispersant stocks and other oil spill equipment;
• Draw up contingency plans relating to the control of shipping casualties or potential casualties;	• Draw up and maintain the DEA&T (now DEA) local coastal contingency plans to combat oil spills for local authorities; and
• Administer the Acts relating to oil pollution;	• Approve in consultation with SAMSA the contingency plans of offshore installations.
• Take charge of the legal and financial aspects relating to oil spill incidents and casualties;	
• Control the use of the standby oil pollution prevention tug; and	

• Issue pollution safety certificates for offshore installations	

A number of stakeholders and role-players are involved at various stages, depending on the type and severity of the pollution incident and threat (for a detailed list of stakeholders and role-players and stipulation of their responsibilities, see Appendix A).

4.4.3.1 Places of Refuge

According to the DOT (2007), South Africa has over the years allowed vessels in distress place of refuge along the country's coastline. Each request has been considered on its own merits. To this end, SAMSA has developed a policy and principles regarding places of refuge, as enunciated below.

4.4.3.1.1 Places of Refuge Policy - Summary

The policy states that consideration should be given to the quay in a port as the first place of refuge. However, this is subject to the approval of the National Ports Authority (NPA). There should be consultation between SAMSA and the harbour master regarding a ship seeking refuge and, taking the environmental impact into account, the DEA is consulted to determine the best place to moor the vessel. The owner is expected to be open about all the relevant facts, and insurance cover is a prerequisite (guarantee cover). In the event of a vessel having suffered structural damage or failure, a salvage agreement with the local salvor is requested by SAMSA, with a tug of suitable power and appropriate towing gear on standby. SAMSA’s order of priority in deciding on the matter will be; safety of crew, pollution prevention, type of cargo, value of the ship

and its cargo. SAMSA may form a joint committee to deal with the incident and has authority to remove the concerned vessel at any time.

4.4.3.1.2 South African marine oil spill response equipment (as of July 2006)

Under the SANCP, South Africa has a pool of equipment for oil pollution surveillance and response (see Table 3).

Table 3: Response and surveillance equipment

Surveillance Aircraft	**Response boats/vessels**
-3 x 47m inshore patrol vessels with 5 000 litre dispersant tanks **-**1 x 83m offshore patrol vessel fitted with 50 000 litre dispersant tanks	**-**One patrol/reconnaissance aircraft (Kuswag 8).

Data Source: SANCP 2007

The SANCP is currently under review to ensure compliance with the International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 **(**OPRC) (for a full list of equipment and stock see Appendix B).

4.5. Chapter concluding analysis and Summary

A. Analysis

SAMSA through DOT has the legal authority for prevention of vessel-source marine pollution including enforcement of domestic legislation and international Conventions. It has also been made custodian of the SANCP. SAMSA act provides for a split mandate with SAMSA retaining preventive duties and the DEA combating responsibilities. This allows for possible conflict as the boundaries seem thin. Having two departments dealing with such a delicate issue is bound to cause finger-pointing and hamper service delivery.

The issue of surveillance where SAMSA is the Authority that administers MARPOL but is not conducting the surveillance itself is also an area that needs to be looked at. The DEA is responsible for combating oil spills; an oil slick might be its responsibility but it is not the administrator of MARPOL. The DEA was patrolling and taking photographic evidence to SAMSA for further action. Operational discharges are released under MARPOL and SAMSA has legal authority over it. South Africa, indeed, has not experienced major disasters in a long period. However, emergency response drills still need to be conducted to ensure the plan is functioning properly.

The DEA is responsible for environmental protection legislation both terrestrial and marine. Vessel source pollution, though, falls within SAMSA. The DEA does have a role in terms of the SAMSA act via the split responsibility regarding oil pollution. The DEA have not been spectators when it comes to vessel source pollution. For several years it has been conducting routine patrolling of the shipping lanes, mostly playing a supporting role to SAMSA when it comes to vessel oil pollution. The lack of surveillance of the shipping lanes and transfer of vessels to DAFF is compromising the country's marine environment. The illicit operational discharge must be flourishing and with the marine environment feeling the brunt

B. Summary

South Africa indeed lies in one of the world's busiest shipping lanes with treacherous sailing conditions. Over the years, these treacherous waters have led to tragic consequences for many ships, be it on the "Wild Coast" or the "Cape of Good Storms". The country experienced one of the world's biggest maritime disasters with the sinking of the *Castillo de Bellver* in 1983. The *Treasure* also saw thousands of penguins oiled and others affected, resulting in one of the biggest penguin evacuation efforts. It is against this background that protection of the environment became a priority for South Africa.

South Africa is party to almost all the important oil pollution preventative Conventions, and has incorporated many into its domestic legislation. The responsibility for prevention and combating of oil spills is divided between the DEA and SAMSA. The latter is responsible for the prevention part, while the former is accountable for the combating part. The SANCP has clearly delineated the duties of the two departments and also identified other stakeholders and role players.

CHAPTER 5: SWEDEN

5.1 BACKGROUND

Sweden is bordered largely by the Baltic Sea and the Kattegat and the Skagerrak. The shallow Baltic Sea is one of the largest brackish water bodies in the world. It is 1500 kilometres long and has an average width of 230km (see Figure 7). As a Large Marine Ecosystem, the Baltic Sea is ranked as a Class 1, highly productive ecosystem based on SeaWIFS global primary productive estimates. Its coastal areas are feeding, spawning and nursery areas for several species of fish (Encyclopedia of Earth, 2011).

Figure 7: Sweden and the Baltic Sea (Source: Denizhaber)

Sweden's vessel-source pollution prevention measures will be viewed with the aim of comparing and contrasting with South Africa's situation. As indicated earlier, South Africa's waters are rich in biodiversity and the country is blessed with pristine beaches. For its part, Sweden (together with Finland) has the longest Baltic coast. Sweden, in particular, has a number of economic activities that are concentrated along the Baltic Sea and a long history of coastal related livelihood (maritime) activities (Tynkkynen, 2014).

Apart from Sweden, the other coastal states bordering the Baltic Sea are Denmark, Germany, Finland, Russia, Poland, Lithuania, Estonia and Latvia. The total Baltic Sea coastal population is about 16 million, and a further 85 million lives within the catchment area. Thus, given that the Baltic Sea is shallow and has a limited exchange with the Skagerrak and the North Sea, it no wonder that it is extremely vulnerable to pollution (HELCOM, 2009).

Like the South African coast, the Baltic Sea is one of the busiest shipping waterways in the world, including other activities. It is projected to be even busier in the next 20 years, compounding the pressure on the environment. The Baltic Sea currently has eutrophication problems in its entirety (WWF Baltic Ecoregion Programme, 2010).

Currently around 2,000 vessels navigate the Baltic Sea at any given time, and it is estimated that 11% of the world's oil traffic traverses the Baltic Sea. The total cargo tonnage in 2008 was 822.4 million, with oil cargo tipping the scale at 251 million tonnes. The expectations are that much bigger tankers will be in use, meaning that tankers carrying 100,000 – 150,000 tonnes of oil will be a common sight in the Baltic Sea (Kostianoy and Lavrova, 2012).

Clearly both South Africa and Sweden have many reasons for protecting their coastlines. It is important to see the extent to which Sweden has been successful in doing this, and how far it has implemented some of the international conventions for doing so (also see Table 4).

5.2 LEGAL REGIME AND INTERNATIONAL CONVENTIONS

Table 4: Status of conventions

Convention	**Ratified**
1. MARPOL 73/78	yes and all Annexures
2. OPRC 90	Yes
3. CLC 92	Yes
4. IOPC 92 Fund	Yes
5. UN Law of the Sea convention - UNCLOSC 82	Yes
6. INTERVENTION 1969 & Protocol 73	Yes
7. Bunker Convention 2001	Yes

8.Helsinki Convention	Yes, new convention signed 1992
9. Bonn Agreement	yes, 1969, 1983
10. Ospar	Yes, 1992

Data source: Helcom, IMO, Bonn Agreement

Key:

Ospar - The Convention for the Protection of the marine Environment of the North-East Atlantic

Helsinki Convention - Convention on the Protection of the Marine Environment of the Baltic Sea Area

Bonn Agreement - Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances

5.3 MAJOR ROLE PLAYERS

The major role players in oil-pollution prevention are the Swedish Coast Guard, the Swedish Contingency Agency and the Swedish Maritime Authority.

5.3.1 SWEDISH COAST GUARD

The Swedish Coast Guard has as one of its primary duties to work towards achieving a sustainable maritime environment. The Swedish Coast Guard goes about achieving this by employing preventative measures on reducing oil spills and hazardous substances at sea. In the event of an accident, it is the duty of the Swedish Coast Guard to ensure that impact is minimized to safeguard the environment (Swedish Coast Guard - kustbevakningen, 2012).

The Swedish Coast guard is an independent civil authority that falls under the Department of Defense. It has a national responsibility for dealing with oil spills and administers and enforces the MARPOL Convention, as well as the National Contingency Plan. It operates 26 stations along the coastline (ITOPF, 2013b).The Swedish Coast Guard's mandate is from the Civil Protection Act (2003) which defines the different roles of branches of civil society's rescue services (Bonn Agreement, 2014). The responsibility extends to the great lakes of Sweden and, at sea, extends to the shoreline (Pålsson and Wåhlander, 2013).

5.3.1.1 Sea Watch and Response

In terms of the Civil Protection Act (2003), for every response operation, there is a Response Commander. The commander is granted extraordinary rights to take whatever action he/she may deem necessary in order to save lives, property or the environment. The following are the requirements for the Coast Guard from the government:

i) measures to prevent the spreading of oil in an accident should be started within four hours of receiving notification of the accident;

ii) recovery operations should be started within eight hours;

iii) the Coast Guard should be capable of dealing with oil spills of up to 10 000 tons using national resources;

iv) response to chemical accident should be started within four hours;

v) the Coast Guard should have sufficient capacity for international cooperation (Bonn Agreement, 2014).

The coast guard has priorities for response and they are:

i) as a first step, to stop the outflow of oil from the vessel;

ii) as a second step, to stop the spreading of oil on the water surface;

iii) as a third step, to recover the oil at sea before it has reached the coastal zone, the Archipelago and the beaches (Bonn Agreement, 2014).

5.3.1.2 Oil Spill Response

The Regional Director acts as a commanding officer in charge of the response. The continued alarm chain to affected municipalities is guided by a checklist. For large oil spills, international help can be sought. The Swedish Coast Guard response to oil spills only involves mechanical means; dispersants are not used. With regard to shoreline response, the responsibility falls on the local Rescue Service. In terms of the Swedish Law, the response phase is complete only when there is no longer an escalation of the risk of injury and to property. The Coast Guard owns several vessels, including 3 multipurpose vessels which are the flagship of the operation. When the response phase is completed, the shoreline clean-up is the responsibility of the local municipality (Pålsson, 2012).

Sweden has strategies and policies for dealing with oil spills; however, a more operational action plan is still under development (Personal Interview [6], September 22, 2014)

5.3.1.3 Oil Spill Preventative Measures

The Coast Guard has at its disposal 3 sophisticated surveillance aircraft equipped with SLAR, IR/UV, FLIR and camera equipment. The aircraft are also equipped with sampling buoys which are used to take oil samples (Bonn Agreement, 2014). The aircraft logged 2,283 flight hours in 2013 on surveillance duties in the Baltic. Aerial surveillance is also conducted jointly in a coordinated effort to curb operational oil pollution under the HELCOM Convention (HELCOM, 2014).

In terms of HELCOM's Manual on Co-operation in Response to Marine Pollution within the Framework of the Convention on the Protection of the Marine Environment of the Baltic Sea Area, parties should endeavour to fly as a minimum twice per week over regular traffic zones. This also includes approaches to major ports as well as areas of regular offshore activities. Other regions with less traffic or fishing zones surveillance should be carried out once a week. The main aim of the flights is detection and identification of polluters (HELCOM, 2013).

The intense surveillance is bearing fruits for the Baltic nations and Sweden. In 2012, the number of operational discharges detected dropped by 50%, compared to the previous 6 years. Ships are aware that their illegal actions are monitored constantly and are forced to comply (HELCOM, 2014).

5.3.1.4 Resources and Equipment

The Coast Guard has the following equipment for surveillance and response, excluding manpower and stores (see Table 5).

Table 5: Response and Surveillance Equipment – Sweden

Air Surveillance	**Sea surveillance and Response**
A. Three surveillance aircraft. For environmental surveillance and support. - Aircraft equipped with SLAR, IR/UV, FLIR and camera equipment. -Equipped with sampling buoys, which can be dropped onto an oil spill in order to obtain a sample of the oil.	A. Twelve environmental response vessels -all equipped with built-in or cassette advancing systems (LORI/LAMOR). -Equipped with ordinary skimmers, pumps and containment booms, and have a storage capacity of 100-1050 m3. -The storage capacity can be extended with the help of rubber containers and barges. B. Three multipurpose vessels with high capacity Emergency towing, fire-fighting and recovery capabilities. At least one, and more usually two, of these vessels are always at sea.

Data source: Bonn Agreement (For a full list of equipment and manpower see Appendix C)

5.3.1.5 Emergency Exercises

Sweden, under the Copenhagen agreement, Bonn agreement and HELCOM, holds annual exercises, although continuous exercises are conducted at the stations where

oil response vessels are located There are additional exercises conducted with the Swedish Sea Rescue Society that has several stations with "first Aid" booms (200m booms) (Pålsson, 2012).

5.4 Swedish Maritime Authority

The Swedish Maritime Authority (SMA) is not directly involved in oil pollution response and surveillance. Its involvement with oil pollution is through the administration of SOLAS, including inspection of vessels. The Maritime Authority lists as its main service the:

(i) Provision of navigable maritime routes

(ii) Preservation of life

(iii) Preservation of the environment (SMA, 2012).

The primary focus of SMA is commercial shipping, however, consideration is granted for leisure boat traffic, commercial fishing and the navy. The Swedish Maritime Authority is mandated through government statute (2007:1161).

SMA has 2 subsidiaries, SMA Helicopter Rescue AB which performs Sea and Air rescue using rescue helicopters on behalf of the Maritime Authority and SMA Training (SMA, 2012; also see Figure 8) for the structure of the Swedish Maritime Authority.

Figure 8: Structure of the Swedish Maritime Authority (Source: SMA)

5.5 The Swedish Civil Contingencies Agency (MSB)

The Swedish Civil Contingencies Agency (MSB) is responsible for assisting municipalities in developing response plans. They are an organization involved in almost all forms of emergencies and they keep equipment required by municipalities in case of an oil spill. They are responsible for oil spill preparedness on land. The MSB is under the Department of Defence (Personal interview [4], September 09, 2014).

5.6 Places of Refuge

Sweden has no areas specially designated as places of refuge, but places are decided upon as and when need arises on a case by case basis. The whole coastline can potentially serve as a place of refuge with the merits that the case determines the specific location (HELCOM, 2007).

The non-designation of Places of Refuge is contrary to EU Directive 2002/59/EC which stipulates that Places of Refuge should be designated. The Swedish Coast Guard is aware of suitable places. The decision regarding moving of vessels under distress is the competency of the Swedish Transport Agency through Regulation 1980:789. The Swedish Coast Guard as the people on the ground are empowered to take a decision in the case where the Swedish Transport Agency is unable to take a timely decision (Personal interview [6], September 22, 2014)

5.7 Chapter concluding analysis and Summary

A. Chapter concluding analysis

The Sweden Maritime Administration does not seem to have any involvement in oil spills. Their emphasis is on Search and Rescue and Piloting. The conclusion that can be made from the Swedish Maritime Authority Sustainability Report 2012 is that they are an organization that is, apart from its primary duty of care, business oriented. There is a lot of emphasis on efficiency, improvement of finances and income. Apart from its primary responsibility of environmental stewardship and safety of life the maritime authority seems to derive a respectable income from its operations.

The Coast Guard is responsible for oil spills. The investment in technical expertise and equipment is commendable. It speaks volumes about the amount of value they have

placed on the marine environment. It is not uncommon around the world to have paramilitary and in some instances military organizations responsible for vessel-source marine pollution. The US Coast Guard is the most popular example. It may be argued that these groups will protect the environment with their lives as they would when protecting citizens. However, the arrangement has its detractors who claim the military has no place in such soft duties, which should be left to civilians.

The Swedish Coast Guard is a good example though of a working arrangement that ensures the country's marine environment is protected. Regional collaboration through regional bodies like HELCOM ensures that the Baltic Sea as whole is protected. Regional bodies like HELCOM allow for pooling of resources ensuring that even countries who cannot afford sophisticated equipment like Sweden's are able to benefit through regional collaboration. This ensures that those making huge efforts are not disadvantaged by countries that lack capacity. HELCOM also allows uniformity, whereby ships are aware that the Baltic Sea in its entirety is monitored, preventing them from taking advantage when in waters of those Baltic States of lesser economical means.

B. Summary

Sweden has considerable interest in the Baltic Sea and its marine environment. The country depends on it for its economic interest and coastal livelihood. It is for this reason that Sweden has shown a lot of intent in preserving the Baltic Sea and the surrounding marine environment. Sweden is party to a number of regional conventions and other efforts to preserve the waters they share with other countries, not just the Baltic Sea. The administration of the preventative measures and response to marine oil pollution lies with the Swedish Coast Guard, which is part of the Ministry of Defense.

The Maritime Authority is more involved in flag state and port state duties, including sea watch and response involving safety of life at sea. The country is also party to almost all

the significant oil pollution related international conventions. Sweden has impressive technical capability and clean-up response ships for the fight against marine pollution.

6. Gap analysis (Sweden vs South Africa)

The structure of the Maritime administration and ocean governance in Sweden is different to South Africa's. The South African Maritime Authority is responsible for all traditional roles of a Maritime administration, including oil-pollution prevention and response. Even though SAMSA is not directly in charge of the surveillance of shipping lanes for operational discharges, it has an oversight. In Sweden, on the other hand, the Maritime Administration is not involved in the oil-pollution response and/or surveillance of shipping lanes for operational discharges. South Africa’s and Sweden’s coasts are almost equal in length, with South Africa’s at about 3000 km, while Sweden’s stands at over 3200 km (also see Tables 6.1, 6.2, 6.3 and 6.4 for comparisons of the 2 countries).

Table 6.1: Maritime Administration and Conventions

South Africa	Maritime Safety Administration	Sweden
- Yes	**Port State Control**	Yes

- Yes	**Flag State Control**	Yes
- Yes	**STCW (Training & licensing)**	Yes
-Yes but does not own rescue helicopters	**Search and Rescue and equipment**	Yes, owns own fleet of rescue helicopters
-Yes, pass alert messages to relevant parties	**Maritime Coordination Centre**	Yes, pass alert messages and deploy team from within
-Yes, responsible for SANCOP and also responsible for preventing oil spills	**Oil pollution response and surveillance**	-Passive involvement
Marine Pollution (OIL) Conventions (Ratified: yes or no)		
Yes	**1. MARPOL 73/78**	Yes
Yes	**2. OPRC 90**	Yes
Yes	**3. IOPC FUND 92**	Yes
Yes	**4. UNCLOS 82**	Yes

Yes	**5. INTERVENTION 1969 & Protocol 73**	Yes
No	**6. BUNKER**	Yes
Yes	**7. London Conventions**	Yes
-Nairobi Convention -Abidjan Convention	**8. Regional Conventions**	-HELCOM -OSPAR -Copenhagen agreement -Bonn Agreement

Table 6.2: Oil spill prevention and response

South Africa	Sweden
1.Split mandate (SAMSA Act) -SAMSA responsible for preventive measures. -DEA for combating including clean up. 2. SAMSA administers all vessel source marine pollution legislation.	1. Coast guard mandated by law in terms of both preventive and response. -Coastal municipality responsible for clean-up assisted by the MSB. 2. MARPOL administered by the coast guard

Table 6.3: Aerial Surveillance for operational discharges & Enforcement

South Africa	Sweden
1. The DEA for several years operated an aerial surveillance service. -Providing support during oil spill incidents. - Patrolling of shipping lanes -Providing photographic evidence to SAMSA for possible legal action. Service is currently being reviewed including looking at new technology. Funding tends to be a problem with	1. The coast guard conducts regular surveillance missions in the Baltic Sea. Apart from their national schedule, in terms of HELCOM they are expected to conduct patrols at least twice a week and are also involved in regional surveillance programmes. -The 3 Dash 8 Q-300 aircrafts are among the world's most advance surveillance aircraft. -Aircraft have sampling buoys which can be dropped on the oil spill to take samples

aerial surveillance.	
2. No satellite surveillance of oil spill currently in place. MRCC technology cannot detect slicks	2. The European Maritime Safety Agency (EMSA) also provides images through the CleanSeaNet satellite based oil spill detection system -Monitoring through CleanSeaNet allows for images even at night.

Table 6.4: Response capacity and places of refuge

South Africa	**Sweden**
-4 vessels under DAFF been out of service since 2012 due to administration issues -1 standby tug on standby	-Sweden has several vessels (12-13) used in response and surveillance including the 3 KB series which are the flagships of the response programme. -The 3 sophisticated vessels are also equipped to conduct emergency towing. -One or two vessels are permanently at sea

Places of Refuge	
South Africa has no designated places of refuge and the ports are not obligated to accept vessels in distress	No designated place of refuge, whole coasts potentially a place of refuge, depends on location of the ship and its condition.

7. Conclusion

The world's voracious appetite for oil is not showing any sign of waning even with the advent of new streams of energy sources. The voices against hydrocarbon use as an energy source have been growing since the 1970s, reaching a crescendo in the 2000s. Yet hydrocarbons remain the major source of energy and maritime transport remains the only viable transport of oil across the oceans and between distant countries.

Over the years, we have been constantly reminded of the threat posed by transporting millions of tonnes of oil in the oceans. Indeed, some of the major incidents such as the *Exxon Valdez*, *Amico Cadiz*, *Torry Canyon*, *Prestige* and, in the case of South Africa, the *Castillo de Bellver* and the *Treasure*, have given notice to the dangers of

transporting oil through the seas. While this has drawn the world's attention, ships have continued to carry oil since this is the most practical and economical mode of transport across the seas. The direction taken has been to strengthen around issues of maritime safety regulations, vessel source pollution and compensation.

The maritime industry and maritime nations have come a long way since the pioneering International Conference in Washington in 1926. Subsequently, development of regulations in the maritime/shipping industry has seen the maritime transport sector becoming one of the most highly regulated in the world. The changes have not only been on paper, but the oil discharges related to maritime accidents have also been in constant decline over the period coinciding with the development of regulations. The double-hull design of tankers has been credited with lower discharges of oil into the sea during accidents. The regime around compensation (CLC 92) was also developed after polluting incidents left governments and coastal communities with astronomical clean-up bills and other costs such as loss of income. However, tankers are not the only threat of oil pollution to the marine environment. Container ships and bulk carriers can carry over 10,000 bunker fuels which pose a significant hazard to the marine environment. It has also been indicated in this study that the amount of oil involved is not the only determining factor of the oil pollution impact. The BUNKER Convention was initiated for the same reasons to cover oil pollution incidents, not just those involving tankers.

South Africa has had its fair share of vessel-source oil pollution incidents over the years, with the *Castillo de Bellver* being the largest to date in terms of the amount of oil involved. The *Treasure* has probably been the most devastating, with about 50,000 penguins affected. South Africa, just like the rest of the maritime world, needs to learn from these accidents. Sweden has not experienced major oil spills by world standards, but the country has nevertheless invested heavily in the preparation for any eventuality. Sweden has an impressive fleet of aircraft and vessels for surveillance and response to oil pollution.

The recently launched Operation “Phakisa” is a sign of a country committed to sustainable development. The first implementation of operation “Phakisa” is “*Unlocking the Economic Potential of South Africa’s Oceans*.” Operation “Phakisa” has as its priority sectors, among others, marine protection services and ocean governance. It is very significant that Marine Protection and Ocean Governance is cited as one of the priority sectors.

8. Recommendations and further research

South Africa has not experienced a major oil spill disaster since the *Castillo de Bellver*. Actually most of the incidents have involved bunker oil from cargo ships other than tankers. However, this does not preclude South Africa from preparing for the possibilities of disaster, particularly given the traffic and sailing conditions. There are many positive steps that are being taken, South Africa's National Contingency Plan for the Prevention and Combating of Pollution from Ships and Offshore Installations (SANCP) being a case in point. South Africa and Sweden are not at the same level economically and in terms of development. Although South Africa is not yet at par with Sweden in terms of resources and/or capacity, there are things that can be learned

from the latter's experience. It is on the basis of issues raised in this dissertation that recommendations are presented below.

A Maritime Administration

The issue of a split mandate has the potential to cause conflict within departments. Senior officials from both SAMSA and the DEA have identified the issue as a grey area. The potential conflict may occur when the DEA feels that oil spills could have been averted if SAMSA had acted earlier or in particular way. The DEA might cite negligence on the part of SAMSA as leading to huge costs being incurred. This might hamper working relations between the two departments. It is recommended that:

- SAMSA, being responsible for administration of vessel-source oil pollution, also be put in charge of both the prevention and combative mandate, while the DEA remains the technical advisor; and,
- SAMSA creates capacity within the organization for combating oil spills.

Giving SAMSA combating duties as well might motivate its staff to ensure more effort is put into ensuring that no oil is spilled from vessels; this does not imply that SAMSA has been negligent in the past.

b. Surveillance and Response

South Africa might not have had major tanker oil spill disasters but the country cannot afford to rest on its laurels. Incidents like the one involving M/V TREASURE have provided a glimpse of the possible consequences should a major oil disaster occur. The lack of patrolling of shipping lanes, the fact that there were 6 vessels that were out of service for such long periods and lack of oil preparedness drills are all worrying signs of complacency.

- SAMSA Administers MARPOL in South Africa. Surveillance of shipping lanes should also fall within SAMSA. The air surveillance programme must be run by SAMSA, which has the legal mandate and enforcement powers regarding MARPOL. Funding of aircraft surveillance should be prioritized and the latest technology used. The surveillance aircraft might be private, but it should be managed and directed by SAMSA.

- The issue of 4 non-operational (dormant) vessels is not only exposing the country to the threat of pollution, but also needs to be addressed urgently and vessels allowed to conduct their duties, including oil-pollution combating duties. However, fisheries by themselves are a big obligation. The author is not convinced that it serves the country well to have vessels that are concerned with both oil-pollution and fisheries duties. Situating pollution combating duties within the DAFF does not tie with the SAMSA Act which has placed preventive and combating responsibilities in the hands of SAMSA and the DEA. The latter should have joint oversight over any vessel that is involved in oil-pollution prevention and combating duties. The issue of sharing of resources between the DAFF and the DEA might be motivated by economic interests. Otherwise, the ideal situation is to have a fleet solely responsible for oil pollution surveillance, prevention and combating duties placed in the hands of SAMSA, in collaboration with the DEA. The vessels under the DAFF can operate as backup in case of a major oil spill or when the other vessels are out of commission due to repairs or scheduled maintenance.

- Full oil spill preparedness drills involving all stakeholders should be conducted at least annually to ensure that all role-players are ready for any eventuality.
  SAMSA is the lead agency in this regard and should ensure that drills are conducted

- Collaboration with Neighbouring coastal States in Oil spill surveillance is recommended as that will allow for pooling of resources and ensures a wider coverage in terms of oil pollution surveillance.

- SAMSA should have full authority when it comes to places of refuge. Ports by their very nature are commercially driven. Therefore, leaving the decision to the port is not in the best interest of the country as Ports might tend to look into their own interests first. SAMSA arguably looks after South Africa's interests and is better positioned to make an informed and balanced decision that will accommodate all stakeholders. SAMSA must involve the Port and the DEA during its decision-making process but the final word must rest with SAMSA. Ports should not be compromised or disadvantaged. The author proposes that a fund be instituted by the government to provide guarantees or cover for Ports in case of ships sinking in the channel or breaking up within the Port's limits and causing pollution. Such incidents might lead to the halting of port operations for longer periods until the vessel is removed or the oil spill contained or cleaned up. The Fund would ensure that Port Authorities are not prejudiced and would also motivate Ports to accept stricken vessels, thus avoiding unnecessary incidents that might cause pollution of larger areas of the coast.

    - This might appear as if SAMSA is being burdened with extra duties; however, SAMSA is already an organization that has shown tremendous growth since 2008. SAMSA has also taken responsibility for the maritime domain and is currently investing in capacity building. In the circumstances, an expanded SAMSA might not be a far-fetched idea. A civilian unit formed along the lines of the Swedish Coast Guard at SAMSA, working alongside the DEA, will ensure consolidation of resources, while also creating employment. The unit can be modelled on the DEA's green scorpions. With South Africa in the oil exploration stage, it will be in line with Operation "Phakisa" to institute radical changes in the country's oil-pollution prevention regime. Oil exploration to exploitation will mean

more vessels in the waters. It will be proper for the country to be ready to meet oil pollution threats posed by oil exploration and its logistics.

c. Conventions

Delay in ratifying and enacting conventions into domestic law has potential to tarnish the country's image. South Africa is a well-respected country in the international community and many look to it for inspiration. The delay in promulgating regulations, as was the case with CLC 92 updates and the Fund convention, needs to be rectified. The 8-year delay has put the country at risk in the event of a major oil disaster. In the circumstances, the compensation for damages would have been limited to the lower limits afforded by the previous Convention.

- MARPOL ANNEXURE IV AND V1 should be ratified and enacted into domestic law as there does not seem to be a valid reason why it was not done in the first place.
- Despite being one of the sponsors of the BUNKER Convention, South Africa has not ratified the convention. It is therefore imperative that the country ratify the Convention if its citizens are to benefit from the Convention's compensation regime.
- There is a need to identify a mechanism that ensures the smooth ratification, enactment and updating of International Conventions between DOT, SAMSA and the legal fraternity.

d. Further research

According to the author, there is a need for further research in the following areas:

• The formation of “blue scorpions” with full capabilities similarly to the Swedish Coast Guard within SAMSA, with regard to dealing with vessel-source oil pollution surveillance and enforcement duties; and,

• The expansion of SAMSA to take more responsibilities in the maritime domain, particularly regarding vessel-source oil pollution i.e. pollution fleet, surveillance duties.

References

Alexopoulos, A. B., & Dounias, G. (2003). An Assessment of Vessel-Source Oil Pollution Incident in the Mediterranean Sea Using Inductive Machine Learning Methodologies. *Aegean Working Papers,* (1). Retrieved August 18, 2014, fromhttp://www.stt.aegean.gr/docs/awp/issue1/AWP1_0101.pdf

Barham, P. J., Crawford, R. J., Underhill, L. G., Wolfaardt, A. C., Barham, B. J., Dyer, B. M., ... Williams, A. J. (2006). Return to Robben Island of African Penguins that were rehabilitated, relocated or reared in captivity following the Treasure oil spill of 2000. *Ostrich, 77*(3 & 4), 202-209. Retrieved August 13, 2014, from http://www.sanccob.co.za/images/stories/research/RESEARCH_SCIENTIFIC%20PAPERS/Paper6.pdf

Bazari, Z., & Longva, T. (2011). *Assessment of IMO Manadated Energy EFFiciency Measures For International Shipping Estimated CO2 Emissions Reduction from Introduction of Mandatory Technical and Operational Energy Efficiency Measures for Ships* (Rep. No. MEPC 63/INF.2). Norway: IMO.

Beaudoin, Y., & Pendleton, L. (Eds.). (2012, February). *Why value the ocean*[Scholarly project]. In *The Economics of Ecosystem & Biodiversity*. Retrieved June 25, 2014, from http://www.grida.no/publications/teeb/

Bonn Agreement. (2014, June 17). *Bonn Agreement Counter Pollution Manual*(Publication). Retrieved August 28, 2014, from Bonn Agreement website:http://www.bonnagreement.org/eng/doc/Chapter17_Sweden_national_organisation.pdf

Brusendorff, A. C., Korpinen, S., Meski, L., & Stankiewicz, M. (2014). HELCOM Actions to Eliminate Illegal and Accidental Oil Pollution from Ships in the Baltic Sea. *The Handbook of Environmental Chemistry, 27*, 15-40. doi: 10.1007/698_2011_131

Buabeng, A. G., & Staniland, H., Prof. (2014). *Mission Report- Needs Assessment in Revising and Amending the Merchant shipping Act 57 of 1951*(TC/1221, Rep. No. 30- 2000). London: IMO.

Cliffe Dekker Hoffmeyer. (2003, September 5). Sweeping Changes in the Regulation of Marine Protected Areas are Expected to Improve Protection from Oil Spills and other Pollution. *Environmental Alert*, 1-2. Retrieved August 7, 2014, from http://www.cliffedekkerhofmeyr.com/export/sites/cdh/en/news/publications/2013/environmental/downloads/Environmental-Alert---2-September-2013.pdf

Cox, T. M., Ragen, T. J., Read, A. J., Vos, E., Baird, R. W., Balcomb, K., ... Benner, L. (2006). Understanding the Impacts of Anthropogenic Sound on Beaked Whales. *Journal of Cetacean Research and Management, 7*(3), 177-187. Retrieved July 30, 2014, from http://www.nmfs.noaa.gov/pr/health/noise/docs/cox_sound.pdf

Crawford, R. J., Davis, S., Harding, R. T., Jackson, L. F., Leshoro, T. M., Meyer, M. A., ... Wolfaardt, A. C. (2000). *Initial impact of the treasure oil spill on seabirds off western South Africa*. Retrieved August 19, 2014, fromhttp://www.ajol.info/index.php/ajms/article/view/67621

Department of Environmental Affairs (DEA). (2014). South Africa's National Coastal Management Programme. Department of Environmental Affairs: Oceans and Coasts. Cape Town.

Department of Environmental Affairs (DEA). (2014). *White Paper on National Environmental Management of the Ocean* (Vol. 426) (South Africa, Department of Environmental Affairs). Cape Town, Select region: Government Gazette No. 37692.

Department of Environmental Affairs (DEA). (n.d.). Overview of the Department. Retrieved August 6, 2014, from https://www.environment.gov.za/aboutus/department

The Department of International Relations and Cooperation (Dirco). (2006, May 15). United Nations Convention on the Law of the Sea (UNCLOS). Retrieved August 17, 2014, from http%3A%2F%2Fwww.dfa.gov.za%2Fforeign%2FMultilateral%2Finter%2Funclos.htm

Department of Transport (DOT). (2007). *South Africa's National Contingency Plan fro the Prevention and Combating of Pollution from Ships and Offshore Installations (* (2007 Amendments) (South Africa, Department of Transport (DOT), South African Maritime Safety Authority). Pretoria, Select region.

Devanney, J. (2009). The Consequences of Providing and Refusing Refuge.*Center for Tankship Excellence*. Retrieved August 18, 2014, from http://www.c4tx.org/ctx/pub/refuge.pdf

Encyclopedia of Earth. (2011, June 02). Baltic Sea Large Marine Ecosystem. Retrieved August 22, 2014, from http://www.eoearth.org/view/article/150400/

García-Mira, R., Real, J., Uzzell, D., Juan, C. S., & Pol, E. (2006). Coping with a threat to quality of life: The case of the Prestige disaster. *Revue Européenne De Psychologie Appliquée/European Review of Applied Psychology, 56*(1), 53-60. doi:10.1016/j.erap.2005.02.008

GESAMP (IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection). 2007. Estimates of oil entering the marine environment from sea-based activities Rep. Stud. GESAMP No. 75, 96 pp.

Global Ocean Commission. (2013, November). *Elimination of pollution that affects the high seas* [Scholarly project]. In *Global Ocean Commission*. Retrieved June 26, 2014, from http://www.globaloceancommission.org/wp-content/uploads/POP-3_Marine-Pollution-FINAL_no-options.pdf

Global Ocean Commission. (2014, June 24). *From Decline to Recovery: A Rescue Package for the Global Ocean* (Rep.). Retrieved July 14, 2014, from Global Ocean Commission website: http://www.globaloceancommission.org/.

Gold, E. (1998). *Gard handbook on marine pollution* (2nd edition ed.). Arendal, Norway: Assuranceforeningen Gard.

Gold, E. (2006). *Gard handbook on protection of the marine environment* (3rd Edition ed.). Norway: Gard.

Gold, E. A. (2010). Shipping and the Environment. *University of Queensland Law Journal, 29*(1), 155-157. Retrieved June 2, 2014, from ProQuest Central.

Gollasch, S., & Nehring, S. (2006). National checklist for aquatic alien species in Germany. *Aquatic Invasions, 1*(4), 245-269. doi: 10.3391/ai.2006.1.4.8

HELCOM. (2007). Chapter on Places of Refuge in the HELCOM Response Manual. In *Workshop on Places of Refuge*. Retrieved August 19, 2014, fromhttp://meeting.helcom.fi/c/document_library/get_file?folderId=74425&name=DLFE-29868.pdf

HELCOM. (2009). *Eutrophication in the Baltic Se: An integrated thematic assessment of the effects of nutrient enrichment and eutrophication in the Baltic Sea region* (Balt. Sea Environ. Proc. No. 115B., Publication). Finland: HELCOM.

HELCOM. (2013). *HELCOM Manual on Co-operation in Response to Marine Pollution within the Framework of the Convention on the Protection of the Marine Environment of the Baltic Sea Area, (Helsinki Convention)* (Publication). Retrieved August 30, 2014, from HELCOM website: http//:www.helcom.fi

HELCOM. (2014). *Illegal Discharges Observed during Aerial Surveillance 2013*(Rep.). Retrieved August 29, 2014, from HELCOM website: http//:www.helcom.fi

Hulsey, L. (2012). *Marine Pollution*. New Dehli: World Technologies.

IMO. (2001). *International Convention on the Control Of Harmful Anti-fouling Systems on Ships 2001*. London: IMO.

International Chamber of Shipping. (2013). *Shipping, World Trade and the Reduction of CO2* (Issue brief). International Chamber of Shipping.

International Chamber of Shipping. (2014). *Annual Review* (Rep.). London: International Chamber of Shipping.

International Maritime Organization (IMO). (2001). IMO adopts bunkers convention. Retrieved August 20, 2014, from http://www.imo.org/blast/mainframe.asp?topic_id=67&doc_id=457

International Ocean Institute. (2010). *World Ocean Review: Living with the oceans* (Vol. 1, p. 87, Rep.). Hamburg: Maribus.

International Tanker Owners Pollution Federation (ITOPF). (2012). *Effects of Oil Pollution on the Marine Environment* (Tech. No. 13). London: ITOPF.

The International Tanker Owners Pollution Federation Limited Ltd (ITOPF). (2008, August). *ITOPF Country Profiles - South Africa* (Publication). Retrieved July 17, 2014, from ITOPF website: http://www.itopf.com/knowledge-resources/countries-regions/

International Tanker Owners Pollution Federation Ltd (ITOPF). (2010). Castillo de Bellver, South Africa, 1983 - Case Study. Retrieved August 20, 2014, from http%3A%2F%2Fwww.itopf.com%2Fin-action%2Fcase-studies%2Fcase-study%2Fcastillo-de-bellver-south-africa-1983%2F

International Tanker Owners Pollution Federation Ltd (ITOPF). (2013a). *Oil Tanker Spill Statistics 2013* (Rep.). Retrieved July 21, 2014, from ITOPF website: http://www.itopf.com/knowledge-resources/data-statistics/

International Tanker Owners Pollution Federation Ltd (ITOPF). (2013b). *ITOPF Country Profiles - Sweden* (Publication). London: ITOPF.

Kostianoy, A. G., & Lavrova, O. Y. (Eds.). (2012). *Oil Pollution in the Baltic Sea* (Vol. 27, The Handbook of Environmental Chemistry). Berlin Heidelberg: Springer-Verlag. doi: DOI 10.1007/698_2011_131,

Lun, Y. H., Himola, O., Goulielmos, A. M., Lai, K., & CHENG, T. E. (2013). *Oil transport management* (Vol. Viii). London: Springer. doi: DOI: 10.1007/978-1-4471-2921-9_2

The Maritime Law Association of South Africa (MLASA). (2014, April 24). MLASA comments on the report from the IMO consultants that carried out a needs assessment mission on the overhauling of the Merchant Shipping Act 57 of 1955 ["MSA"] [Letter to Mpatliseng Ramaema]. La Lucia.

Mearns, K., Olivier, J., & Jordaan, M. (2012). Shipping Accidents along the South African Coastline. In *7th International Coastal & Marine Tourism Congress*. Retrieved August 28, 2014, from https://www.academia.edu/537251/Shipping_Accidents_Along_the_South_African_Coastline

Moldan, A. (1997). Response to the Apollo Sea Oil Spill, South Africa. In*International Oil Spill Conference Proceedings* (Vol. 1997, Ser. 1, pp. 777-781). Washington: American Petroleum Institute. doi: http://dx.doi.org/10.7901/2169-3358-1997-1-777

Molnar, M., & Koshure, N. (2009). *Cleaning up our ocean: A report on pollution from shipping-related sources in the Pacific North Coast Integrated Management Area (Pncima) on the British Columbia Coast* (Rep.).

Mrosovsky, N., Ryan, G. D., & James, M. C. (2009). Leatherback turtles: The menace of plastic. *Marine Pollution Bulletin, 58*(2), 287-289. doi: 10.1016/j.marpolbul.2008.10.018

National Research Council. (2007). *Pollution in the ocean* (Rep.). Retrieved July 14, 2014, from The National Academy of Science website:http://www.nap.edu

Nellemann, C., Hain, S., and Alder, J. (Eds). February 2008. In Dead Water: Merging of climate change with pollution, over-harvest, and infestations in the world's fishing grounds. United Nations Environment Programme, GRID-Arendal, Norway, www.grida.no

OECD. (2013). *OECD Environmental Performance Review: South Africa 2013*(Rep.). OECD Publishing. doi: http://dx.doi.org/10.1787/978926202887-en

Parliament of the Republic of South Africa - Research Unit. (2014, May 29).*Overview of the South African Fisheries* (Rep.). Retrieved August 8, 2014, from Parliament of the Republic of SA - Research Unit website:www.parliament.gov.za

Parliament of the Republic of South Africa. (2014, July 29). Transport Committee Approves Annexes on Marine Pollution. Retrieved August 14, 2014, from http://www.parliament.gov.za/live/content.php?Item_ID=6237

Pålsson, J., & Wåhlander, H. (2013). *Oil Spill Preparedness Among Sweden's Municipalities 2013* (Rep.). Simrishamn: Kimo Baltic Sea.

Pålsson, J. (2012). *Oil Spill Preparedness in the Baltic Sea Countries* (Rep.). Master Baltic II.

Potters, G., Dr. (2013). *Marine Pollution* (1st ed.). Retrieved July 12, 2014, fromwww.bookboon.com

Pulido, J. L. (2007). Pollution of the Sea: Prevention and Compensation. In *Pollution of the sea: Prevention and compensation* (Vol. 10, pp. 151-169). Berlin: Springer. Retrieved August 22, 2014, from http://link.springer.com/chapter/10.1007/978-3-540-73396-6_12

Read, C. (2011). *BP and the Macondo spill: The complete story*. Houndmills, Basingstoke, Hampshire: Palgrave Macmillan.

South African Maritime Safety Authority. (2013). *Annual Report (SAMSA) 2012/2013* (Rep.). Pretoria: SAMSA.

Strydom, H. A., & King, N. D. (Eds.). (2009). *Environmental management in South Africa* (2nd edition ed.). Cape Town: Juta.

Swedish Coast Guard -kustbevakningen. (2012, February 01). Sustainable Maritime Environment. Retrieved August 24, 2014, fromhttp://www.kustbevakningen.se/sv/the-swedish-coast-guard/sustainable-marine-environment/

Swedish Maritime Authority (SMA). (2012). *Swedish Maritime Authority Sustainability Report 2012* (Rep.). Retrieved September 27, 2014, from Swedish Maritime Administration website: http://www.sjofartsverket.se/upload/Listade dokument/Rapporter_Remisser/EN/2013/GRI-2012-eng.pdf

Tan, A. (2005). *Vessel-Source Marine Pollution : The Law and Politics of International Regulation*. Cambridge: Cambridge University Press.

Tunley, K. (2009). *State of Management of South Africa's Marine Protected Areas* (2009/Marine/001, Rep.). Cape Town: WWF South Africa Report Series.

Tynkkynen, N., Schönach, P., Pihlajamäki, M., & Nechiporuk, D. (2014). The Governance of the Mitigation of the Baltic Sea Eutrophication: Exploring the Challenges of the Formal Governing System. *Ambio, 43*(1), 105-114. doi: 10.1007/s13280-013-0481-8

UNEP Global Marine Oil Pollution Information Gateway • Facts •. (n.d.). Effects of oil Pollution on marine wildlife. Retrieved August 27, 2014, fromhttp://oils.gpa.unep.org/facts/wildlife.htm

UNEP year book 2011: Emerging issues in our global environment. (2011). Nairobi, Kenya:UNEP

United Nations Conference on Trade and Development (UNCTAD). (2012).*Liability and Compensation for Ship - Source Oil Pollution: An Overview of the International Legal Framework for Oil Pollution Damage from Tankers* (Rep. No. 1). New York and Geneva: United Nations.

United Nations Convention on the Law of the Sea, 1982, Art. 1.1(4).

Vidas, D., & Schei, P. J. (2011). *The world ocean in globalisation: Climate change, sustainable fisheries, biodiversity, shipping, regional issues*. Leiden: Martinus Nijhoff.

Vidas, D., & Schei, P. J. (2011). *The world ocean in globalisation: Climate change, sustainable fisheries, biodiversity, shipping, regional issues*. Leiden: Martinus Nijhoff.

Wabnitz, C., & Nichols, W. (2010). Plastic Pollution: An Ocean Emergency.*Marine Turtle Newsletter*, *129*, 1-4. Retrieved July 14, 2014, fromhttp://www.seaturtle.org/mtn/archives/mtn129/mtn129p1.shtml

WWF Baltic Ecoregion Programme. (2010). *Future trends in the Baltic Sea*(Publication). WWF.

Yuen, B. K., & Kumssa, A. (Eds.). (2011). *Climate change and sustainable urban development in Africa and Asia*. Dordrecht: Springer. doi: 10.1007/978-90-481-9867-2

APPENDICE A

APPENDIX 1 List of stakeholders and role-players in the SANCP

- South African Petroleum Industry Association

- Ship Owner
- Terminal operator or installation operator
- Provincial Departments of Environmental Affairs; South African National Parks; South African Museum; South African National Defence Force; Prince Edward Islands Management Committee
- Local authorities which include among others, provincial, municipal, parks, environmental, museum, traffic, health, labour, etc.
- Disaster management authorities
- National Ports Authority (NPA)
- Chemical industry National Nuclear Regulator (NNR)
- Salvors
- Smit Amandla Marine
- Department of Water Affairs and Forestry (Now Department of Water and Sanitation)
- South African Defence Force
- South African Police Services
- SANCCOB
- Local environmental agencies, wildlife organizations and related NGOs
- South African Weather Service
- Home Affairs
- Customs and Excise
- Service providers, such as, OPCSA, Drizit, HAZMAT, Oil Spill Response Ltd. (OSRL), the International Tanker Owners Federation (ITOPF), etc. (DOT, 2007).

Source: (SANCP, 2007)

APPENDIX B

SOUTH AFRICAN MARINE OIL SPILL RESPONSE EQUIPMENT

The equipment and its location is all listed in the SANCP. Some of the stores are with the Government Departments, National Port Authority as well as the private sector. The list below consists of all the stores that are with the Government Departments.

(Updated July 2006)

1. DEPARTMENT OF ENVIRONMENTAL AFFAIRS & TOURISM

• **3 x 47m inshore patrol vessels fitted with 5 000 L dispersant tanks, carrying Chemserve OSE 970 concentrate and breaker boards**

• **1 x 83m offshore patrol vessel fitted with 50 000 L dispersant tanks, carrying Chemserve OSE 750**

• Oil spill dispersant stocks (L):

-Cape Town tanks: 59 200 (Chemserve OSE 750) 20 000 (Chemserve OSE 970)

-Durban tanks: 39 350 (Chemserve OSE 750)

• **One patrol/reconnaissance aircraft (Kuswag 8).**

• Booms

14 x 25m Portboom

30 x 25m Seaguardian boom

5 x 25m Shoreguardian boom

7 x 10m Shoreguardian boom

1 x 20m Riverboom on reel

• Skimmers

2 x T-disc skimmers

1 x Rotadisc 15 skimmer

1 x Desmi Ocean skimmer (detachable Desmi DOP 250 Archimedes screw pump).

• 1 x 25m³ Aristock inflatable floating tank

2 x 10m³ Fastanks

1 x 4m inflatable boat with 2 x 60hp engines

1 x Drum-vac unit

• 1 x Karcher high pressure water washer

2. SOUTH AFRICAN NAVY – SIMONSTOWN

• 2 x 20.5m tugs fitted with 4 000l dispersant tanks & side arm spray booms.

• 1 x 20t/hr Ro-clean rope-mop skimmer (Seamop 5060)

• 1 x 20t/hr Ro-clean disc skimmer

• 400m Ro-clean roboom 1000 (0.43 x 0.36m) on reels with powerpack

Apart from the equipment that is with the Navy and the Department of Environmental Affairs, South Africa has access to the equipment within the National Port Authority, Engen, SAPREF, Petro SA, Oil pollution Control SA, as well as at other Oil spill response service providers.

Source: (SANCP, 2007)

APPENDIX C

Sweden Oil spill response equipment and manpower

Resources

• +The Coast Guard has about 70 emergency responders specially trained and equipped for scuba diving, response to chemicals and fire-fighting on board.

• The Coast Guard also has a special agreement with municipal fire brigades along the coast according to which each of the fire brigades has agreed to assist the Coast Guard in an accident at sea with a MIRG

• (Maritime Incident Response Group) team of six firemen. These firemen are specially trained for actions on board ships and for deployment from helicopter together with light equipment. The Coast Guard should provide immediate assistance to the helicopter in the form of heavy equipment such as hoses, foam-cooling capability and everything needed for a protracted operation.

• **The Coast Guard operates three surveillance aircraft. For environmental surveillance and support in an oil spill situation, the aircraft are equipped with SLAR, IR/UV, FLIR and camera equipment. They are also equipped with sampling buoys, which can be dropped onto an oil spill in order to obtain a sample of the oil. The three aircraft have a total flying time of approximately 3000 hours per year**

• **The main body of the resources for environmental response consists of twelve environmental response vessels, all equipped with built-in or cassette advancing systems (LORI/LAMOR). These vessels are also equipped with ordinary skimmers, pumps and containment booms, and have a storage capacity of 100-1050 m3. The storage capacity can be extended with the help of rubber containers and barges**.

• **The Swedish Coast Guard operates three multipurpose vessels with high capacity emergency towing, firefighting and recovery capabilities. At least one, and more usually two, of these vessels are always at sea.**

• For shallow water operations in the archipelago, there are twelve units equipped with brushskimmers. These are designed for transportation by lorry or by aircraft/helicopter.

• For rapid containment of oil, the Coast Guard has seventeen sea-trailers, each carrying 500 metres of booms strategically allocated along the coastline. These sea-trailers are designed for lorry transportation to an appropriate port near the accident. The trailer can be launched into the water directly from the lorry and can be towed to the site at a speed of up to 30 knots.

• The Coast Guard has approximately 16 000 metres of “RoBoom high sea booms”, “Expandi 4300 coastal booms” and NOFI 600S. The Coast Guard also has a number of skimmers, containers and transfer pumps. For backup and assistance in an operation the Coast Guard has over thirty cutters and around sixty smaller workboats.
• For oil recovery operations, most of the response vessels have special air filters and an overpressure system which is used when operating in hazardous atmospheres, thus allowing the crew to work inside the ship without carrying gas masks etc. One vessel is

equipped with filters to protect the interior of the ship against different hazardous gases in case of an incident involving chemicals.

• Response on shore – Municipalities and Swedish Civil Contingencies Agency. The local fire brigades of the municipalities are required to have a certain capacity for beach cleaning and harbour spills. In the case of larger spills, the Swedish Civil Contingencies Agency has allocated two larger equipment stores at strategic locations. These stores support the local fire brigades with different types of beach protection and cleaning devices, such as light booms, tarpaulins, pumps, protective clothing, brushes and buckets**.**