

**UNIVERSITY OF KWAZULU-NATAL**

**The Status of Ballast Water Management in the Ports of South Africa**

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## DECLARATION

I, Fiona Calitz, declare that

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- (ii) This dissertation has not been submitted for any degree or examination at any other university.
- (iii) This dissertation does not contain other peoples' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.
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## **ABSTRACT**

Ballast water discharged from ships is considered to be one of the four biggest threats to oceans, as alien species, detrimental to the marine ecosystems, are introduced into domestic waters via ballast. Nevertheless, eight years after its adoption, the International Convention for the Control and Management of Ship's Ballast Water and Sediments of 2004 remains unenforced. In the interim, the IMO has encouraged member countries to implement national ballast water policies in order to reduce the risk of alien invasions into their waters. South Africa was chosen as one of six countries in the world to participate as a pilot country for the GloBallast programme which was conducted in Saldanha Bay between 2000 and 2004. The purpose of the GloBallast programme was to assist developing countries to understand, develop and implement control measures relating to ships ballast water within their ports. The outcome of the risk assessment completed during the programme was that South Africa needed to implement a mandatory ballast water reporting system. The purpose of this study is to examine the status of ballast water management in the ports of South Africa and to determine the progress made since South Africa participated in the GloBallast programme. The methodology used in this study included questionnaires distributed to industry experts and the full population of Ships Agents that are members of the South African Association of Ship Operations and Agents. The findings show that whilst each port is reported to have a ballast water management plan; only three of the eight potential plans could be produced. Two of these plans, belonging to the eco-sensitive ports of Ngqura and Saldanha Bay, were proven to be well-known amongst the agents. The other ports, however, reflected a weak 50% and lower level of awareness. It was further determined that the ships agents are largely unaware of the responsibilities placed upon them by these plans. The findings further revealed that these regulations have not been monitored or enforced and presently ballast water management would appear to be merely a paper exercise. Those ships agents who are aware and comply with the requirements report that they have never had a problem with obtaining approval to discharge ballast. Recent developments in July 2012 show that the Department of Transport has assembled a team to further develop legislation and regulations to address ballast water management in South Africa.

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## ABBREVIATIONS

AQIS	Australian Quarantine and Inspection Service
BW	Ballast Water
BWE	Ballast Water Exchange
BWM	International Convention for the Control and Management of Ships Ballast Water and Sediments
BWMP	Ballast Water Management Programme
BWRF	Ballast Water Reporting Form
DEAT	Department of Environmental Affairs and Tourism
DOT	Department of Transport
EEZ	Exclusive Economic Zone
GEF	Global Environment Facility
GESAMP	Joint Group of Experts on the Scientific Aspects of Marine Environment Protection
GPS	Global Positioning System
IMO	International Maritime Organisation
IOI	International Ocean Institute
ISO	International Standards Organisation
LPC	Lead Partnering Country
MEPC	Marine Environment Protection Committee
MOU	Memorandum of Understanding
MT	Metric Tons
NANPCA	Non-indigenous Aquatic Nuisance Prevention and Control Act
NEMBA	National Environmental Management Biodiversity Act No. 10 of 2004
NISA	National Invasive Species Act
NM	Nautical Miles

OHSAS	Occupational Health and Safety Assessment Specification
PSC	Port State Control
SAASOA	South African Association of Ship Owners and Agents
SAMSA	South African Maritime Safety Authority
SANBI	South African National Biodiversity Institute
SHE	Safety, Health, Environmental
TNPA	Transnet National Port Authority
UNCLOS	United Nations Convention on the Law of the Sea
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
USCG	United States Coast Guard

## CHAPTER ONE

### INTRODUCTION

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#### **1.1 Introduction**

The environmental impact that commercial activities are having on the earth has created an urgent need for industries to focus on sustainable development (Endresen et al., 2008). These commercial activities extend to the maritime industry, a sector of the transport industry which is estimated to carry more than 90% of the world's trade (IMO, 2012a). There are many well-known environmental concerns within the maritime industry, including oil, water and air pollution, however, this study focuses on one of the lesser known concerns, being the environmental damage caused by the discharge of ballast water.

The purpose of this chapter is to provide an overview and an introduction to the study undertaken, what the objectives of the study are, the research methodology used and the limitations of the study.

#### **1.2 Problem Statement and Motivation for the Study**

Ballast water is water taken on board a ship to improve stability when a vessel is empty or partially laden. This water is generally uplifted in one geographical area, and discharged in another (Alderton, 2004). As far back as the 1980s, ballast water was identified as being a vector (carrier) of transport for invasive marine species which invade local marine ecosystems (IMO, 2007). Not only was this having a negative effect on the environment, this invasion was also reported as having significant economic effects on local industry (Heasman, 1996; Knowler, 2005; Lodge and Finnoff, 2008). This became an area of concern which received much attention and in 2000, a programme called GloBallast was initiated as a joint initiative developed by the IMO (International Maritime Organisation), the Global Environment Facility (GEF) and the United Nations Development Programme (UNDP) (IMO, 2007). This programme was aimed at assisting developing

countries to understand, develop and implement control measures relating to ships ballast water.

The Port of Saldanha Bay was chosen to be one of the six participating ports in the GloBallast programme. A risk assessment conducted during the programme indicated that South Africa was exposed to marine alien invasions through ballast water discharges into the ports, and recommendations were made that South Africa implement national guidelines to control this risk. This resulted in the “Draft Policy on the Management of Ballast Water in South Africa” which was prepared in 2002. The document recommended that South Africa immediately implement ballast water management in all of its commercial ports in order to reduce the risks to which it is exposed (Enact, 2002).

In 2004, the IMO Ballast Water Management (BWM) Convention was adopted during the International Conference on Ballast Water Management for Ships held in London. At the time of adoption, the IMO appealed to member countries to implement National Ballast Water Regulations in their ports until such time as the BWM Convention was enforced (Rodrigo de Larrucea, 2008). In 2012, the IMO BWM Convention remains unenforced, and the Draft Policy on the Management of Ballast Water in South Africa appears to remain in a draft format, a decade after it was originally produced. Despite this, the National Ports Authorities’ Ports Rules of 2009 makes reference to ballast water management in the ports and the assumption is therefore made that some progress has been made, but there appears to be little information readily available about this ballast water management within the ports.

The aim of this study is therefore to determine the status of ballast water management in the Ports of South Africa.

### **1.3 Objectives**

The following four specific objectives have been identified for the study.

- To determine what ballast water management policies have been implemented in the Ports of South Africa.

- To determine the awareness of the ballast water management policies in place by relevant port users.
- To determine which authority or organisation is responsible for the monitoring of the ballast water management policies.
- To determine which authority or organisation is responsible for the enforcement of the ballast water management policies.

#### **1.4 Research Methodology**

A literature review was conducted using secondary data obtained from journals, books and electronic sources. This review provided a clear background on the issue under consideration and what actions have been taken to address this issue locally and internationally. The review also considers the environmental legislation which exists within South Africa.

For the primary research, three groups of respondents were identified by the author who could provide insight into the situation in South Africa. These three groups were the subject experts, the Port Authorities and the ships agents. The reason for the three groups was an attempt to triangulate the information received in order to achieve an unbiased perception of the status of ballast water management.

All respondents were requested to complete a self-administered questionnaire. The responses from the ships agents were largely able to be analysed in a quantitative fashion, however, one of the questions required qualitative analysis which was done by summarising the responses into specific themes, and inserting these themes into a matrix for analysis. The responses from the subject experts were analysed in terms of a discussion of opinions, much of which was based on potential future decisions. The Port Authorities declined the invitation to complete the questionnaire, but were able to provide literature which had not otherwise been available.

## **1.5 Overview of the study**

The study has followed the generic framework, and is set out as follows.

- Chapter one is an introduction to the study, providing insight into the motivation for the study, the research methodology utilised and the limitations of the study.
- Chapter two is the literature review which seeks to clarify the reasons for the necessity to control ballast water, as well as the methods available for control and what has been done about it.
- Chapter three discusses the research methodology used in the study, and explains the reasons for the choice of the methodology.
- Chapter four is the presentation of the data received from the research conducted.
- Chapter five discusses the findings of the primary research combined with the information obtained from the literature review.
- Chapter six concludes the study and provides recommendations.

## **1.6 Limitations of the study**

The response rate to the ships agents questionnaire is a limitation to the study as the purpose was to determine awareness of the ballast water management policies in place. A failure to respond could indicate that either the respondent did not want to respond, or could indicate lack of knowledge, and therefore awareness on the subject.

The original intention for the distribution of the questionnaires to the Ships Agents was to present them with the questionnaire for immediate completion in the presence of the author. Unfortunately, this was not achievable and instead the respondents were sent the questionnaires via e-mail for replies at their convenience. This allowed time for the respondents to research the matter if need be, thereby providing a possible biased impression of awareness.

The corporate regulations of Transnet National Port Authorities (TNPA) did not allow for the completion of the questionnaire, and therefore no perceptions were



obtained from TNPA relating to the relevant management control methods in place.

## **1.7 Conclusion**

This chapter sought to provide a broad overview of the study conducted, indicating the need for the study, what the objectives of the study were, how it was conducted and the limitations of the study.

The next chapter is a literature review on ballast water aimed at providing a thorough understanding of the problem and the regulation requirements.

## CHAPTER TWO

### LITERATURE REVIEW

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#### **2.1 Introduction**

The purpose of the second chapter is to conduct a literature review of available literature relating to ballast water. It seeks to provide a comprehensive understanding of what ballast water is, the environmental problems relating to ballast water and what actions have been taken. Legislation particularly pertaining to the maritime environment and protection thereof is discussed, as well as measures which have been taken by the International Maritime Organisation and certain countries which have implemented their own national policies regarding ballast water.

#### **2.2 Maritime Environmental Concerns**

An increased uneasiness is developing worldwide due to the greater demands being placed on the earth's environment and resources by the burgeoning world economy (Grossman, 1995). Grossman argues that this uneasiness is generating a fear that the world's resources will eventually be depleted and the earth will become irreparably damaged due to the increase of emissions and waste generated. In order to address this issue, both the public and private sectors are taking steps to alleviate and reduce the damage to the earth by implementing relevant legislation and national environmental policies (Duncan, 2007; Lloyd's, 2012).

The maritime industry is one such industry that has recognised and acknowledged its effects on the environment. Governments and industry are working towards mitigating such damage to the environment by implementing maritime environmental policies and conventions to govern this international trading arena. Whilst sea transport is considered to be a relatively environmentally friendly method of transport, it does carry the vast majority of cargo transported resulting in high levels of activity and therefore there is a large focus on this area and it needs

to be addressed (Chapman, 2007). The United Nations Conference on Trade and Development (UNCTAD) reported that the estimated quantity of goods transported by sea worldwide in 2010 was 8.4 billion tons, with the total volumes increasing on an annual basis (Asariotis et al., 2011). This is the equivalent of an average of 1.2 tonnes of cargo per person worldwide per annum (Stopford, 2010). With such large quantities of cargo being transported by this mode of transport, it is imperative that environmental threats be addressed.

Sea transport affects the environment in numerous ways, both directly and indirectly. Oil spills, water and air pollution are the obvious concerns related to shipping whilst a ship is at sea, however, consideration must also be given to the environmental damage which could be caused by maritime activities within the ports (Firestone and Corbett, 2005; Bailey, et al., 2011). Couriaut (2011) suggests that there are three main threats to the environment within the port area, namely the result of oil pollution, dredging, and ballast water discharges.

Oil pollution within the port could be caused by a number of activities, including the loading of fuel onto a ship or discharging of cargo. Dredging refers to the activity whereby materials are excavated from the sea beds and relocated, either for operational maintenance requirements or possible engineering construction works within the port (Couriaut, 2011). This activity has a number of negative environmental issues, including the problem that it disturbs the layers of sediments which have accumulated over a long period, thereby reintroducing potentially polluted sediments which had previously settled into the marine ecosystem, or disturbing the habitats of local species. Ballast water is the last of Couriaut's (2011) listed environmental concerns, and is the subject of this study.

### **2.3 An introduction to Ballast Water**

Ballast is described by Alderton (2004) as a weight which is taken on board a vessel in order to make it seaworthy. The ballast improves the seaworthiness of the vessel by making it more stable in the water and improving the manoeuvrability whilst the vessel is at sea in an empty or partially laden condition (Brodie, 2006). In modern times, this weight is in the form of water taken into ballast tanks built into the vessel. Historically this ballast could have been in the form of any heavy

item such as rocks or sand, however, this practise lost favour due to many countries implementing policies to control the discharge of such ballast due to the number of foreign insects and plant diseases being introduced to their country via the contaminated sand and rock (Thomas, 1977).

Figure 2.1 illustrates the ballast water cycle of a ship which discharges her cargo at a source port and then sails “in ballast” to her next load port, which is the destination port for the ballast water.

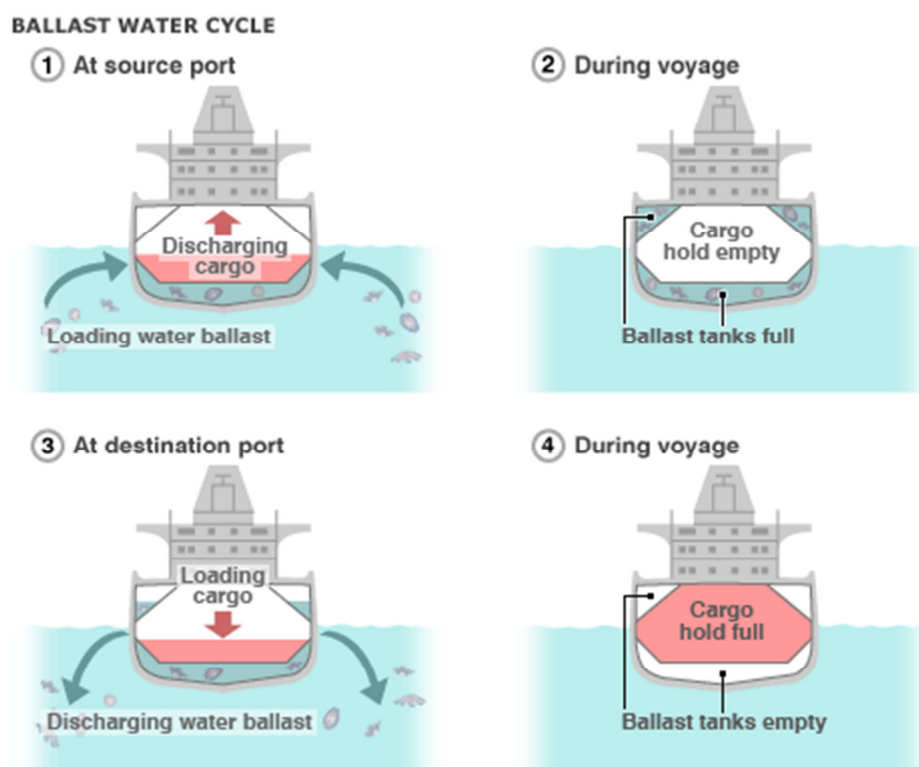


Figure 2.1. Cross Section of a ship showing ballast tanks and ballast water cycle

Source: Tamelander et al., 2010, p. 5

As depicted in figure 2.1, as the ship discharges the cargo in port, it takes on ballast water into the ballast tanks to stabilise the vessel in order for it to safely sail with no cargo on board to the next port of loading. This is referred to as “sailing in ballast”. At the load port, the ship then discharges the ballast as cargo is loaded as the weight of the cargo now provides the stability to the ship. Ballast is not only used when the vessel is at sea. It is also utilised when the vessel is working cargo

in port in order to control the height at which the vessel may be sitting in relation to the quay as the tides change and/or cargo is worked. There are times when it is crucial for a vessel to remain at a certain height above water to facilitate loading, such as in the case of loading bulk cargos through an apparatus, or loading a car carrier with the use of a ramp. This height manipulation can be achieved by discharging ballast simultaneously as loading takes place, or taking on ballast as cargo is discharged (Brodie, 2006).

## **2.4 The Environmental issues related to Ballast Water**

The negative environmental impact caused by ballast water is that it provides a vector (carrier) of transport for microscopic organisms which are present in the water taken on board at one port, and subsequently discharged into the waters of a foreign port. According to the Joint Group of Experts on the Scientific Aspects of Marine Environment Protection (GESAMP) (2001), an estimated 3000 species of marine organisms are transferred in ballast water on a daily basis into international water. Not all of these organisms are able to survive the foreign conditions, but those that do are considered to be invasive, to the detriment of the local biological marine ecosystem (Raaymakers and Gould, 2010). This introduction of invasive marine species is so severe that it is considered to be one of the four greatest threats to the world's oceans (IMO, 2007).

An introduced species is one where a native species is relocated from its known origin and "introduced" into a foreign area, whereas a cryptogenic species is one which is discovered in a foreign environment, however, its origins are not known and cannot be verified (Neves et al., 2007). In 2005, research undertaken by Robinson, Griffiths, McQuaid and Ruis determined that there were 10 introduced alien species, and 22 cryptogenic species in South African waters. It was suggested in 2009 that this list was incomplete, due to insufficient taxonomic expertise in the area, as well as the fact that many areas remain inadequately surveyed (Griffiths et al., 2009). Since then, further research has been conducted and the number of identified marine and estuary alien species in South Africa has increased to 85 introduced and 39 cryptogenic species (Mead et al., 2011b).

Two examples of marine species which have invaded the South African coastlines are the Mediterranean mussel, *Mytilus galloprovincialis* and the Pacific barnacle, *Balanus glandula* (Griffiths et al., 2009). Whilst there is no conclusive method of determining the manner in which the introduced species travelled from their native land, it is most likely to have been through the medium of ballast water (Laird and Griffiths, 2008). This is further substantiated by Griffiths et al. (2009) who acknowledged that whilst there are numerous methods of introduction of the alien species to the South African waters, shipping is reported to be the major contributor towards the invasions, by means of ballast water and hull fouling. Mead et al. (2011a) have also shown in their research that 86% of the species introduced were as a result of shipping practices, with 48% introduced by hull fouling and 38% via ballast water. Hull fouling occurs when species, such as barnacles, attach themselves to the externally exposed surfaces of the ship. These barnacles are then transported into foreign waters, where they may be dislodged (Sylvester et al., 2011).

These invasions by alien species do not only cause harm to the environment, but also have an economic impact. In South Africa, this impact was illustrated by Heasman's research conducted in 1996 on the *Ciona Intestinalis*. According to Millar (1955), the *Ciona Intestinalis*, a type of ascidian or sea squirt, is one of the first known alien marine species to have been introduced into South African waters and can be found in all South African harbours. The *Ciona Intestinalis* grows in dense accumulations on surfaces beneath the water surface, with the resultant fouling of vessel hulls and port structures and equipment. Heasman (1996) estimated the cost of the ascidians to the mussel farmers in Saldanha Bay alone to be in the region of R 100 000 per annum (in 1996).

Far more serious economic impacts have been reported elsewhere. In the 1980s, it was reported that the North American comb jelly, *Mnemiopsis leidyi* invaded the Black Sea via the vector of ballast water. By the early 1990s, it was estimated that the local commercial fishing industry had lost approximately USD 240 million in revenue as the comb jellies consumed fish eggs and larvae (Knowler, 2005). Similarly, the sea lamprey invasions in the Great Lakes had a double economic impact – the costs of putting in place programs to control the invasion as well as a negative economic impact on the commercial fishing industry in the area. It is

estimated that the control program alone costs USD 5.3 million annually (Christie and Goddard, 2003). Lodge and Finnoff (2008) expand on the cost estimates, and estimate the total cost to be USD 200 million per annum in costs and loss of economic benefits to the local consumers. Hebert, et al. (1989) provided a more vague estimate when estimating that the cost of the invasion of the Zebra mussel, *Dreissena polymorpha* in the Great Lakes to be “in the millions of dollars”.

The invasion by these alien species has proven to be detrimental to both the environment and economy, however, eradication of these alien species is almost impossible. The focus must therefore be on the prevention of invasion, which could be partially achieved by managing ballast water discharges from ships (GEF/IMO/UNDP, 2010).

## **2.5 Methods of Ballast Water Management**

The methods of ballast water management can be divided into three areas, namely; via the exchange of the ballast at sea, via an on-board ballast water management system or via the isolation of the ballast water (Yongming and Shuhong, 2012).

Ballast water exchange is the most popular method of addressing the problem, recommended by the IMO and forms part of the implementation phase of the IMO Ballast Water Management Convention (Gollasch et al., 2007). There are two methods of ballast water exchange; namely sequential and flow-through (also known as dilution method). The sequential method refers to the practise of completely emptying a ballast tank, and then refilling it with deep ocean water. On the other hand, the flow-through method is undertaken when the ballast tanks are “flushed” with deep ocean water which is pumped into the full ballast tanks, thus diluting the ballast on board (Dunstan and Bax, 2008). The exchange is conducted preferably in water of at least 200m deep and a minimum of 50 nautical miles (nm) from land. The reasoning for this exchange to be done in deep waters to reduce the risks associated with ballast water is due to the belief that coastal organisms are unable to survive in deep water environments, and deep water organisms are unable to survive in coastal waters (Verling et al., 2005).

Ballast water exchange is, however, considered to be a temporary method of ballast water management. This is due to numerous research studies which have concluded that such methods have limited effectiveness for various reasons, including, but not limited to, the safety and time aspect of such exchange and that the requirements for distance from shore and depth of water cannot always be achieved (Endresen et al., 2004, Gollasch et al., 2007). Despite this, certain countries have imposed mandatory ballast water exchange requirements for ships calling at their ports (Hillman et al., 2004).

Another difficulty of controlling and regulating ballast exchanged in such a way is due to the fact that the proof of the treatment relies largely on the integrity of the officers completing the ballast water management records, and there is little hard evidence of such replacement of ballast actually occurring. This problem is being investigated and technological solutions are being developed to verify such practices. One such solution under development in 2012 aims to record changes in the levels of the ballast water tanks on board, whilst recording the global positioning system (GPS) co-ordinates of the vessel. Ballast exchanges will therefore be recorded as the levels in the tanks fluctuate during the exchange process. Such records will be fixed, and ideally will be unable to be tampered with, thereby providing the Port State Control (PSC) with verifiable evidence of the vessel's compliance with their requirements upon arrival at the next port of call (Yongming and Shuhong, 2012). Another innovative solution being developed is to introduce certain trace elements to the ballast water tanks of the ship prior to conducting the exchange. Once flushed, the concentration of the element left in the tank should be diluted within a specified range and this will determine the effectiveness of the exchange (Murphy et al., 2008).

The treatment of ballast on board is indicated to be the long term preferred solution which the IMO advocates to have installed in all foreign going ships, however, as of April 2012, only 25 ballast water management systems had received Final Approval from the IMO, with another 37 systems having received Basic Approval only (IMO, 2012b).

The isolation of the ballast water refers to the discharge of untreated ballast into a reception facility made available on shore (or via barge) when the vessel is in port.



Such a reception facility is not always feasible, and many ports would require extensive renovations to be in a position to offer such a facility. Further to this, very few ships, other than tankers, have the pipework and ability to pump ballast from their tanks, and as such, this possibility would be very limited (Gollasch et al., 2007).

To summarise, the methods of managing ballast water remains limited, however, as the technology is being developed the manual process of ballast water exchange will be replaced by on board technology.

## **2.6 The International Maritime Organisation**

The difficulty with the management of any maritime matter is that shipping is an international business and therefore, in order to be regulated effectively, it needs to be done so by an internationally co-ordinated body, as opposed to individual countries developing rules which will make compliance very difficult for the foreign shipowner. For this reason, the International Maritime Organisation (IMO) was founded in 1948 at a United Nations conference, initially to address safety issues within the maritime industry. It is now the international body responsible for regulating all maritime issues within its member countries. The membership count in 2012 indicated that the number of member states amounted to 169, all of which are required to adhere to the rules laid out by the organisation. South Africa became a member in February 1995 (IMO, 2011).

As of January 2012, the IMO had developed in excess of 50 conventions addressing issues which are required to regulate the industry (IMO, 2012a). Many countries develop their own legislation governing issues covered by the IMO conventions, and as such the IMO conventions purely act as a guideline within which the country in question is at liberty to expand on or adjust as required. One of these 50 conventions is the “International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004” (known as BWM). The BWM convention seeks to regulate the management of ballast water of the international shipping fleet.

### **2.6.1 The Background to the BWM Convention**

The environmental concerns created by ballast water were initially brought to the attention of the Marine Environment Protection Committee (MEPC) (a committee within the IMO) in 1988 when Canada reported the problem of invasive species in the Great Lakes, which was then followed by further similar reports from other countries, including Australia (Global Ballast Water Management Programme, 2004). This triggered the introduction of voluntary guidelines which were adopted by the MEPC in 1991 to avoid the transfer of marine organisms through ballast water. In 1997, the IMO Assembly adopted a more thorough resolution, A.868 (20), called “Guidelines for the control and management of ships’ ballast water to minimize the transfer of harmful aquatic organisms and pathogens”. This resolution called for parties to provide feedback on the implementation of the guidelines, and for the MEPC to develop a legally binding convention with guidelines to address the ballast water problem (IMO, 1997).

The matter was again addressed at the World Summit on Sustainable Development held in Johannesburg in 2002 where all states were called upon to increase awareness and implement control measures to address the problem of the introduction of invasive species via ballast water, and more specifically urged the IMO to assist by finalising the International Convention for the Control and Management of Ships’ Ballast Water and Sediments (BWM) which, in 2002, was only in its draft stage (United Nations, 2002).

The IMO took heed of this request and the BWM Convention was finalised and adopted in February 2004 during the International Conference on Ballast Water Management for Ships held in the London headquarters of the IMO. The BWM Convention will come into force 12 months after being ratified by a minimum of 30 member states, representing a minimum of 35% of the world’s merchant tonnage (IMO, 2009). As at the 31<sup>st</sup> October 2012, 36 member states had ratified the BWM Convention, representing a total of 29.07% of the world’s merchant tonnage (IMO, 2012c). Even though the minimum number of ratifying member states has been exceeded, the BWM Convention has not met the criteria for the world’s merchant tonnage percentage and is therefore not in force as at 31<sup>st</sup> October 2012. It must be acknowledged that ratification of the BWM Convention cannot be taken lightly

by member states as enforcement of the requirements of the BWM Convention will require significant financial and other resources, however, it is the opinion of Gollasch et al.(2007), that the rewards of the successful implementation of the program will exceed the costs.

During the International Conference on Ballast Water Management for Ships held in the London headquarters in 2004 Resolution 3, titled “Promotion of technical co-operation and assistance” was adopted (Rodrigo de Larrucea, 2008). This resolution appeals to the IMO and other bodies to provide member states with the necessary assistance in implementing the requirements of the BWM Convention and urges members to initiate implementation despite the BWM Convention not being enforced (IMO, 2004).

### **2.6.2 The International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004**

In line with the main purpose of the IMO, the main purpose of the BWM Convention is to provide a unified method of controlling the risk related to the discharge of ballast water in foreign waters, and to ensure that the practices used to comply with the requirements are not themselves harmful to the environment (IMO, 2009). Such control is aimed to ultimately eliminate the risk to the environment, people and the economy caused by the introduction of alien species to foreign waters via the vector of ballast water (Gollasch et al., 2007). The requirement for the issue to be addressed in a unified manner is essential to the success of the BWM Convention, and ultimately the success of a globally integrated approach to the protection of the environment (McConnell, 2002).

The BWM Convention is made up of 22 Articles, an Annexure with 5 sections and a set of 14 guidelines. The purpose of the guidelines is to ensure the uniform implementation of the BWM Convention. The BWM Convention approaches the control of ballast water from two different angles, namely; from the ship and from the state (IMO, 2009).

The state to which the BWM Convention refers encompasses both the flag state and the coastal state in whose waters the vessel is sailing. A flag state is the state in which a merchant ship is registered. It is important to understand that the flag

state is therefore not necessarily the state from where the ship owner conducts his business, however, it becomes the primary legal authority governing that ship, and therefore the flag states are incorporated into and consulted when international laws and conventions are drafted (Stopford, 2008).

The coastal state is the state within whose waters the vessel is sailing. The area referred to as “waters” is the open water area defined by the states exclusive economic zone. In South Africa, this area is defined within section 7(1) of the Maritime Zones Act of 1994 as being the ocean area within 200 nautical miles from the South African coastline. In terms of section 7(2) read with section 4 (2), any law which is in force within the Republic will also apply to this exclusive economic zone.

The requirements for the state are set out in article 4 of the BWM Convention (IMO, 2009). It compels the state to develop national policies, strategies or programmes detailing the required standards within which the ships must comply. Such standards are to align with those set out by the BWM Convention and are to be monitored and enforced.

Article 5 of the BWM Convention requires that coastal states provide for sediment reception facilities in areas where the repair or cleaning of ballast tanks may take place. It is to be noted that this is not required in all ports.

Article 7 places the responsibility on the flag state to inspect; survey and certify ships to ensure compliance in terms of guidelines set out within the BWM Convention, and article 9 makes provision for the coastal state to appoint officers to attend on board a vessel to verify compliance with the BWM Convention, by inspecting ballast water record books, certificates and taking samples of ballast on board. Should a vessel fail the inspection, the BWM Convention provides guidelines as to the actions to be taken.

Section B of the BWM Convention defines the requirements to which ships must comply. Regulation B-1 and B-2 require that ships implement a documented ballast water management plan (BWRP) incorporating the reporting requirements of the BWM Convention as well as detailing the procedures relating to their specific ballast water management requirements. Every vessel is required to keep

and maintain a ballast water record book detailing all events relating to ballast water which must be available for inspection on request.

Regulation B-3 requires ships to install ballast water management treatment systems over a specified implementation period in order to treat ballast whilst still on board the vessel. Prior to the installation of this treatment system, the ship is required to conduct ballast water exchange in terms of the requirements set out in Regulation B-4. The treatment systems referred to by the BWM Convention have been under development for a number of years in order to achieve the strict results required in terms of Regulation D-2 of the BWM Convention, which defines the ballast water performance standard in terms of maximum viable organisms per unit of measure (IMO, 2009). According to King and Tamburri (2010), it remains under question as to whether or not it will be viable for authorities to conduct the laboratory tests to determine compliance with the stringent D-2 standards as it is estimated that it could cost up to several hundred thousand dollars to conduct the tests.

The BWM Convention continues with guidelines on the required standards for ballast water management and detailed requirements for the surveys to be conducted by the flag states, as well as best practise guidelines which were utilised during the GloBallast programme, which is discussed in section 2.6.3.

### **2.6.3 The GloBallast Initiative**

After the MEPC had provided the guidelines for the control of ballast water in 1997 and prior to the BWM Convention being produced in 2004, a programme called the “Removal of Barriers to the Effective Implementation of Ballast Water Control and Management Measures in Developing Countries” was introduced. The programme started in 2000 with the objective of assisting developing countries to understand, develop and implement control measures relating to ships ballast water. The name of the programme was later referred to as the Global Ballast Water Management Programme, and shortened to GloBallast. This programme was a joint initiative developed by the IMO, the Global Environment Facility (GEF) and the United Nations Development Programme (UNDP) (IMO, 2007).

The programme targeted ports in six initial pilot countries, of which South Africa was one; with the others being Brazil, China, India, Iran and the Ukraine. The countries were chosen as they were considered to represent the six main developing countries in the world. The GloBallast programme sought to provide a foundation BWM system which each country could then adapt in order to address their unique scenarios (Boelens, 2012).

The port identified in South Africa for the programme was Saldanha Bay (McConnell, 2002). Saldanha Bay has a particularly sensitive ecosystem as it is close to the West Coast National Park, and there are commercial mussel farms within the bay. A port survey, undertaken in 2001, detected eight alien species within the Saldanha Bay region, of which two were invasive (Awad, 2003). As part of the programme, a risk assessment was conducted for the port. Information was collected by handing ballast water reporting forms to Masters of ships for completion when entering the port and from that, information was gathered as to where the ballast on board originated from and the quantity that was being discharged into the port. This collection of data occurred between January 1999 and June 2002, during which period 1315 vessel port calls were registered with a total ballast water discharge of 29'647'954 tonnes recorded (Awad et al., 2004). This amounts to just over 23'000 tonnes per day, or 8.4 million tonnes per annum.

At the conclusion of the risk assessment report, recommendations were made which included the following (Awad et al., 2004):

- A mandatory ballast water reporting system needed to be introduced with the collaboration of Transnet National Port Authority (TNPA), the Department of Environmental Affairs and Tourism (DEAT), and the South African Maritime Safety Association (SAMSA);
- The port authority would need to include as one of its responsibilities the task of collecting ballast water reporting forms, and that port officials would need to be trained to enable them to educate the ships agents and ships officers as to the reporting requirements.

Further activities which were carried out during the course of the programme included creating an awareness and educating parties on ballast water issues; the review of the South African legislation pertaining to ballast water; the

encouragement of collaboration between parties and neighbouring countries; and a look at methods of compliance, monitoring and enforcement (GEF/IMO/UNDP GloBallast Partnerships and IOI, 2009).

The second phase of the GloBallast project, known as GloBallast Partnerships started in 2008 and is due to complete in 2014. It assists 15 of the less-industrialised countries, referred to as Lead Partnering Countries (LPCs) in building partnerships and becoming more aware of the problem and implementing BWM plans. Of these 15 LPCs, only 3 participants have ratified the BWM Convention as at 31 March 2012 (Boelens, 2012).

#### **2.6.4 The outcome of the GloBallast Programme**

Of the six pilot countries which participated in the original program, only three have ratified the BWM Convention as at the 31<sup>st</sup> March 2012 (IMO, 2012c). These countries are; South Africa, Iran and Brazil. Whilst India has not ratified the BWM Convention, it is the only pilot country to have instituted a BWM policy as at January 2012. India has developed a national policy as well as found the necessary resources to fund the policy. Iran, on the other hand, has commenced with awareness campaigns and assisted in training matters, however, Iran has not as yet developed a BWM policy (Boelens, 2012).

In a follow up report to GloBallast in 2012, Boelens (2012) identified the lack of legislation to enforce a ballast water management policy as a major hurdle in the implementation of a BWM program, as well as the need for the IMO to finalise suitable compliance monitoring and enforcement guidelines, which are ineffectual in their current state. Other hurdles include scarcity of resources for implementation with such resources including financial and human resources.

#### **2.7 South African Legislation**

Boelens' (2012) theory regarding the lack of legislation as a hurdle is supported by the Transnet National Ports Authority (TNPA) (known as NPA in 2003) who pointed out in 2003 that it felt that their attempts to implement ballast water reporting failed as there was no legislation in place to support their requests (NPA, 2003). Since then, new legislation has been passed in terms of the National Ports

Act 12 of 2005 which does provide the Port Authority with the necessary power of enforcement which was previously lacking, however, this Act does not specifically cover ballast water management. Further to this a number of rules and regulations exist in South Africa which are relevant and relate to the protection of the environment.

A summary of such applicable rules and regulations follow.

### **2.7.1 The Constitution of the Republic of South Africa Act, No. 108 of 1996**

The Constitution of the Republic of South Africa Act, No. 108 of 1996 clearly states in Section 24:

*“Environment: Everyone has the right*

- a) to an environment that is not harmful to their health or well-being; and*
- b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that –*
  - i) prevent pollution and ecological degradation;*
  - ii) promote conservation; and*
  - iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”*

The control of ballast water would be a “measure” to prevent “ecological degradation” and is therefore considered to be a regulation supported by the Constitution.

### **2.7.2 The South African Maritime Safety Association Act, No. 5 of 1998**

The South African Maritime Safety Association (SAMSA) was established by the Minister of Transport in 1998 in terms of the SAMSA Act, Act 5 of 1998 with three objectives defined in section 4, one of them being “to prevent and combat pollution of the marine environment by ships”. In order to accomplish the objectives, the Act sets out that the authority is to administer the laws mentioned in the Schedule (Republic of South Africa, 1998). This was later amended to incorporate “or any other Act”, and a new clause was introduced to incorporate the participation of



SAMSA in international bodies including the International Maritime Organisation. The amendment also adjusted the wording of the pollution objective in section 3(b) to “protect the marine environment from – pollution from ships and other environmental damage caused by shipping” (Department of Transport, 2009).

### **2.7.3 The National Ports Act, No. 12 of 2005**

The National Ports Act of 2005 provides for the establishment and appointment of the National Ports Authority and Ports Regulator to be the authorities covering all ports of South Africa and defines their roles and responsibilities relating to such authority. Chapter 3, section 11(g)(vi) specifically appoints the authority to regulate and control the “pollution and protection of the environment within the port limits”.

Section 80 (2) of the Act further allows for the Authority to draw up a set of rules relating to the port which would become effective once published in the Government Gazette. This was done, and on the 6<sup>th</sup> March 2009 the National Ports Act (12/2005): Ports Rules were published, and specific references to ballast water controls are made in the rules.

Chapter 4 of the Ports Rules 2009 refers to the protection of the environment. Section 86 (1) states as follows:

*“No person may throw or deposit within port limits any harmful matter or substance of whatsoever nature, including effluent of polluted water or foreign organisms, without the permission of the Authority, and, in the case where it is to be thrown or deposited from a vessel, without the permission of the Harbour Master. The Authority or the Harbour Master, as the case may be, may impose conditions upon the permission to be granted.”*

Section 88 is titled “Ballast Water” and states:

*“The Master of a vessel and any other person to whom the Port Ballast Waste Management Plan applies, must comply with that plan.”*

The “*Ballast Water Management Plan*” for the port is, according to Chapter 1, section 4 of the rules, available on the website of the Port Authority or alternatively, directly from the authority. (An assumption is made that the “Port

Ballast Waste Management Plans” and the “Ballast Water Management Plan” are the same document. A search conducted on the Port Authorities’ website on the 8<sup>th</sup> July 2012 resulted in no result for the above mentioned document).

#### **2.7.4 National Environmental Management: Biodiversity Act, No. 10 of 2004**

The National Environmental Management: Biodiversity Act, 2004 was published in the Government Gazette in June 2004. The Act allows for the management and conservation of the biological diversity and encompasses international agreements addressing these issues which have been ratified by the State. Two such international agreements are the United Nations Convention of the Law of the Sea and the Convention on Biological Diversity.

##### **2.7.4.1 United Nations Convention on the Law of the Sea**

South Africa became a signatory to the United Nations Convention on the Law of the Sea (UNCLOS) in 1998. Part XII of UNCLOS refers to the requirement to protect and preserve the marine environment. Article 196 relates to the introduction of alien species: *“States shall take all measures necessary to prevent, reduce and control pollution of the marine environment resulting from the use of technologies under their jurisdiction or control, or the intentional or accidental introduction of species, alien or new, to a particular part of the marine environment, which may cause significant and harmful changes thereto”* (UNCLOS, 1994).

##### **2.7.4.2 Convention on Biological Diversity**

The Convention on Biological Diversity, which South Africa signed in June 1993, entered into force in December 1993. Article 8 (h) states that *“Each contracting party shall, as far as possible and as appropriate...prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species”* (United Nations, 1992).

## **2.8 Implementation Steps taken by South Africa**

South Africa is a signatory to the IMO and is guided by its conventions, as well as the applicable South African legislation in place, such as the National Ports Act No. 12 of 2005 and the National Environmental Management Act No.107 of 1998 (Couriaut, 2011).

The National Ports Act appoints Transnet National Ports Authority (TNPA) with the efficient running of and sustainability of the South African ports. TNPA's risk management policy statement states its mission is "to provide efficient freight transportation on a sustainable business that enhances the interests of our stakeholders, while improving Safety, Health, Environmental (SHE) and Quality Risk Management" (Molefe, 2011, p. 1). In order to achieve this mission, TNPA has put into place the best practice systems of International Standards Organisation (ISO) 14001, ISO 9001 and Occupational Health and Safety Assessment Specification (OHSAS) 18001. These best practice systems' refer to internationally agreed standards relating to quality, environmental and occupational health and safety management (TNPA, 2010).

The "Integrated SHE management system overview" document brings together their overall objectives and environmental policies (2007). The document refers to seven objectives, which includes minimising the transfer of unwanted organisms and pathogens into the port. The document assigns responsibilities of accomplishing such directives to the various business units operating in the port. Further to this, TNPA have produce the booklet "A Basic Guide to Environmental Management in the South African ports" to educate its stakeholders on port environmental issues (2010). Sea and land based pollution are discussed as well as the management tools and relevant legislation to which the port abides.

The matter of ballast water management is covered within the Ports Rules. However, there appears to be a lack of publically available documents detailing the requirements other than for the port of Saldanha Bay. As part of the GloBallast programme, an initial risk assessment was conducted within the Port of Saldanha Bay, which prompted the TNPA to commission a baseline survey to be done on the marine invasive species of the Port of Ngqura, which was under construction at the time, in order to provide for a benchmark level against which future surveys

could be compared (NPA, 2003). No follow up information has been found to determine whether or not this survey has been utilised as yet.

TNPA implemented a procedure to collect Ballast Water Reporting Forms from ships calling at South African ports, however, in 2003 concluded that the collection of this information had been hampered by the fact that there was no legislation available at the time requiring the mandatory completion of the ballast water forms (NPA, 2003). A follow up report conducted on behalf of the GloBallast Partnership Projects (2012) states that South Africa appears not to have made much progress since the initial pilot phase in Saldanha Bay. The report refers to the response received from South Africa to a questionnaire circulated by Boelens in June 2011. The survey reported that the *“principal barriers to ballast water management development in South Africa were given as a lack of awareness/understanding of the problem, institutional issues, limited co-operation between shipping and environment authorities and lack of capacity”* (Boelens, 2012, p.27). Boelens (2012) reports that the South African respondent to the questionnaire suggested that the IMO conduct follow up training in South Africa. The barriers of awareness and of understanding the problem relate back directly to the objectives of the initial GloBallast program, and would indicate that the program has therefore failed to achieve its objective in South Africa of assisting developing countries to understand ballast water management.

The “Draft Policy on the Management of Ballast Water in South Africa” was prepared in August 2002 as part of the GloBallast program by Enact International (2002). The purpose of the draft presented was to facilitate discussions and was therefore intended to be a working document. The policy applied to all discharges of ballast water and sediments within South African internal, territorial waters and exclusive economic zone.

The document recommends a blanket approach to the management of ballast water within the Ports of South Africa, meaning that all ships carrying ballast are seen to be a potential threat and must therefore adhere to defined measures aimed at reducing that perceived threat. The document advises that the South African Government considers ballast water exchange to be a temporary solution

which is required to be superseded as soon as possible by the more sophisticated techniques of ballast water treatment systems (Enact International, 2002).

One of the goals of the policy is to establish ballast water management plans for all ports, taking into consideration each ports' unique attributes. It acknowledges the GloBallast activities in Saldanha Bay and recommends that the programme developed there is used as a guideline for the other ports (Enact International, 2002).

Other issues identified in the Draft Policy on the Management of Ballast Water in South Africa include:

- The need for the Government to develop an integrated national biosecurity strategy;
- The need to create awareness and expand on the educational road shows held by the DEAT in 2001 as part of the GloBallast programme;
- The need to allocate finances to a fund capable of implementing the ballast water management policy and deal with any emergencies which develop;
- The need to develop a cross functional inspectorate capable of monitoring and enforcing regulations on ships in port, as opposed to the multiple inspectors visiting ships from the various departments, including the Department of Health, Customs, Police, Immigration and South African Maritime Safety Authority;
- The need to pass the relevant legislation to implement the requirements of the IMO Convention once South Africa became a party to it.

As of April 2012, a decade after the draft was produced, there is no evidence available that any progress has been made on the draft ballast water management policy. (Note: In July 2012 a task group was put together by the Department of Transport to further advance this document. This will be discussed under section 4.5).

In 2008, the Department of Transport published its Draft South African Maritime Policy (2008). Section 3.10 deals with Environmental and Energy issues. Section 3.10.2 suggests that these issues are not as important to developing nations as it is to developed nations, but does concede that since shipping is a global industry,

that cognisance will be given to these matters and that South Africa will take note of them and be ready to implement any rules or regulations at such time that they are enforced (Department of Transport, 2008). Policy Statement 58 from the document specifically states that in 2008 the Department of Transport did not have sufficient resources to oversee certain issues, including the IMO Ballast Water Management Convention, and as such the Department of Environmental Affairs and Tourism would provide such services. The document continues with Policy Statement 60, which declares that the Department of Transport would be responsible for performing all activities relating to the environment as decided by the IMO (Department of Transport, 2008). This would indicate a possible contradiction of the previous policy statement. This draft maritime policy remains in its draft phase 4 years later, however, it was announced in March 2012 that the policy was in the process of being “revamped” (Sabinet, 2012).

The responsibility for the implementation for ballast water management in South Africa therefore appears to be split. In terms of the National Ports Act, TNPA is the responsible authority for controlling management measures within the port waters, whereas the Department of Transport is responsible for overall maritime pollution management. This responsibility appears to be seconded by the Department of Transport to SAMSA as well as the Department of Environmental Affairs and Tourism. Regardless of the responsible party, there is little evidence available to indicate that any measures are being enforced in South African ports.

## **2.9 Ballast Water Initiatives**

A number of countries have already implemented ballast water legislation and regulations. Table 2.1 provides a summary of these requirements. The table has been compiled with information extracted from the document “National ballast water management requirements: May 2012” as issued by Lloyd’s Register (2012). Lloyd’s Register of Shipping is well-respected, and the oldest classification society, having opened its doors in the 1700s (Stopford, 2008). It must be noted that the Panama Canal, which is under the control of the Panamanian Canal Authority, prohibits any discharge of ballast, regardless as to whether it is clean or not (Panama Canal Authority, 2010).

The following observations are discussed from the table.

- Responsibility

The table shows no definite pattern as to the allocation of responsibility for ballast water management. Nominated parties include the coast guards, environmental or transport departments and port or maritime authorities.

- Start date

A number of countries have regulations that have been mandatory for some time, with the earliest reported by Lloyd's in their document as being Israel whose regulations became mandatory in 1994. Of the 17 countries, 15 have known dates of implementation of policies. Of those 15, 10 had implemented ballast water regulations prior to the IMO BWM Convention adoption in 2004, and of those 10, two of the countries have revised their policies since the BWM Convention was issued.

- Implementation

It is a mandatory requirement that all vessels calling at the countries and/or ports listed adhere to the ballast water requirements concerned.

- Accepted methods of ballast water control.

Apart from the Panama Canal, all countries consider the process of ballast water exchange as an acceptable method of ballast water management. Ballast water treatment systems are specifically recognised by 9 of the 17 countries (Note: It is likely that these systems would be accepted if they have obtained IMO approval.)

The United States revised their regulations in 2012 and has introduced the compulsory requirement for Ballast Water Treatment Systems to be installed onboard all ships. This requirement, like that of the IMO BWM Convention, will be phased in over a specified period, after which the ballast water exchange method will no longer be accepted (Department of Homeland Security, 2012).

- Inspection of records.

The only countries who inspect the ballast water records of every vessel calling in their ports is Australia and Canada. All other countries reserve their rights to inspect the ballast water log books and records of the ship, which inspection they undertake on a random basis, or where they consider the ballast to be high risk.

- Requirement to report.

The only ports which do not require the vessel to submit a ballast water management report are Georgia and Panama. All other countries require the vessel to submit a ballast water management report prior to, or on arrival. Canadian legislation requires every vessel to submit a ballast water report before entering its territorial waters. The Panamanian authorities do not require the report as the discharge of ballast water is expressly forbidden.



**Table 2.1 Summary of ballast water requirements in countries that have ballast water management policies**

Country	Responsibility	Ports Affected	Ships Affected	Implementation	Start date	Accepted methods		Records Inspected	Required to report
						BWE	Treatment		
Argentina	Coastguard	All	All	Mandatory	1998	✓	✓	Random	Yes
Australia	AQIS (DAFF)	All	All	Mandatory	2001	✓	Not mentioned	Yes	Yes
Brazil	Coastguard	All	All	Mandatory	2006	✓	Not mentioned	Random	Yes
Canada	Transport Canada (DOT)	All	All	Mandatory	2000, revised 2006	✓	✓	Yes	Yes
Canada - Vancouver	Port Authority	Vancouver	All	Mandatory	1998	✓	Not mentioned	Random	Yes
Chile	Various	All	All	Mandatory	1995	✓	✓	Random	Yes
Georgia	Dept of Environment	All	All	Mandatory	Not avail.	✓	✓	Random	No
Israel	DOT/Port	All	All	Mandatory	1994	✓	✓	Random	Yes
Lithuania (oil terminal)	Port Authority	Klaipeda	All	Mandatory	pre 2004	✓	Not mentioned	Random	Yes
New Zealand	DAFF	All	All	Mandatory	1998, revised 2005	✓	✓	Random	Yes
Norway	Maritime Directorate	All	All	Mandatory	2010	✓	✓	Random	Yes
Panama	Canal Authority	Panama canal	All	Mandatory	1999	✗	✗	Random	No
Peru	Coastguard	All	All	Mandatory	2006	✓	✓	Random	Yes
Russia	Port	Novorossiysk	All	Not available	2006	✓	Not mentioned	Random	Yes
Ukraine	SIPBS	All	All	Not available	Not avail.	✓	Not mentioned	Random	Yes
United States	Coastguard	All	All	Mandatory	2004, revised 2012	✓	✓	Random	Yes
United Kingdom	Orkney Islands Council	Scapa Flow	All	Mandatory	1998	✓	Not mentioned	Random	Yes

Source: Author compiled from Lloyd's Register: National Ballast Water Management Requirements: 2012

The following section takes a more in-depth look at the programmes implemented in Canada, the USA and Australia.

### **2.9.1 Great Lakes' Ballast Water Management Program (Canada)**

The Great Lakes basin revised their ballast water management plan (BWMP) in 2005 (Bailey et al., 2011). Bailey et al. reports that the revised BWMP introduced a new reporting system for ships to report the details of the ballast which they have on board prior to their arrival within a defined area surrounding the basin. Any ballast which is deemed to be “unmanaged” by the authorities is required to be exchanged and/or flushed whilst the vessel is still offshore. This is then followed up by physical inspections of the ballast water logs and tanks, and the water within the tanks is tested. The significant factor for this BWMP is the fact that every vessel is subjected to an inspection.

Recent testing of the water surrounding the Great Lakes area has shown that the BWMP has proven to be successful and has reduced the number of biological invasions (Bailey et al., 2011).

### **2.9.2 United States of America**

The United States of America (USA) is a forerunner with legislation dealing with invasive species, and in 1990 it introduced the Non-indigenous Aquatic Nuisance Prevention and Control Act (NANPCA) which sought to avoid ballast water from being introduced into the Great Lakes by requiring them to exchange ballast water at sea. NANPCA was subsequently replaced by the National Invasive Species Act (NISA) in 1996. NISA expanded the NANPCA requirement for the exchange of ballast water at sea to include all ships calling from outside of the USA exclusive economic zone (EEZ), and introduced the compulsory requirement for the reporting of a vessel's ballast water management plan to a national registry for all ships calling at USA ports in 1999.

In 2004, the United States Coast Guard (USCG) made ballast water exchange a mandatory requirement for ships wishing to discharge foreign ballast within USA territorial waters (USCG, 2004). A further review was conducted in 2012, mirroring the requirement of the IMO Convention for ballast water treatment systems to be

installed and ballast water exchange as an acceptable method of ballast water management will be phased out (Department of Homeland Security, 2012).

### **2.9.3 Australia**

As of July 2001, Australia introduced mandatory ballast water management requirements which are enforceable in terms of the Quarantine Act No. 3 of 1908 as amended and enforced by the Australian Quarantine and Inspection Service (AQIS).

The requirements relating to the control measures in place are set out in the National Seaports Program: Australian Ballast Water Management Requirements (Version 5) which stipulates that only ballast which is considered to be low risk may be discharged into Australian territorial waters (Department of Agriculture, Fisheries and Forestry, 2011). Low risk ballast is that which has been exchanged in mid-ocean waters, fresh water, or ballast taken up in Australian territorial waters. All ships are required to send information relating to their ballast on board to the AQIS prior to entering Australian waters (within 12 nautical miles off the Australian coast), and are required to request permission to discharge ballast if they intend to do so. If all requirements have been met, the AQIS will provide permission in writing for the vessel to discharge accordingly. Failure to adhere to these requirements would result in a vessel needing to undergo a physical inspection prior to discharge of any ballast. Compliance with the program as a whole is ensured through on board inspections conducted by AQIS officers (Department of Agriculture, Fisheries and Forestry, 2011).

No literature was found to determine the level of success of the USA or Australian ballast water management plans, however, personnel communications on the 8<sup>th</sup> August 2012 between the author and a Master of a vessel, who wishes to remain anonymous, revealed that the regulations are adhered to as it is well known that the regulations are strictly enforced (Anon., 2012).

### **2.10 Summary**

The literature review undertaken seeks to provide an in-depth understanding of ballast water management and the damage that ballast water is having on marine

ecosystems. Whilst the IMO have developed a Convention to address these issues, the onerous requirements which it places on ship owners and lack of available technology has resulted in a delay in its enforcement, and as at November 2012, the BWM Convention remains unenforced. In the interim, the IMO is encouraging member countries to implement national ballast water management regulations in order to slow down the transfer of these alien species. GloBallast, a joint initiative between IMO/GEF/UNDP was set up to assist developing countries to implement these strategies. Saldanha Bay was selected to participate in the initiative, and an assessment was made to determine the risk potential. Results from the assessment indicated the need:

- to implement a mandatory ballast water management system; and
- to create awareness of the problem; and
- to develop adequate legislation in order to specifically address the problem.

A Draft Ballast Water Management Policy was produced in 2002, however, a decade later it appears that nothing further has come of the draft policy.

In 2003, TNPA advised that their attempts to implement ballast water reporting was failing due to the lack of legislation to enforce the requirement. Further legislation was passed in terms of the National Ports Act and the Ports Rules which make reference specifically to ballast water management plans, however, there remains a lack of legislation directly related to ballast water management. There is also very little evidence of the existence of the ballast water management plans for each port, with the exception of Saldanha Bay, whose procedures, drawn up in 2003 and revised in 2007, are available online.

Responsibility for implementation, enforcement and monitoring would also appear to be vague. In terms of South African legislation, there are a number of departments responsible for marine environmental issues, such as the Department of Environmental Affairs and Tourism, the Department of Transport (incorporating SAMSA), and the port authorities (TNPA). Regardless of which body is responsible, there is no evidence in the literature that any enforcement is being undertaken.

The aim of this study is to determine the status of ballast water management in the Ports of South Africa, and from the literature review undertaken it is clear that issues such as awareness, implementation, enforcement and monitoring as well as the responsibility thereof needs to be investigated further. The research methodology used for this investigation is discussed in chapter three.

## CHAPTER THREE

### RESEARCH METHODOLOGY

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#### 3.1 Introduction

The purpose of this third chapter is to provide insight into the research methodology used in this study and the manner in which data was collected. In chapter two, the literature review identified various issues such as awareness, implementation, enforcement and monitoring as well as the responsibility thereof as areas of concern relating to the status of ballast water management in the Ports of South Africa. These concerns were unable to be answered with the literature available, and thus formed the framework for the study. As ballast water and the management thereof is not a topic which is widely understood, the research methodology needed to be designed in such a way as to ensure that the research questions on the status of ballast water management in the Ports of South Africa were adequately addressed by respondents with the necessary expertise in the subject.

#### 3.2 Aims and Objectives

The environmental issues relating to ballast water are not going to be resolved without the active involvement of both government and private industry. The IMO BWM Convention for the control and management of ships ballast has been delayed in being enforced. However, until such time as it does become enforced the IMO has appealed to member countries to implement measures in order to reduce the risk of transfer of invasive marine organisms. As a member country of the IMO, the aim of this study is to therefore examine the status of ballast water management in the Ports of South Africa.

The objectives for this study are:

- To determine what ballast water management policies have been implemented in the Ports of South Africa;

- To determine the awareness of the ballast water management policies in place by relevant port users;
- To determine which authority or organisation is responsible for the monitoring of the ballast water management policies;
- To determine which authority or organisation is responsible for the enforcement of the ballast water management policies.

### **3.3 Research methods**

Research is defined by Sekaran and Bougie (2009, p.3) as “an organised, systematic, data-based, critical, objective, scientific enquiry or investigation into a specific problem”. Essentially, the researcher seeks to obtain a better understanding of a specific issue by conducting an in-depth analysis of the situation. This analysis should place researchers in a position where they are able to provide a clear perspective on the situation, undeterred by personal bias, perception or untruths (Denscombe, 2010). In order to accurately conduct the research and determine the reality regarding a specific situation, researchers are required to apply objective methods and techniques of data collection and analysis. This increases the likelihood of obtaining accurate results on which one can rely (Mouton, 2009). There are three different methods which one can utilise for research, namely qualitative, quantitative or a mixed methods approach.

Qualitative research is considered to be research which revolves around interpretivism as the researcher collects data in the form of words and utilises these as units for analyses. This is used to provide a more holistic understanding of the issue taking into account the varying factors which could affect it. Qualitative researchers usually limit the respondents to a small number of experts who are able to provide in-depth knowledge and insight into the research topic (Babbie and Mouton, 2007).

Quantitative research on the other hand, derives from a positivist framework as the researcher collects more scientific data in the form of numbers and figures on more specific variables relating to the research topic. Due to the statistical nature of such research, it is preferential to have many respondents participate, and therefore the research is conducted with much larger numbers of respondents.

Quantitative research often limits respondents as they are not free to express their opinions which are limited by the predetermined scales set by the researcher (Henning et al., 2004).

The third method is called the “mixed methods approach” which allows for qualitative and quantitative methods to be combined in order to adequately address the research problem (Denscombe, 2010). The outcome of the literature review conducted for this study indicated issues pertaining to both an understanding of the measures in place, done through a qualitative research method, as well as the need to measure the level of awareness of these measures. These issues reflect the need for both qualitative and quantitative research methods, and therefore the mixed methods approach was identified as being the best method to adopt for the study.

A challenge when conducting qualitative research is that results could reflect a biased viewpoint dependent on the method of data collection and respondents chosen, thereby affecting the reliability of the results. This is particularly relevant in this study as limiting the respondents to one sector of the industry could provide incorrect results due to different perceptions and/or understanding of the topic. To counteract this, the triangulation method was utilised in this study.

Triangulation is the method of combining research methods or data collection from different sources in order to minimise the possibility of biased results and viewpoints on a specific research topic. By utilising the different methods, researchers are able to partially overcome the level of bias and improve the reliability of the outcome (Denzin, 1989). Babbie and Mouton (2007) believe triangulation to be one of the better ways to ensure validity and reliability in qualitative research.

### **3.4 Participants in the Study**

The respondents for this study have therefore been chosen in order to obtain a contextual understanding of the topic by approaching different sectors of the industry, namely the port authorities, the port users and the experts within the field on both a qualitative and quantitative basis.



This study focuses on the status of ballast water management in the Ports of South Africa, of which there are eight commercial ports, through which more than 9000 cargo carrying ships pass every year (TNPA, 2003 - 2008). Within the ports, hundreds of personnel and service providers operate in order to facilitate and coordinate the requirements of these ships. To get all parties to respond to the research in question would be beyond the scope and resources of this study, and therefore the respondent selection was based on selected criteria using purposive sampling.

In accordance with the triangulation method, three different groups of respondents were identified to participate in the study, based on their ability to add value to the study, via the purposive sampling method. The first group of respondents chosen are considered to be industry experts on ballast water management and have been purposively chosen to provide expert opinion on the matter.

The second group of intended respondents consisted of port personnel who are involved in the environmental departments of the commercial ports. The reason for their inclusion was due to the fact that the Ports Rules refer to the Ballast Water Management Plans of each port, and they are therefore adequately qualified to comment on the ballast water plans within their respective ports. Unfortunately, the approach made to the senior members of TNPA to participate was unsuccessful due to company policy and they were unable to reply to the questionnaire, however, they were able to provide copies of some of the port's ballast water management plans.

The third group of respondents are the ships agency members of the South African Association of Ships Owners and Agents (SAASOA). One of the duties of a ships agent is to inform the Master of a ship, for whom they are the port agent, of any requirements or formalities relating to the port in which the ship is calling. It is therefore imperative that the agent is aware of the port requirements relating to ballast water as failure to correctly advise the Master of any port requirements could result in costly delays and have serious repercussions.

### **3.5 Recruitment of Study Participants**

In order to conduct effective research, it is necessary to define the population and then determine a representative sample size from which one is able to draw conclusions generalizable to the population. The population relates to the entire number of items of interest under study. Each item of the population is referred to as an element. Dependent on the size of the population, it is often necessary to then determine a sample size (Sekaran and Bougie, 2009).

For this study, the first group of respondents was difficult to define as there are very few experts on the topic of ballast water management in South Africa. Four experts were identified from the literature review conducted, and all invited to participate. For the purposes of this study, the expert respondents were considered to be experts based on their involvement in the ballast water initiatives undertaken.

The population for the intended respondents from the ports was easily defined as there are only 8 commercial ports in South Africa, namely the Port of Richards Bay, the Port of Durban, the Port of East London, the Port of Ngqura, the Port of Port Elizabeth, the Port of Mossel Bay, the Ports of Cape Town and the Port of Saldanha Bay. No sampling was therefore envisaged as it was feasible to approach the entire population. A formal request was sent through to the National Environmental Manager of Transnet for approval to approach each port. Unfortunately, this request was rejected by the legal department of Transnet who required that a confidentiality agreement restricting the use of the information received needed to be signed before the questionnaire was completed. This was rejected by the author and a request was placed with the National Environmental Manager to provide copies of all the ballast water management plans for each port which are considered to be public documents as, according to the Ports Rules, they are available online or directly from each port.

The third group of respondents chosen were the ships agents. It is a requirement of TNPA that all licenced agents are members of the South African Association of Ships Owners and Agents (SAASOA), and this therefore provided the framework to define the population as being the ships agency members of SAASOA. A gatekeeper's letter was obtained from the Chief Executive Officer of SAASOA in

order to approach their membership to participate. As per the SAASOA website, accessed on the 1<sup>st</sup> October 2012, there are a total of 99 members of the organisation, of which 75 are ships agents and the balance are ship operators (SAASOA, 2012). A telephonic call to the offices of SAASOA on the 8<sup>th</sup> October 2012, confirmed that 6 ships agents had recently become members and were not on the list available online. After contacting all 6 of these new members, it was determined that they were not yet operational, and therefore these 6 new members were excluded from the population.

This initial population figure of 75 was reduced by a further 20 after eliminating members who are not active in the industry and the companies who share operational departments with other member companies. The final population defined for ships agents was therefore 55, all of whom were contacted.

The questionnaires distributed had a covering letter explaining to the respondent the purpose of the study, and an informed consent form which allowed the respondent to choose whether or not they wished to remain anonymous (see appendix one). All respondents completed this document.

### **3.6 Construction of the Questionnaire**

The research design called for empirical research to be conducted using both primary and secondary data. The literature review provided theoretical insight into the matter using existing secondary data which highlighted various areas of concern, which included awareness, implementation, enforcement and monitoring of the regulations. Self-administered questionnaires were then prepared in order to address these areas. Three questionnaires were prepared, dependent on the nature of the respondent. The questionnaires developed for the Port personnel and industry experts were directed at the actual nature of the ballast water management plans in place, and sought clarification on enforcement, monitoring and responsibility. The ships agents, however, were asked more about their understanding of ballast water, and their knowledge of any ballast water management plans being applied within the port in which they operate. All respondents were given the opportunity to comment on their perceptions as to the adequacy of the procedures and possible areas of improvement.

The questions within the questionnaire were predominantly structured open-ended questions addressing the immediate concerns as identified in the literature review whilst leaving the respondent with a certain level of flexibility to comment and bring in any concerns which they thought relevant.

The questionnaires were completed in a variety of ways, for reasons of convenience, availability and geographical limitations. The methods used for completion were personnel interviews, e-mail and telephonic communications.

### **3.7 Administration of the Questionnaire**

A form of questionnaire utilised in this study was that of the self-administered questionnaire. It is usual for self-administered questionnaires to be circulated via mail or e-mail to respondents, who are requested to complete the document and return it to the researcher. It is also possible to circulate this questionnaire to a group of people gathered in the same venue, at the same time.

There are advantages and disadvantages to self-administered questionnaires, both of which were experienced during this study. An important advantage of this method is that it is far quicker and cheaper to administer as the questionnaires are circulated in bulk, as opposed to a one-on-one interview which is time-consuming and can be costly. Respondents are also able to reply at a time convenient to them, as opposed to having a set time. As there is no interviewer present, there is no opportunity to introduce any bias as the respondent is unable to ask questions, the answer to which may influence the reply. It has also been suggested that certain characteristics of an interviewer could also affect the responses, such as ethnicity, gender and status (Sekaran and Bougie, 2009).

Disadvantages of this method include the inability for the researcher to explain or clarify questions, or to probe further on answers provided. Respondents are also able to skip any question which they choose not to answer. The biggest challenge with self-administered questionnaires, however, is the low response rate. This is an important aspect of the research as the findings could be different if the respondents who chose not to reply did reply, thereby increasing the risk of bias (Babbie and Mouton, 2007).

The initial manner in which the ships agency questionnaire was to be administered was during the monthly SAASOA meeting of ships agents. The author obtained permission from the Durban Chapter Chairman of SAASOA and distributed questionnaires at the September 2012 meeting. Of the 40 questionnaires distributed, only 4 were returned completed.

With the failure of this method, the author then telephonically contacted a senior manager of every SAASOA member agency, to request their participation in the research, which was then followed up with the questionnaire sent via e-mail. This method proved more successful, and after sending through up to three reminders, the total number of responses received amounted to 29, the equivalent of a 53% return using the initial population figure of 55. An additional 3 returns were obtained from branch offices of three of the ships agents, therefore increasing the population to 58 (initial 55 plus 3 extra's), and the rate of return 55%. According to Babbie and Mouton (2007), a rate of return of 50% or more on self-administered questionnaires is sufficient for analysis and reporting.

The questionnaires which were sent through to the industry experts were done so via e-mail, with follow up reminders sent where necessary. Of the four respondents approached, two completed the questionnaire and one responded via e-mail with information relevant to the research. No reply was received from the fourth expert.

### **3.8 Analysis of Data**

The manner in which the data was analysed differed depending on the respondents. The responses from the experts were mostly qualitative. Due to the small number of respondents in this sector, all the responses were considered in the presentation of the results in chapter 4.

The ports authorities were unable to respond to the questionnaire, however, did supply the Ballast Water Management Plans for three of their ports. These plans provided theoretical answers to some of the objectives. This theoretical information was also utilised - in the measurement of the awareness of the ships agents of the ballast water management plans. As the implementation of these plans would largely require the close co-operation of the ships agents, the plans

were analysed according to pertinent aspects which the ships agent would need to be aware of to correctly advise the Master of the vessel. Key words were identified from these aspects, and these key words were then used to draw up a matrix which was used to analyse the agents' responses to the awareness questionnaire.

This analysis was done by marking off each key point which the ships agent mentioned or alluded to when replying to question 5 regarding the requirements of the ballast water management plan of the port. Other questions from the ships agents' questionnaire were analysed using both quantitative and qualitative methods. This information was used to develop graphs which provided a visual representation of the quantitative data collected.

### **3.9 Research Limitations**

The following limitations must be acknowledged.

- The poor response rate to the ships agency questionnaires introduces the potential for bias as many of the non-respondents indicated verbally that they had no knowledge of ballast water and would need to "look into it" before responding. As this questionnaire was primarily aimed at determining the awareness amongst agents, this would indicate the results are potentially biased towards those that are aware, as the non-respondents verbal comments could not be considered in the results.
- The failure of the port to complete the questionnaire limits the insight into the conclusions made on implementation, monitoring and enforcement.
- The self-administered questionnaire hampered the author from probing further into matters with respondents; however, this was partially overcome by follow up correspondence between the author and respondents to clarify comments made.
- It was the intention of the author to not lead the ships agency respondents in question 5 of the questionnaire with regard to the details of the ballast water management requirements. This may have resulted in some information, which is known to the respondent, from being omitted from the answer.

### **3.10 Summary**

The purpose of this third chapter is to describe the research methodology employed for this study. The aims and objectives were explained and the data collection strategies discussed. The reasoning behind the choice of participants, as well as the challenges encountered with the primary research was detailed in order for the limitations of the research to be understood. Of the three groups of participants chosen, two have provided adequate responses, and the third has provided information which can assist in the analysis of the responses obtained from the ships agents. A response rate of 55% for the agency participants has been achieved, and three industry experts have chosen to respond. Additional literature relating to a meeting held in July 2012 was also obtained, thereby providing further insight and consequently providing perspectives to the questions raised in the questionnaires. This information on ballast water management and the data collected from the questionnaires will be discussed in chapter four.

## CHAPTER FOUR

### PRESENTATION OF THE QUESTIONNAIRE RESPONSES AND FINDINGS

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#### 4.1 Introduction

The purpose of this fourth chapter is to present and analyse the data collected from the questionnaires distributed to the respondents in order to determine the status of ballast water management in the Ports of South Africa. The study approached the topic from three different viewpoints.

The first viewpoint is that from the experts in the field, two of whom had previously participated in the GloBallast pilot project in Saldanha Bay and would be able to provide input as to what is happening from an overall aspect. The second viewpoint is that of the port authorities (TNPA), who are tasked with the efficient running of and sustainability of the Ports of South Africa. TNPA were approached in order provide information as to what the status of ballast water management is within the ports. Lastly, is the viewpoint of the ships agents who are required to be able to guide foreign shipowners and Masters as to the local customs of the port, which would include the ballast water requirements for calling at any South African port.

Each viewpoint has been presented and discussed separately in order to provide a holistic view on the status of the ballast water management in the Ports of South Africa.

#### 4.2 Industry Experts

Boelens (2012, p.27) described one of the principal barriers for the development of ballast water management in South Africa as being the “lack of awareness/understanding of the problem”. This was evident in the lack of knowledgeable parties capable of providing expert opinion on the status of ballast water management in the Ports of South Africa.



For the purposes of this study, two of the active participants in the GloBallast programme in Saldanha Bay were contacted to provide their opinion on the status of ballast water management in the Ports of South Africa. A third expert from the Department of Transport also contributed to the research but chose not to complete the questionnaire. The fourth expert did not respond.

The questionnaire is presented in Table 4.1 below.

Table 4.1 Expert Questionnaire

<ol style="list-style-type: none"><li>1. <b>What is your involvement or experience with regards to ballast water management?</b></li><li>2. <b>What ballast water management plans or policies are currently in place in the Ports of South Africa?</b></li><li>3. <b>Who is responsible for the monitoring of the above mentioned plans or policies? Why?</b></li><li>4. <b>Who is responsible for the enforcement of the plans or policies, if different to the party responsible for monitoring mentioned in question 3? Why?</b></li><li>5. <b>Are there any problems with the ballast water management policies in the Ports of South Africa?</b></li><li>6. <b>What should be done to improve the management of ballast water in the Ports of South Africa?</b></li><li>7. <b>Are the current provisions adequate to avoid the further introduction of invasive marine organisms into South African waters?</b></li><li>8. <b>Any other comments you would like to add?</b></li></ol>
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The responses to the questions asked of the two participating experts who completed the questionnaire are detailed below.

#### **4.2.1 Presentation of Data Collected from the Experts**

The questionnaires were sent via e-mail to the participants, who in turn replied via e-mail. Where an issue required further clarification, this was done via further e-

mail correspondence. The response received from the participants is presented in a narrative format.

#### **4.2.1.1 Participant 1**

The first participant is Captain Ravi Naicker who currently holds the position of National Operations Manager for SAMSA. Captain Naicker was the harbour master of the Port of Saldanha Bay during the time of the GloBallast Programme.

Even though Naicker was unaware of the current ballast water management policies within the ports, he was able to provide information as to the estimated quantities of ballast water discharged into the Port of Richards Bay and the Port of Saldanha Bay, which was approximately 18 million tonnes and 9 million tonnes per annum respectively. These estimates had been calculated based on the records which the ports kept of the discharges during the course of the GloBallast programme, which ran between 2000 and 2004. Naicker was unable to provide information as to whether the practices of keeping these records continue today.

Naicker identifies the Department of Transport (DOT) as the responsible Ministry for the monitoring of BWM plans in South Africa due to the fact that the DOT represents the country at IMO and MEPC meetings where issues including ballast water are discussed. He is not able to identify the party responsible for enforcing the BWM plans as he advises that this is still to be determined.

Naicker chose not to comment on his perception regarding possible problems with the current BWM plans in place as he was not familiar with them, nor did he provide an opinion on the effectiveness of these plans. Naicker did, however, advise that the DOT was taking action to improve the current BWM plans in that it had engaged the services of the International Ocean Institute (IOI) in order to develop the Ballast Water Act and Regulations. The first meeting of the IOI and stakeholders was held on the 24<sup>th</sup> July 2012.

#### **4.2.1.2 Participant 2**

The second participant requested anonymity. Participant 2 became involved in ballast water management in the 1990s whilst working for Marine and Coastal Management and initiated a programme to collect information relating to ballast

water discharges from the ports. Participant 2 was a key member of the team which ran the GloBallast Saldanha Bay programme and gained further experience with regard to ballast water as an active member of the IMO Ballast Water Working Group who was responsible for the successful negotiations which led to the adoption of the International BWM Convention. Participant 2 is a member of the project team which the DOT put together in July 2012 to develop the Ballast Water Act and Regulations.

Participant 2 was unable to provide information relating to the current BWM plans in place other than advising that they existed in some of the ports, and referred the author to the Port Authorities for further details. Participant 2 was, however, able to provide the data which was collected during the programme initiated to collect information on ballast water discharges from ships for the period 1991 to 1996. This information is presented in table 4.2.

Table 4.2 Ballast Water discharged in the Ports of South Africa (tonnes)

<b>Year</b>	<b>Saldanha Bay</b>	<b>Cape Town</b>	<b>Port Elizabeth</b>	<b>East London</b>	<b>Durban</b>	<b>Richards Bay</b>
<b>1991</b>	5'046'478	36'220	N/A	N/A	N/A	N/A
<b>1992</b>	5'531'114	N/A	N/A	N/A	N/A	7'732'437
<b>1993</b>	7'005'107	N/A	273'948	N/A	709'461	14'623'598
<b>1994</b>	7'769'206	N/A	370'298	N/A	792'088	15'630'298
<b>1995</b>	8'488'551	N/A	N/A	37'172	N/A	12'345'555
<b>1996</b>	8'014'904	N/A	N/A	N/A	N/A	16'793'553
<b>Total</b>	<b>41'855'360</b>	<b>36'220</b>	<b>644'246</b>	<b>37'172</b>	<b>1'501'549</b>	<b>67'125'441</b>
<b>Average</b>	<b>6'975'893</b>	<b>36'220</b>	<b>322'123</b>	<b>37'172</b>	<b>750'775</b>	<b>13'425'088</b>

Source: Author compiled with information provided by Participant 2

Table 4.2 provides information on the amount of ballast water discharged into the different ports as recorded during Participant 2's programme for the years 1991 to 1996. The measurement for the quantities recorded is per metric tonne. The results are incomplete due to incomplete information provided by the ports, the limitation of which is acknowledged. The records reflect that the quantity of ballast water discharged in the Port of Richards Bay is 67 125 441 tonnes over a period of

5 years, providing an average annual discharge of 13 425 088 tonnes, almost twice that of the next highest port which is Saldanha Bay, where the average discharge amounted to 6 975 893 tonnes per annum. These two ports are known to accommodate large bulk vessels which carry high volumes of ballast water which would explain the reason for the significantly higher levels of discharge of ballast water than the other ports in South Africa.

The determination of the responsible parties for monitoring and enforcement is answered by Participant 2 in terms of how Participant 2 sees the development of the regulations which are not yet in place. Participant 2 indicates that TNPA should be the responsible party for the implementation of the port BWMP's and for ensuring that vessels calling within the port adhere to the plans. Monitoring of the ballast water discharges within the port should also be done by TNPA, however, the inspections of the ship BWMP and ballast water treatment equipment on the vessels should be done by SAMSA.

Participant 2 believes that the development of the Ballast Water Act will improve the BWM plans in place and indicates that the provisions of the Act will most likely mirror those of the IMO BWM Convention, with the exception of BWE policies, which are expected to be stricter than those of the BWM Convention. The improvement of BWM within the Ports of South Africa can be achieved by re-instating the reporting of ballast water discharges and undertaking inspections to assess compliance once the local legislation is promulgated. Participant 2 also advocates the use of ballast water sampling to assess compliance with the required standards as set out in the BWM Convention. Until such time as this is achieved, Participant 2 believes that the current policies are not sufficient to avoid the further introduction of invasive marine organisms into South African waters, and mentioned that ballast water is not the only means of introducing invasive species into South African waters.

#### **4.2.1.3 Participant 3**

The third expert, Terrence Mabuela from the Department of Transport, chose not to complete the questionnaire and instead replied as follows:

*“Unfortunately I may not be able to assist as much as you required due to the absence of the legislative framework. Although SA has ratified the (BWM) convention, it is yet to enter in to force. The Department (of Transport) has appointed a service provider to develop the Ballast Water Management Act and Regulations. As soon as the Bill has been signed into law by the President, after a parliamentary process, it would provide legislative requirements for our partners such as TNPA to commence with their work. At an operational level, you can still check with TNPA or SAMSA on what has been put in place on the BWM”* (Mabuela, 2012).

Mabuela’s statement further verifies the comments made by the other Participants regarding the development of the legislation, and again refers the author to the port authorities to determine the ballast water management plans which may be in place. The next section explores the port authority policies, to which the experts referred.

#### **4.3 Ports Authority**

The Ports Authority in South Africa is Transnet National Ports Authority (TNPA), who was unable to complete the questionnaire due to company policy which would have required the author to agree to a confidentiality agreement. In light of this, requests were made for the authority to then provide copies of the “Ballast Water Management Plans” (BWMP) for each port. These BWMP’s are not to be confused with the BWMP’s required to be on board every ship in terms of the IMO BWM Convention.

As discussed in the literature review, these plans are referred to in the Ports Rules and are said to be available either on the TNPA website or from the ports directly. The author was provided with procedures for the Port of Saldanha Bay, the Port of Ngqura and the Port of Durban by the TNPA National Environmental Manager. Other ports were said to have procedures, however, these were not available, and the existence of these documents could not be verified.

The details of the documents received for the above mentioned ports are as follows:

- Saldanha Bay

Title: Port of Saldanha Standard Operating Procedures for handling and management of Ballast Water  
Procedure Number: SOP 19  
Originator: SHE Officer  
Effective Date: 02 May 2007

- Ngqura

Title: Environmental Management Programme for the Operation of the Port of Ngqura  
Version: 1  
Date: 13 September 2009

- Durban

Title: Ballast Water Management  
Procedure number: SOP No. EM-14  
Amendment: 01  
Date: 25.05.09  
Approved by: Environmental Manager  
Authorised by: Port Manager

As TNPA were unable to contribute to the study by way of answering the questionnaire, the author was required to adjust the research methodology of the study to allow for the analysis of the BWMP's provided. This analysis was done to achieve the following two objectives:

1. To determine which parties are responsible for the implementation of the plans within the port; and

2. To identify key elements of the BWMP which the vessel would need to abide by. This was done in order to provide a framework which would allow for the evaluation of the awareness of the procedures amongst the third group of respondents, the ships agents.

#### 4.3.1 Responsibility for Implementation

The responsible parties specific to the implementation of the BWMP's are clearly identified in the procedures for the Port of Saldanha Bay and the Port of Durban. The responsible parties for the Port of Ngqura are defined within the document "Environmental Management Programme for the Operation of the Port of Ngqura" (2009), which covers all environmental policies within the port and not only ballast water. Table 4.3 provides a summary of the parties responsible.

Table 4.3 Responsibility for Implementation of Port BWMP

Saldanha Bay	Harbour Master; Vessel Traffic Control/Port Control; Pollution Control Officer
Ngqura	Port Authority; Port Users; Environmental Monitoring Committee
Durban	Harbour Master; Pollution Control Officer; Environmental Manager; Ships Agents

Source: Author compiled from information provided in Port BWMP

Table 4.3 shows that the TNPA personnel operating within the ports carry the responsibility for the implementation, however, in the Port of Ngqura the port users are also identified, and in the Port of Durban the BWMP is more specific by identifying the ships agents as responsible parties for implementing the BWMP's. This responsibility inferred on the ships agents is concerning when considered the study results of the level of awareness of these plans, which is discussed in section 4.4.

#### 4.3.2 Key points of the Ballast Water Management Plans

In order for a ship to discharge ballast water into the port, certain requirements need to be adhered to by the Master and/or his agent. These requirements are

detailed in the respective ports' Ballast Water Management Plan (BWMP). The BWMP's provided by the three different ports are largely similar, with a few minor adjustments, none of which make any significant difference to the key elements of the plans. For the purpose of this study and to assist in the analysis of the ships agents' awareness, the author has analysed the ballast water management plans for the Port of Saldanha Bay, Port of Ngqura and the Port of Durban and summarised the plans into the following eight key points.

1. No port has banned outright the discharge of ballast water. All ports will allow for the discharge of ballast water if the vessel has adhered to their requirements, however, TNPA for the Port of Ngqura does prefer that ships do not discharge ballast in port due to the high sensitivity of their ecosystem.
2. The Master of a ship must request permission in order to discharge ballast water in the port.
3. The permission request is done in the form of a Ballast Water Reporting Form. This form is a standard document formatted by the IMO and included as an Appendix to IMO Resolution A.868(20). The form is to be completed by the ship and includes all relevant data as to what quantity of ballast is on board, how long it has been on board, how it has been treated and whether or not it is to be discharged in the present port. This allows the port to determine the risk based on risk profiles of the areas from where the ballast comes.
4. The ports require that the ship has a BWMP on board. The BWMP is referred to in Annex Section B, Regulation B-1 of the IMO BWM Convention. It provides a standard operating procedure for the ship and its crew as to how ballast water and sediments are to be handled, with such procedures being in line with the IMO guidelines.
5. The minimum requirement of the port is that the ballast on board should have undergone the Ballast Water Exchange (BWE) method of treatment. This refers the method of exchanging the ballast on board in deep water during the voyage. The requirements for BWE are specified in Annex Section B, Regulation B-4 of the IMO BWM Convention.



6. Should the vessel have failed to comply with the requirements, the procedures stipulate that quarantine clearance will be withheld.
7. Durban port reserves the right to inspect the ballast water management records of the vessel.
8. Durban port reserves the right to collect ballast water samples from the ballast tanks on board.

The above key points have been summarised in Table 4.4. A tick under a port's name reflects that a specific key point has been made in the ports BWMP, a dash (-) means that the point was not mentioned and an exclamation mark indicates that whilst the point has been confirmed, there is a specific condition to that point.

Table 4.4 Summary of the key points of the Port BWMP's

Point	Port:	Saldanha	Ngqura	Durban
1	Ballast water discharge allowed	✓	!	✓
2	Ship to apply for permission to deballast	✓	✓	✓
3	Ballast Water Reporting Form to be completed	✓	✓	✓
4	Ballast Water Management Plan (BWMP)	✓	✓	✓
5	Ballast Water exchange to be conducted (BWE)	✓	✓	✓
6	Failure to comply - quarantine clearance withheld	✓	✓	✓
7	Reserve right to inspect records	-	-	✓
8	Reserve right to collect samples	-	-	✓

Source: Author compiled from information provided in Port BWMP

Six of the eight points mentioned in table 4.4 will be used in section 4.4.5 when analysing the results of the ships agents' responses to the question relating to the details of the BWMP's in place. As point 7 and 8 refer only to Durban, these key elements of the BWMP's will be excluded from the analysis conducted in section 4.4.5.

#### 4.4 Ships Agents

A ships agent is one who is appointed by a ship owner or a charterer to look after a ship on their behalf whilst she is in port, or at anchorage. The duties of the agent

include liaising with the port for a berth, co-ordinating all requirements for the vessel's port stay and arranging clearances for the ship. These clearances would include all formal clearances required for the vessel to enter port, including customs, port health, security and immigration (Brodie, 2006). These clearances would also include ballast water clearances and it is therefore imperative that the ships agents are aware of the requirements of the port relating to ballast water management.

It is for this reason that the ships agency members of SAASOA were approached to participate in this study, as their awareness would be an effective measure of determining whether port users are aware of the ballast water management policies within the Ports of South Africa. The ships agents were requested to answer a self-administered questionnaire to determine their knowledge and understanding of the ballast water procedures in place. The questionnaire was distributed to 55 ships agency members of SAASOA, of which 29 companies reverted, with an additional three responses received from branch offices. This equated to an overall return of 55%. The questionnaire is presented in Table 4.5 below.

Table 4.5 Ships Agents Questionnaire

1. How long have you been working as a ships agent?
2. For the multiple choice questions below, please choose the answer which you believe to be the most accurate by placing an "x" in the corresponding block.

a) Ballast water is:

- i. Dirty water that collects in the bottom of the hull
- ii. Water taken into tanks of the ship to provide stability to the ship
- iii. Fresh water

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

b) The environmental issue created by ballast water is:

- i. The introduction of alien marine organisms
- ii. Oil pollution
- iii. The change of salinity in the port water due to the introduction of fresh water into sea water

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

3. Please select which of the below ports you have worked in as a ships agent? Mark as many as apply.

- Richards Bay
- Durban
- East London
- Ngqura
- Port Elizabeth
- Mossel Bay
- Cape Town
- Saldanha Bay
- Other - please specify \_\_\_\_\_

4. Of the ports which you have selected in question 3, can you confirm which have ballast water procedures in place, if any?

- Richards Bay
- Durban
- East London
- Ngqura
- Port Elizabeth
- Mossel Bay
- Cape Town
- Saldanha Bay
- Other - please specify \_\_\_\_\_

5. If you have selected any port in question 4 above, please provide details of the ballast water management procedures in place in each port selected.

6. How would you rate the management of the ballast water control measures?

Very weak	Weak	Strong	Very Strong
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7. How would you rate the monitoring of the ballast water control measures?

Very weak	Weak	Strong	Very Strong
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8. How would you rate the enforcement of the ballast water control measures?

Very weak	Weak	Strong	Very Strong
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9. What should be done to improve the management of ballast water in the port?

10. Any other comments?

The responses received by the ships agents are analysed and discussed below.

#### 4.4.1 Question 1: Experience in Ships Agency

Question 1 was posed in order to determine the experience of the respondents, and was received in numerical measurements, which allowed for an analysis in terms of the mean, median, mode and range of this data set. These measures are used to provide a descriptive measurement of the respondents to the questionnaire (Keller, 2009). The mean is an indication of the average measure in the data set; the median is the centre measurement of the data set; the mode is the measurement repeated most often and the range provides the minimum and maximum measurement within the data set.

The data set consisted of measurements from the 32 respondents, the details of which were captured in an Excel spreadsheet for analysis. The measurement was the number of years' experience that each respondent has in ships agency. The mean, median, mode and range of this data set are:

Mean:	19.68 years
Median:	18.5 years
Mode:	30 years
Range:	2 years to 36 years

The mean result of 19.68 years indicates that the respondents to the questionnaire have been involved in the industry for many years and the assumption could be made that with their years of experience, the respondents will have extensive knowledge of port procedures and requirements. The median measurement result was 18.5 years. This is reflective to the mean, which would indicate a fairly equal spread of numbers, with no major outliers affecting the results.

The mode result was 30 years, which conflicts with the result of the median which indicated a close to normal distribution. The large difference between the mode and the mean measurement indicates a skewed distribution. This is also reflected in the range of 2 to 36 years.

This skewed distribution was considered, and the measurements recalculated by taking out the outliers, however, the results of the calculations remained similar and the conclusion can be made that the respondents to the questionnaire are well experienced ships agents, with an average of 19 years of experience in the field.

#### **4.4.2 Question 2: Understanding of Ballast Water**

The reason for this question was to determine if the respondents understood what ballast water was and what the environmental implications are. The results of the questionnaire proved that 100% of respondents knew what ballast water was, and only one of the 32 respondents was unfamiliar with the environmental impact that it has.

This high rate of understanding provides a good platform in that it indicates that all the respondents are familiar with the topic and should be able to answer the questions knowledgeably. The limitation that is acknowledged at this point is that it is possible that some of the respondents researched the topic to provide the correct answer.

#### **4.4.3 Question 3: Ports of Operation in South Africa**

In order to be able to make inferences on the awareness that the agents have of the ballast water management plans in the individual ports, it was necessary to determine which ports the respondents had experience in. Figure 4.1 is a graph representing the number of respondents who have experience in each of the eight commercial ports. It is to be noted that some agents may have experience in only one port, whilst others may have experience in a number of ports.

Figure 4.1 shows that the only a few respondents have experience in the Ports of Mossel Bay, Ngqura and East London which is reflective of the activity in those ports. The Port of Saldanha Bay and the Port of Richards Bay, which were identified by both Naicker and Participant 2 as having the largest quantity of ballast

water discharged, is well represented in the study with 15 respondents having had experience in the Port of Saldanha Bay and 13 in the Port of Richards Bay. The Port of Durban, the busiest of all the commercial ports in South Africa, reflects the highest number of respondents. This information is used to calculate percentages for question 4.

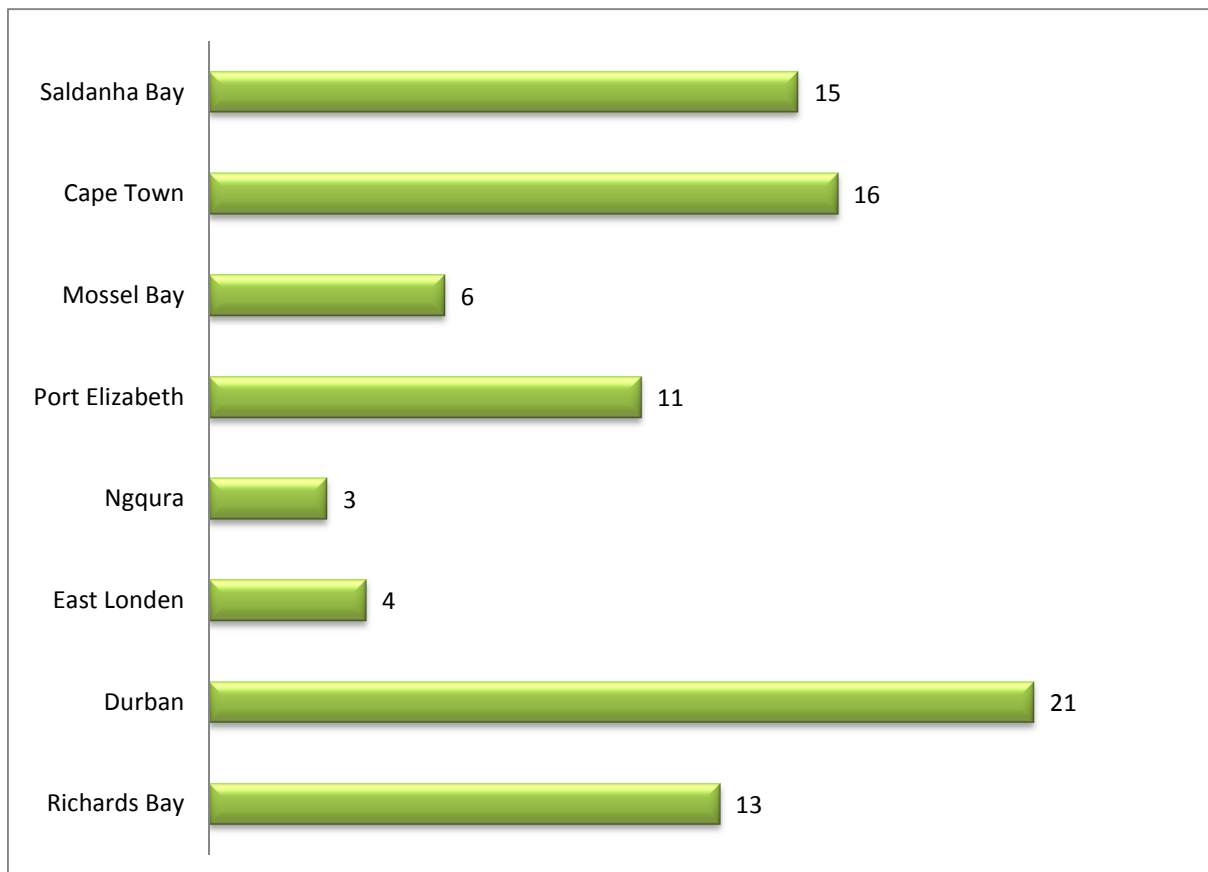


Figure 4.1 Representation of the number of respondents per port

Figure 4.2 indicates the number of ports that the respondents have experience in. The information shown is provided to further illustrate the experience that the respondents have. Twenty-two of the 32 respondents have experience in more than one port, with one respondent having experience in 7 of the 8 commercial Ports in South Africa. No respondent has experience in every port.

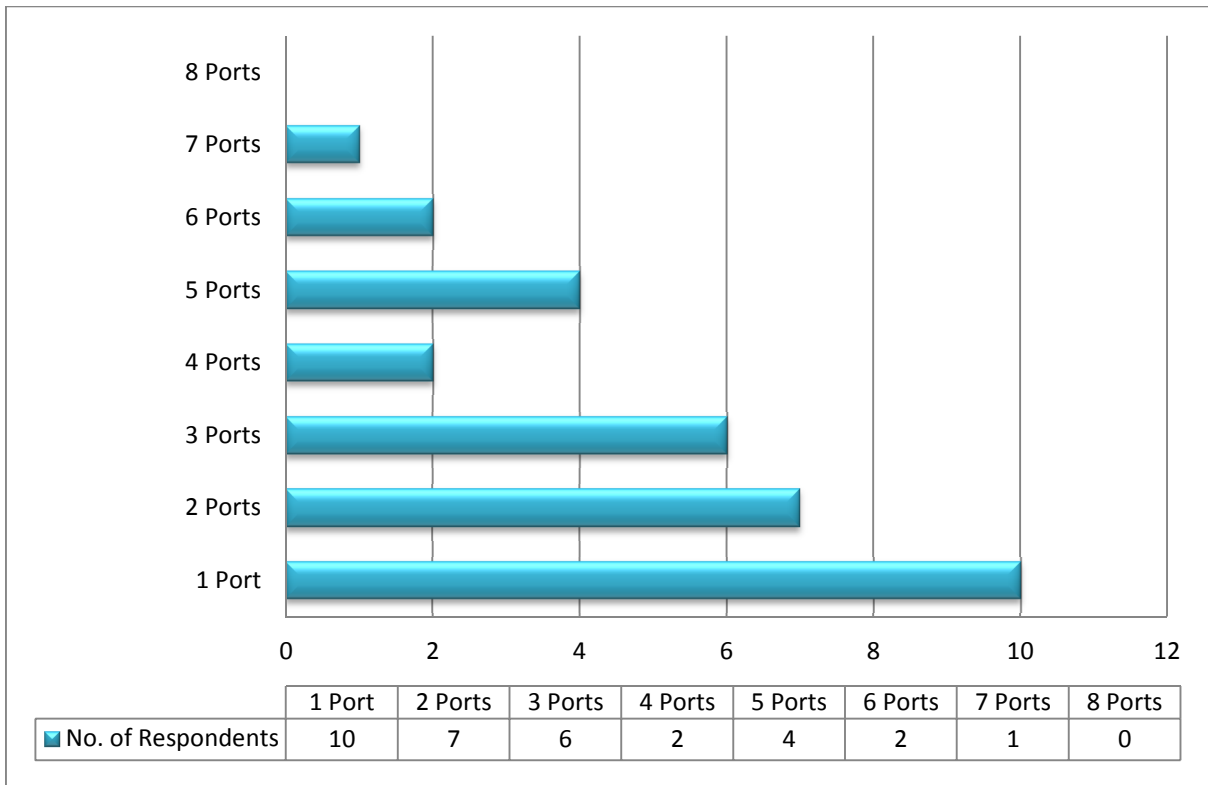


Figure 4.2 The number of respondents with experience in multiple ports

#### 4.4.4 Question 4: Knowledge of which Ports have Ballast Water Management Plans

The respondents were asked to identify which of the ports, in which they have experience, had ballast water management plans in place. Of the 32 respondents, 5 indicated no knowledge of ballast water management plans at all. This equates to 15.6% of the respondents, who are experienced ships agents, who have no knowledge of the ports Ballast Water Management Plans. Further to this, respondents who had experience in multiple ports indicated that they were aware of ballast water management plans in some ports, but not in others. For example, referring to Appendix 1 of the study which is a full summary of the respondents' responses, Respondent 1 indicates knowledge of ballast water management in the Port of Saldanha Bay, but no knowledge of such in the Port of Durban or the Port of Cape Town.

Figure 4.3 reflects the percentage of agents who are aware of ballast water procedures in the ports in which they have experience. The results are reflected per port.

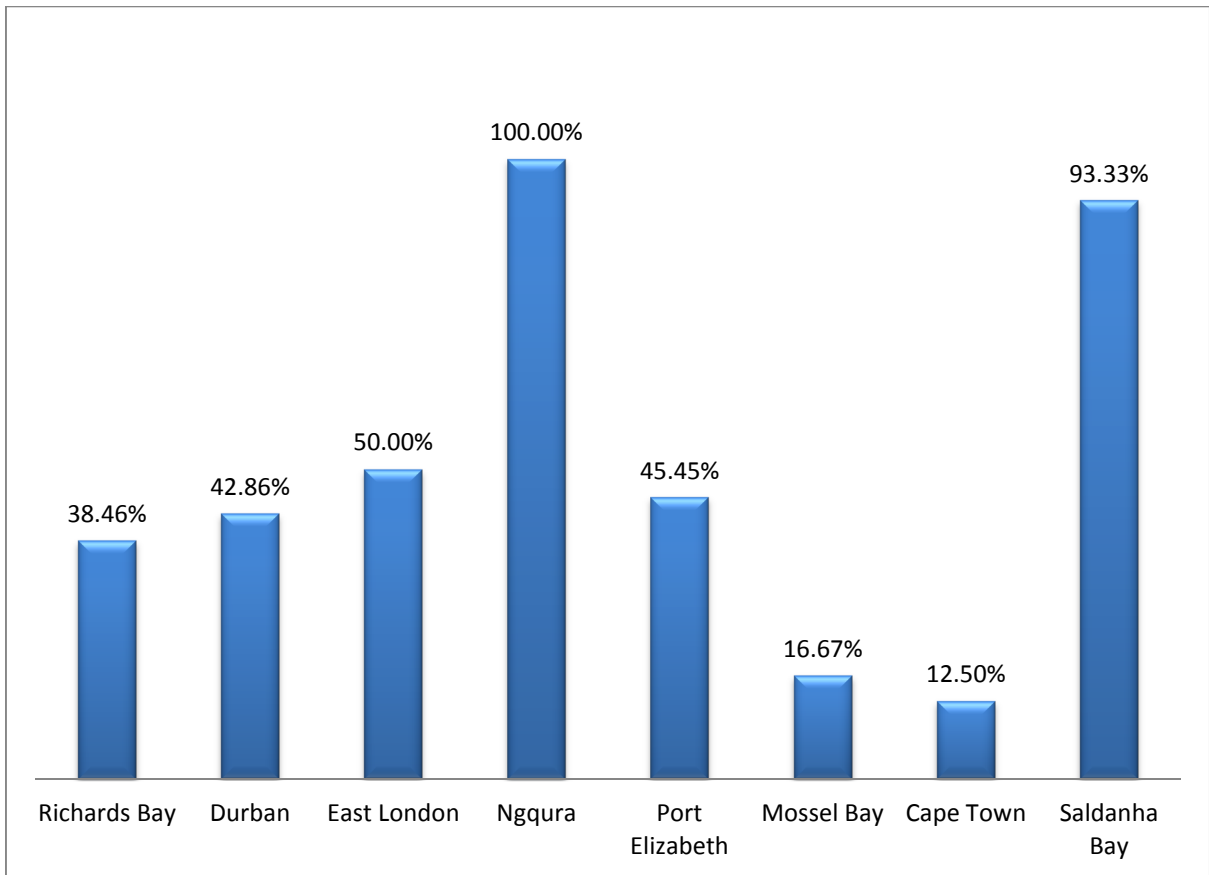


Figure 4.3 The percentage of respondents who are aware of ballast water procedures in the different ports

Two ports in South Africa show significant strengths over the other ports in terms of ships agents' knowledge of the existence of ballast water procedures. These are the Port of Ngqura and the Port of Saldanha Bay, with all the respondents that have experience in Ngqura knowing about the plans, and 93.33% of the agents who have experience in Saldanha Bay being aware of the plans.

Both ports are environmentally sensitive areas with official TNPA BWMP's (see section 4.3) and it is assumed that these are the reasons for the greater awareness. Ballast water management was also highlighted in Saldanha Bay during the GloBallast programme, and agents are aware of the active involvement of the pollution officer who agents advise attends vessels on arrival to discuss the ports ballast water requirements with the Master.

Ngqura, on the other hand, is in an environmentally sensitive zone and the only port in South Africa which required the permission of the DEAT in order to be constructed. Such permission was granted subject to certain minimum



environmental requirements being met (TNPA, 2009). The Ngqura Operational Environmental Plan was published in September 2009 and includes the port's ballast water management requirements. It is of interest to point out that no ships agent made mention of this in their questionnaire replies, indicating a possible lack of awareness of this trading condition of the port.

The other Ports of South Africa show a 50% awareness or below, with the lowest being in Cape Town where only 12.5% of respondents mentioned knowledge of the requirements. The Port of Richards Bay, known to have the highest volume of ballast water discharged, reflects an awareness of only 38.46%. It can therefore be assumed that the 50% or more of the ships agencies within these ports are not correctly informing the Masters with regards to ballast water requirements and no permission is being sought from the port authorities to discharge ballast, resulting in potentially high risk ballast being discharged with no control measures.

The full table detailing this information is attached as appendix one.

#### **4.4.5 Question 5: Knowledge of the details of the ballast water management plans in place**

In order for the ballast water management plans to be effective, it is required that ships agents are aware of the details of these plans in order to correctly guide the Master. The respondents were therefore asked to provide details of the ballast water management plans in the ports which they had identified in question 4. These responses were provided in qualitative format. In order to analyse the replies, the author used six of the eight key points identified in section 4.3.2 to draw up a matrix. Each answer was then analysed by ticking off a key point if mentioned in the respondents reply. The number of respondents who referred to a specific point was then calculated in order to provide a descriptive illustration of the knowledge that the respondents had on the BWMP's. This method of analysis of the qualitative information provided a good indication as to the awareness and understanding that the ships agents have of the key points of the ballast water management plans in order for them to provide the correct information to the Master of the ship.

The six key points extracted from the TNPA BWMP's and summarised in section 4.3.2, against which the respondent's replies were graded were reduced to the following key words:

- Discharge allowed;
- Permission (required to deballast);
- Ballast Water Reporting Form (BWRF);
- Ballast Water Management Plan (BWMP);
- Ballast Water Exchange (BWE);
- Quarantine clearance withheld.

Figure 4.4 illustrates the percentage of respondents who mentioned the key points when explaining the procedures in place.

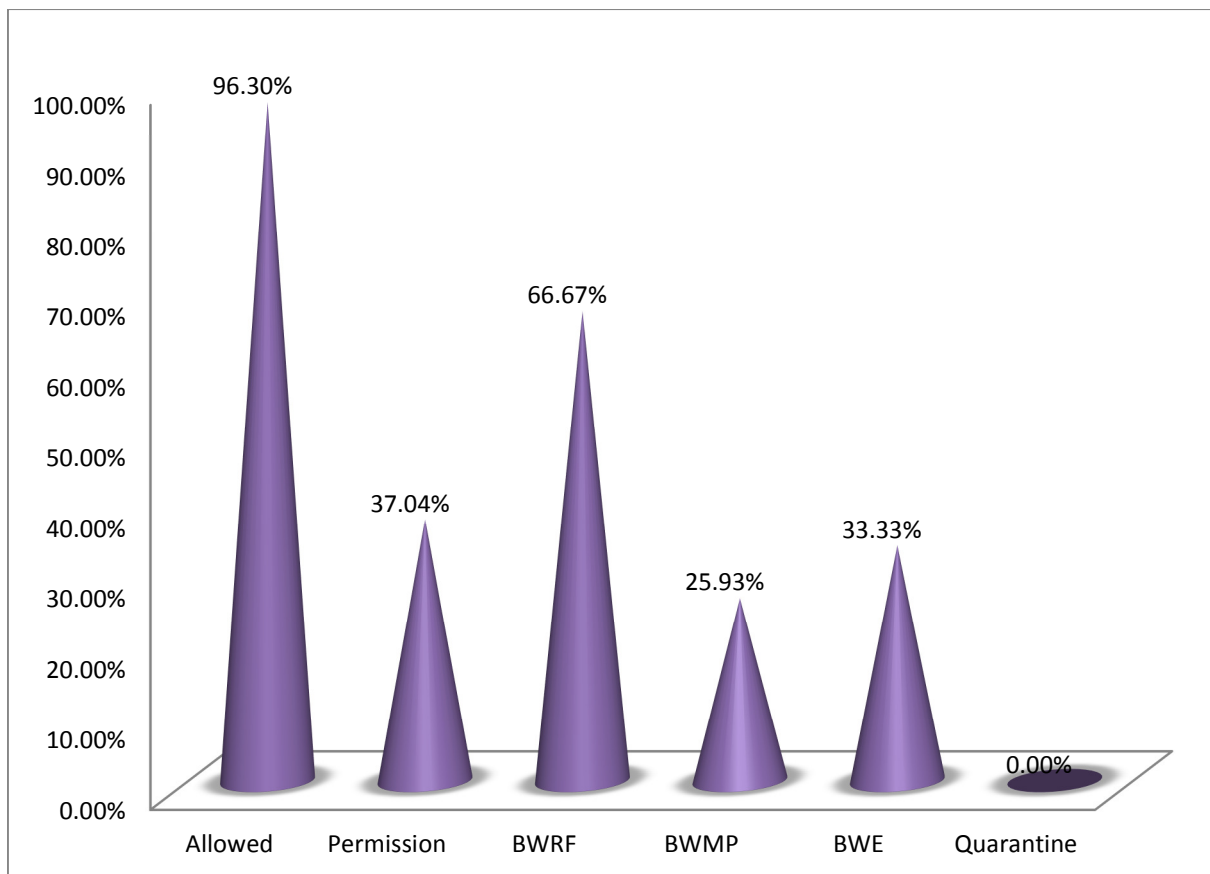


Figure 4.4 The percentage of respondents with knowledge of the key points of the ballast water management plans

The results reflected in Figure 4.4 show the following.

- a) 96.3% of the respondents indicated that the vessels were permitted to discharge ballast water. One respondent advised that the practise was banned in terms of the Ports Rules, which is an incorrect statement.
- b) 37.04% of the respondents were aware that the vessel was required to request permission to deballast.
- c) 66.67 % of the respondents mentioned the Ballast Water Reporting Form.
- d) 25.93% mentioned that the vessel had to have a Ballast Water Management Plan on board.
- e) 33.33% of the respondents were aware that the vessel is required to conduct ballast water exchange.
- f) No agents made mention of the fact that the vessel would have quarantine clearance withheld, nor that the agency would be preventing from conducting work in the port if the procedures were not adhered to.

Of the respondents who indicated that they were aware that the ports had ballast water management plans, 25% reported having no idea as to what those plans involved.

The above mentioned figures show further reason for concern as to the awareness of the port BWMP's because question 4's results showed that in all but two of the Ports in South Africa, there was a 50% or less awareness of the existence of ballast water management plans, and of those ships agents that are aware, only 37.04% knew that permission must be granted prior to the discharge of ballast water from the ship.

An encouraging 66.67% of the respondents were aware of the Ballast Water Reporting Form. Ships agents in Richards Bay advised that whilst these forms were completed by the Masters on arrival, the agents had been advised by the port authorities to retain them on the ships files unless asked for same by the Environmental Department. In Port Elizabeth, however, the ships agents advised that the marine pilot who boarded the vessel to bring her into port usually handed the document to the Master and carried the completed document off the ship once berthed. No agents reported any feedback from the port after submission of the document.

The failure of the port to implement the procedure as mandatory is more than likely the reason that no agents mentioned the repercussions in the event of failure to comply.

#### 4.4.6 Question 6, 7 and 8: Ships Agents Perception of the Effectiveness of the Authorities in Managing, Monitoring and Enforcing the Ballast Water Control Measures

Question 6, 7 and 8 were posed in order to determine the respondents' perceptions as to the strength of the management, monitoring and enforcement of the ballast water control measures, the results of which are reflected in Figure 4.5.

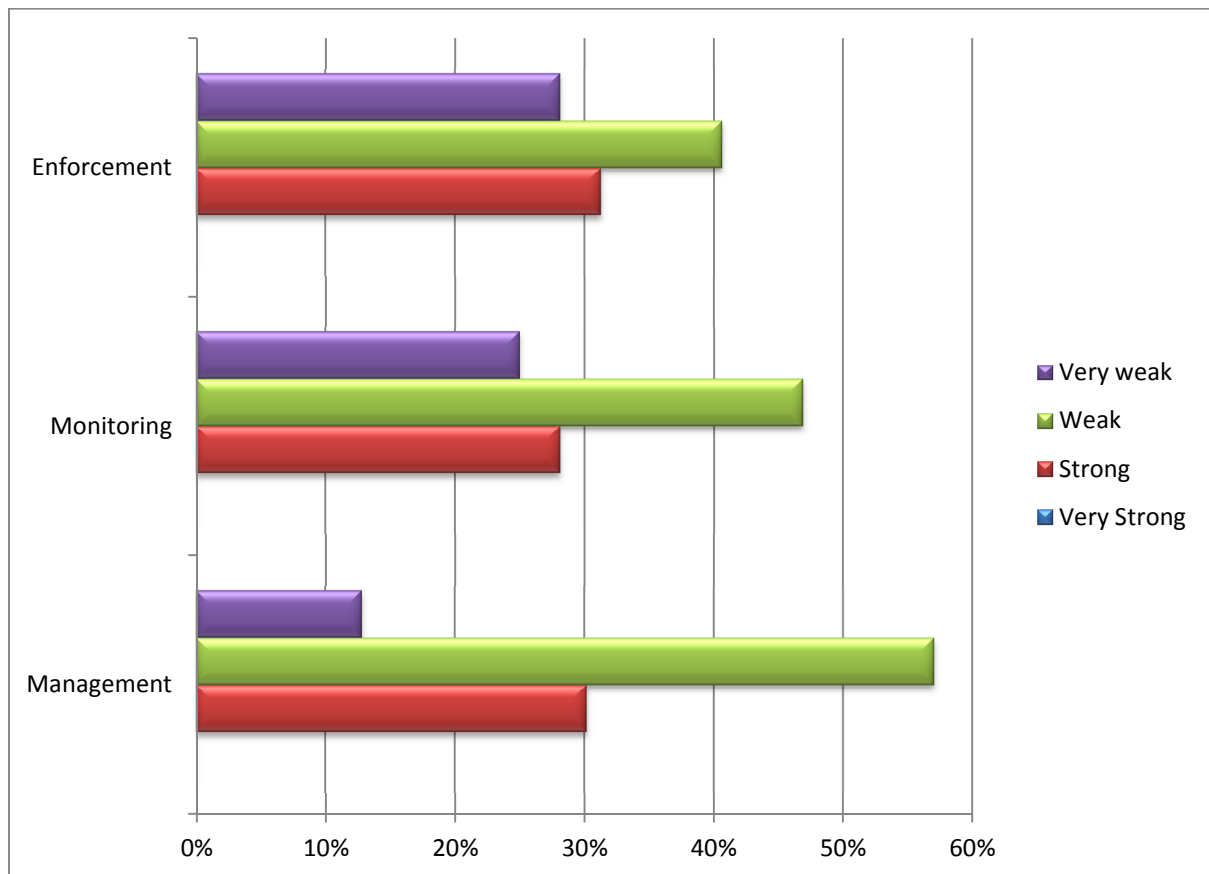


Figure 4.5 The perceptions on the effectiveness of the management, monitoring and enforcement of the BW plans by the authorities

Figure 4.5 shows that on all aspects, the ships agent's general perception of the management, monitoring and enforcing of the ballast water management plans is typically weak. There is, however, a 30% perception that it is strong, which may be

as a reflection on the environmentally sensitive ports of Saldanha Bay and Ngqura.

#### **4.4.7 Question 9 and 10: Additional Comments and Suggestions**

Question 9 and 10 were open ended qualitative questions, posed to get insight from the ships agents as to what should be done and any other comments which they would want to add. Trends in responses were identified which are included below, as well as any relevant and interesting viewpoints.

- a) Many agents believed that the ballast water control measures were purely a paper exercise and that the information contained therein was not checked.
- b) No agent reported any issue with obtaining permission to discharge ballast water, or any questions from the TNPA office to which the ballast water reporting form was submitted.
- c) Respondent 12 suggested that all vessels should be inspected; and not just random vessels. Based on this comment, the author asked the respondent if any of his vessels had ever been inspected, to which he answered that he was not aware of any checks and presumed that the authorities boarded without notifying the agents.
- d) Respondent 15 commented that there was no understanding at “grass roots” level and people needed to be educated.
- e) Some respondents reported absolutely no knowledge of ballast water management plans, with respondent 17 advising that in his 20 years of being in ships agency in Cape Town, he had never been asked by the port for any ballast water information.
- f) The general consensus amongst ships agents was that action needed to be taken by the authorities. SAMSA, TNPA and the Department of Health were suggested as the responsible parties to take this forward.

A full summary of the responses received are detailed in appendix two.

#### **4.4.8 Limitations of the Ships Agents Study**

The potential for bias in these results is acknowledged, with ships agents fearing that their lack of knowledge may be exposed. This is evident in the number of agents who, when approached to participate in the research, confirmed that they would participate but failed to reply. When follow-ups were conducted, the agents advised that the topic did not affect them; or that they were “too busy to be able to provide the right answers”, indicating perhaps that they were not familiar with the topic and would need to conduct some research on the matter before replying.

In the same manner, some respondents who did reply provided some responses that one could consider to be “outliers”. As an example, respondent 24 is the only agent in Cape Town reported being aware of ballast water procedures in place, referring to the Ports Rules which specifically ban the discharge of ballast into the port and believes that the management, monitoring and enforcement of the ballast water control measures to be Strong. As mentioned in the literature review, the Ports Rules does mention that ballast water cannot be discharged, however, the respondent has failed to read further in the same section which advises that discharge can be done, subject to the approval of the Harbour Master.

Respondent 18, a Durban agent who confirms that there is ballast water management control in the port, indicates that the method of control is that “all SA ports have ballast water”. This reply would indicate to the author that the respondent is not familiar with the topic and had possibly briefly researched the topic to answer the questionnaire, without really understanding it.

The author intentionally did not lead the respondents with their replies to question 5 in order to determine their real understanding of the policies. It is acknowledged that it is therefore possible that the agents may have omitted key facts that they may possibly be aware of.

Despite the bias possibilities, the results still show that the vast majority of ships agents in South Africa are unaware of the requirements for the discharge of ballast water into the ports, and that the management, monitoring and enforcement is considered to be weak.

## **4.5 Development of the Draft Bill**

An outcome of the research conducted with the experts and TNPA was that all made reference to current activities by the DOT to address the shortcomings of ballast water management in the Ports of South Africa. The DOT had engaged the services of the International Ocean Institute to develop a draft Ballast Water Management Bill and Regulations, in association with national stakeholders. The team first met on the 24<sup>th</sup> July 2012, and are in the process of developing legislation and regulations which specifically apply to ballast water.

As a result of the author's enquiries regarding ballast water management and the progress made thereof, the author was invited to attend the Ballast Water Stakeholder meeting held on the 2<sup>nd</sup> November 2012 in Cape Town. The purpose of the meeting was to review the draft Ballast Water Management Bill - 2012 which had been circulated amongst stakeholders and to discuss the drafting of a Memorandum of Understanding (MOU) between the stakeholders.

The draft Ballast Water Management Bill – 2012 is modelled largely on the IMO BWM Convention, with a few adjustments to suit the local conditions. The main requirements of the BWM Convention, such as the requirement for all ships to have ballast water management plans on board, to conduct ballast water exchange at sea, and to complete the ballast water reporting form, are an integral part of the bill. According to the draft bill, the ballast water exchange method of managing ballast will be accepted until 1 January 2016, at which stage only ballast treated with an approved ballast water treatment system will be given permission to discharge.

The aim is to have the Draft Ballast Water Management Bill finalised by the end of November 2012, and to thereafter proceed with the presentation of same to Parliament for acceptance.

### **4.5.1 Responsible Parties**

The draft Ballast Water Management Act appoints the Department of Transport (DOT) as the responsible party for the Act and the DOT is required to report to Government on matters pertaining to the Act, however, SAMSA is the authority

nominated by the draft Act to control and administer the Act. SAMSA is also provided with the necessary power to appoint and integrate other authorities in order to administer the Act effectively.

From the discussions held at the meeting on the 2<sup>nd</sup> November 2012, it would appear that the clarity regarding the roles and responsibilities will be clarified in the Memorandum of Understanding which is still to be drafted. SAMSA and TNPA have been identified as the two main authorities with the ability to conduct the duties of Port State Control, which includes the development, implementation and enforcement of the Port Ballast Water Management Plans. The flag state responsibilities which encompass the on board technology and systems will be the responsibility of SAMSA.

An authority which the author did not previously identify as having a strong involvement in the management of ballast water is the Department of Environmental Affairs and Tourism (DEAT). The DEAT, through the mechanism of the National Environmental Management: Biodiversity Act No. 10 of 2004 (NEMBA), has developed the South African National Biodiversity Institute (SANBI). The mandate of SANBI is detailed in Section 11 of NEMBA (Republic of South Africa, 2004). Section 11(1)(a)(iii) requires that SANBI monitors and reports back to the Minister on the status of invasive species (this incorporates all species and not only marine). Section 11(1)(c) requires SANBI to act as an advisory to state departments and other stakeholders on all matters related to biodiversity. Section 11 continues with mandating SANBI to conduct research on biodiversity and communicate this information, as well as requiring SANBI to take an active role in programmes intended to prevent, control or eradicate any invasive species. SANBI is required to advise the Minister of legislation and regulations dealing with biodiversity.

In terms of this mandate, SANBI will therefore be required to take an active role in Ballast Water Management within South Africa, and is therefore likely to form part of the MOU under the auspices of the DEAT. The areas of responsibility for SANBI will then most likely fall under the risk assessments, contingency planning, as well as research and development into new technologies and issues pertaining to biodiversity which would have an effect on the application of the Act.



## **4.6 A Summary of Findings from the Research Conducted**

The result of the research undertaken is presented below, in the form of a summary on the finding from each group of respondents.

### **4.6.1 Summary of Findings from the Expert Participants**

The expert participants provided insight in terms of the legislation to be implemented as opposed to current ballast water management policies in existence. The participants did refer to BWMP's implemented by the ports themselves, however, they were unable to provide any details on these plans and referred the author to TNPA.

The need for ballast water management was highlighted by the experts who provided information relating to the quantity of ballast water discharged in the ports. This information was collected over different periods, one set of information between 1991 and 1996 and the other between 2000 and 2004. Both sets of information revealed that the quantities of ballast water discharged into the Port of Saldanha Bay and the Port of Richards Bay were in the millions of tonnes annually, with Richards Bay having twice the discharge quantity than that of Saldanha Bay. Updated figures could not be provided.

In terms of the development of the legislation specific to ballast water management in South Africa, Participant 1 identified the DOT as the responsible party for the overall implementation of ballast water management within South Africa. Participant 2 identified that the responsible parties for the actual monitoring and enforcement are likely to be TNPA and SAMSA.

### **4.6.2 Summary of Information provided by the Port Authorities**

The information obtained from the Port Authorities was limited, in that no response was received from the questionnaires, however, the Ballast Water Management Plans were able to provide some information relating to the management of ballast water and the status thereof in South Africa. TNPA were able to provide the plans for three of the eight commercial ports in South Africa.

These plans were analysed in order to provide answers to the objectives of the study. One of the objectives is to determine which party is responsible for the monitoring and enforcement of the ballast water management in the Ports of South Africa. Whilst the Port Ballast Water Management plans do not specify this, they do refer to the parties responsible for the implementation of the plans. These were identified to be the port authorities (Harbour Master / Environmental Departments/ Pollution control office) and the port users, which includes ships agents. The inclusion of the ships agents and port users as responsible parties for the implementation of these plans is significant to this study as it would require that these parties are aware of their responsibilities.

The analysis of the plans included the identification of key points and requirements which the Captain of the vessel would need to conform to in order to obtain permission to discharge their ballast in port. These requirements included the method in which the ballast must be treated on board, the requirements relating to the management of ballast water by the ship, and the manner in which the Master should apply for permission to the Port in order to deballast. Non-conformance with these requirements would result in the ship being denied quarantine clearance, resulting in the ship not being able to enter the port.

The responsibility for informing the Master of these requirements before the ship arrived at the port would fall upon the ships agent. Ship owners rely heavily on ships agents to guide the Master of the ship as to the local regulations, and it is therefore imperative that the ships agents are familiar with the requirements of the port. It could also have an effect as to the continuing operation of their business as, in terms of the Port Ballast water plans for the Ports of Saldanha Bay and Durban, the ships agents could be prevented from conducting work in the port in the event that the ballast water management plans are not adhered to. For this reason, the above key points were used to analyse the third group of respondents, the ships agents.

### 4.6.3 Summary of Findings from the Ships Agents

The research conducted amongst the ships agents provided some interesting statistics in terms of awareness of the agents of ballast water management plans in the ports.

A total of 32 respondents submitted questionnaires. A summary of the findings shows the following:

- The mean years of experience of the respondents was 19.68, indicating that the respondents had a high level of industry expertise
- All respondents understood what ballast water was
- All but one respondent understood the environmental issues related to ballast water
- All ports were represented by the respondents, with the busier ports having a larger number of respondents
- 100 % of respondents from Ngqura and 93.33% of respondents from Saldanha Bay were aware of the existence of ballast water management plans
- Ports reflecting an awareness of between 42% and 50% were as follows:
  - East London - 50%
  - Port Elizabeth – 45.45%
  - Durban – 42.86%
- Richards Bay, the port with the highest discharge of ballast water in South Africa, returned a 38.46% awareness result
- Mossel Bay returned a 16.67% awareness and Cape Town the lowest result of 12.5%
- Of the 27 respondents who were aware of ballast water procedures within their ports:
  - The majority were aware of the Ballast Water Reporting Form, however, only 37.04% were aware that the Master had to apply for permission prior to discharging ballast.

- The implications for failure to adhere to the port ballast water management plans was unknown to all respondents
- The management; monitoring and enforcement of ballast water was typically ranked by respondents as “weak”.
- No respondents have had any experience with being denied permission to discharge ballast, nor had a ship been detained for deballasting without permission
- A few respondents mentioned that the procedure is purely a paper exercise and that the authorities need to become more involved and implement stronger regulations.

The findings from the research undertaken will be discussed further in Chapter Five in conjunction with the information obtained from the literature.

## CHAPTER FIVE

### DISCUSSION

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#### **5.1 Introduction**

This chapter seeks to consider the findings from the primary research combined with information obtained from the literature review. The discussion will commence with the consideration as to whether or not the need for ballast water management in South Africa is valid, or if this is just hype on an issue which would be consuming the scarce resources of the authorities which could be better used elsewhere.

The discussion will then continue to address each of the objectives in the study, by discussing the issue and making conclusions based on the research undertaken.

#### **5.2 Does South Africa need Ballast Water Management?**

The negative environmental effect of ballast water was identified in the 1980s and progressively steps have been taken by the international community to implement control measures to limit this damage, however, the final adoption of the IMO BWM Convention has been significantly delayed. Until such time as all the issues have been resolved, individual countries have been requested to implement national ballast water regulations in order to minimise the potential risk to marine ecosystems.

The exposure that South Africa faces has been confirmed through both the literature review and the primary research. Awad et al. (2004) provided figures from the GloBallast programme for the ballast water quantity discharged in Saldanha Bay over the period January 1999 to June 2002, which amounted to an average of 23'000 tonnes per day, equivalent to 8.4 million tonnes per annum. Naicker provided figures of 9 million tonnes for Saldanha Bay and 18 million tonnes for Richards Bay (period not defined). Participant 2 was able to share quantities collected for the period from 1991 to 1996 which indicated an average of just below 7 million tonnes for Saldanha Bay and 13.4 million tonnes for Richards

Bay. Other ports within South Africa have a greatly reduced quantity of ballast water discharged according to the information provided by Participant 2.

This lower discharge of ballast water had not provided an effective barrier against invasions, as was proven during research conducted on the South African marine ecosystem which indicated marine invasions in all ports, despite the differences in the quantity of ballast water discharged (Mead et al., 2011b). The recommendation made by the GloBallast programme risk assessment to implement a mandatory ballast water management system in all South African ports is therefore considered to be fair and reasonable, in order to protect our environment and economy.

### **5.3 Determining the Ballast Water Policies that have been implemented in South Africa**

As the study progressed, it became clear that this particular objective covered two areas, namely; to define the responsible party for the implementation of the ballast water policies, and to determine what those ballast water policies are. For this reason, they are discussed separately.

#### **5.3.1 Responsibility for Implementation**

The authority responsible for the implementation of ballast water management plans in the port is not clear. Internationally, the responsible authority varies and includes authorities such as the Coast Guard, Port Authorities, Environmental Authorities and Maritime Authorities. Participant 1, Captain Naicker suggests that the responsibility must be that of the DOT, who is the IMO South African representative and attends the IMO and MEPC meetings. The National Ports Act appoints the Port Authority as the responsible party for environmental management within the port, however, SAMSA, appointed by the DOT, is the appointed authority to oversee all maritime pollution issues. Another complication is that the DOT, in its draft Maritime Policy of 2008, has also appointed the DEAT to be the authority responsible due to a lack of resources however the DOT does not deny the ultimate responsibility.

The identification as to which authority is responsible for the implementation of ballast water management appears to have been settled by the recent development of the draft Ballast Water Management Act and regulations. The DOT has taken a lead agency role, and will appoint the responsible parties through the medium of a Memorandum of Understanding between the different authorities.

### **5.3.2 Ballast Water Management Policies**

TNPA have taken steps to implement operational controls and includes the objective of minimising the transfer number of unwanted organisms and pathogens within the port area as one of its seven objectives in the TNPA “Integrated SHE Management system review” (TNPA, 2007). The Ports Rules of 2009 make reference to each port having a BWMP and the expert participants make reference to these port plans as well.

The existence of these plans for all ports could not, however, be verified during the course of this study and only plans for the Port of Durban, the Port of Ngqura and the Port of Saldanha Bay were provided. Despite these plans being considered to be public documents, the only plan which was available publically was that for the Port of Saldanha Bay.

According to the plans made available, the personnel from within the port are responsible for the implementation of the plans. An interesting finding in the Port of Durban and the Port of Ngqura BWMP’s, is that ships agents and port users are also nominated as being responsible for the implementation of these plans. This is a reason for concern as the research has indicated that in most ports the agents are unaware of these requirements.

### **5.4 Awareness of the Ballast Water Management Plans in Place**

The port BWMP’s provided reflected a need for the port users, specifically the ships agents, to be aware of the requirements in place in order for the vessels calling in the ports to be compliant. Further to this, two of the three BWMP’s provided nominated the ships agents and port users as responsible parties for the implementation of the plans.

The study undertook research amongst the ships agents in South Africa to determine whether or not they were aware of the BWMP's in place, and what the requirements of the BWMP's were. Overall, the research returned results indicating a poor level of awareness and understanding, with 15.6% of the respondents having no knowledge at all of the BWMP's in place. The awareness of the BWMP's in the eco-sensitive ports of Ngqura and Saldanha Bay are impressive, with 100% awareness in Ngqura and 93.33% in Saldanha Bay which is most likely a result of the heightened awareness of environmental sensitivities in those areas, however, in other ports awareness is poor with a 50% and lower awareness.

Indications of the understanding of these plans returned equally concerning results, with only 37.04% of the agents aware that the Master was required to obtain permission prior to discharging his ballast. It can therefore be assumed that large amounts of ballast water are being discharged into the ports with no control.

The results of the research show therefore that the awareness of the ballast water management plans is very low amongst the ships agents in all ports except for the Port of Ngqura and the Port of Saldanha Bay. These ships agents are responsible for guiding the Master of the vessel, and play a role in the implementation of these plans.

## **5.5 Authorities Responsible for Monitoring and Enforcement**

The identification of the parties responsible for the monitoring and enforcement of the BWMP's proved to be complicated and could not be adequately answered in this study.

In terms of Article 9 of the IMO BWM Convention, the coastal state must appoint an officer to attend on board a vessel to verify compliance with the BWM Convention, and must be empowered to inspect the ballast water records and take samples of the ballast water. The article continues with guidelines as to actions to be taken in the event that the vessel fails these inspections (IMO, 2009). Boelens (2012), however, criticised the IMO in 2012 for failing to provide effective compliance, monitoring and enforcement guidelines. This would therefore indicate two separate issues. Which authority is the coastal state to appoint and what



guidelines are to be developed to ensure effective compliance, monitoring and enforcement?

The view of Participant 2 is that this authority is to be split between TNPA and SAMSA. TNPA would be required to monitor the discharges, and SAMSA would conduct the on board inspections. This would be in accordance with the responsibilities imposed on the two organisations through the legislature referred to in section 5.6, as the act of monitoring the discharge would amount to controlling the pollution within the port environment, whereas the controls on board the ship would be more of an overall maritime environmental issue.

The current monitoring of the port BWMP's is reported to be typically weak by the ships agents. Ships agents in Richards Bay, the port with the highest volume of ballast water discharge in South Africa, report that they are no longer required to submit the BWRf to the port, but have been told to keep it with their vessel port call records in the event that the TNPA environmental department calls for it. No respondents have ever been asked for this document.

Respondents from Port Elizabeth advised that the collection of the completed BWRf is done by the marine pilot when bringing the vessel into port. If the document has not been completed, it is the duty of the ships agent to then take the document through to the port authorities. However, it is questionable if this is done due to the result of only 45.45% of ships agents in Port Elizabeth being aware of the BWMP of the port.

The completion of the BWRf is therefore considered to be a paper exercise, as the ports lack the knowledge and expertise to analyse the information provided by the ships and no effective monitoring or enforcement is being undertaken. This is being addressed by the DOT in the development of legislation and regulations.

## **5.6 Draft Ballast Water Management Bill – 2012**

The lack of legislation dealing specifically with ballast water management has been identified frequently through the literature. TNPA (2003) attributed their failure to collect BWRf's due to no legislation being available to enforce the

requirement. Boelens (2012) also referred to the lack of legislation as an issue in the successful implementation of BWMP.

Internationally, countries have implemented legislation to address ballast water management, many well before the IMO BWM Convention of 2004 was adopted. The results of the success of this legislation was not readily available, however, Canadian authorities have reported excellent results with the monitoring of ballast water, as each vessel is inspected and enforcement is stringent.

Whilst South Africa has many laws which make reference to the need to protect the environment (see section 2.7 for details on these laws), there is no law which deals specifically with ballast water management. The need to prioritize this legislation was questioned by the Minister of the DOT in 2008 who commented that environmental issues are not as high priority in developing countries as they are in developed countries. However, the Minister did concede that as this issue carried international consequences it would be considered (DOT, 2008).

In July 2012 the DOT formed a team to draft the Ballast Water legislation. This was mentioned by Naicker, Participant 2 and TNPA. This draft legislation is expected to be completed by the end of November 2012. The draft is prepared on the guidelines provided by the IMO BWM Convention, with adjustments to suit the local conditions. Whilst the final appointment of responsible parties for implementation, monitoring and enforcement has not been finalised, the parties will collaborate through the medium of a Memorandum of Understanding to define the roles each authority will play. It would appear that these parties will include SAMSA, as the authority responsible for administering the bill, supported by TNPA, DEAT incorporating SANBI and potentially the Department of Health.

## **5.7 Conclusion**

The purpose of this chapter was to set out the findings of the literature and the primary research in the form of a discussion. This allowed for the consideration of the findings from all viewpoints to be considered as one, to identify common trends and discrepancies. The conclusions and recommendations made as a result of this discussion are provided in chapter six.

## CHAPTER SIX

### CONCLUSION AND RECOMMENDATIONS

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#### **6.1 Introduction**

This purpose of this sixth chapter is to provide the conclusions and recommendations obtained from this study and to provide recommendations for future studies.

The purpose of this study was to determine the status of ballast water management in the Ports of South Africa. Research was conducted amongst ballast water experts, the port authorities and the ships agents operating within the South Africa ports. The data collected was analysed and findings discussed in order to provide insight into the status of ballast water management in South African ports.

#### **6.2 Summary of the Findings**

The study contributed to the objectives as follows:

##### **6.2.1 Objective One**

The first objective was to determine what ballast water management policies have been implemented in the Ports of South Africa. The study revealed that no legislation or regulations exist to manage ballast water in the Ports of South Africa, except for the operational BWMP's implemented by TNPA. The effectiveness of these BWMP's is questioned by the lack of public and industry access to these documents, as well as the apparent lack of access to these documents by TNPA Environmental Department. Of the eight commercial ports, only three had BWMP's which could be verified.

Recent developments have seen the drafting of a Ballast Water Management Bill which is expected to be complete by the end of November 2012. This legislation

will be accompanied by National Ballast Water Regulations which will provide clear policies for ballast water management in the Ports of South Africa.

### **6.2.2 Objective Two**

The second objective was to determine the level of awareness of the ballast water management policies in place by the relevant port users. Without awareness of the requirements, implementation could not be effective. Of further concern was that two of these BWMP's referred to ships agents as being a responsible party for the implementation of the plans.

The study amongst the experienced ships agents found that the respondents were familiar with the concept of ballast water and the negative effects that it has on the environment. Respondents with experience in the eco-sensitive ports of Ngqura and Saldanha Bay returned very strong awareness results of 100% and 93.33% respectively. The levels of awareness in the other six commercial ports was, however, very weak with results of 50% and less.

Interestingly, the BWMP's supplied by TNPA were for the ports of Durban, Saldanha Bay and Ngqura. Of those three ports, two presented with the very high awareness levels which would indicate good implementation of the policies. Durban, unfortunately, did not provide good results with a low 42.86% awareness despite the BWMP being available.

The study found that the level of understanding of the requirements of the ballast water management plans was typically very weak, with a low 37.04% of the respondents aware that permission needed to be granted before ballast could be discharged. It can therefore be concluded that a large percentage of vessels discharging ballast into the ports are doing so without the risks of the ballast on board being assessed.

### **6.2.3 Objectives Three and Four**

The final two objectives of the study were to determine which authority or organisation is responsible for the monitoring and enforcement of the ballast water management policies in the Ports of South Africa. This proved to be difficult to determine, as no legislation is yet in place and therefore no official Regulations

have been drafted in order to assign the necessary responsibilities or powers to any authority or organisation to undertake these activities.

Indications from the meeting of stakeholders held on the 2<sup>nd</sup> November 2012, as well as from input provided by Participant 2 is that the responsibilities for compliance, monitoring and enforcement of the Ballast Water Management Act will be shared amongst TNPA, SAMSA and SANBI, representing the DEAT.

For the current TNPA BWMP's, the responsibility for the monitoring and enforcement lies with the port, however, the study has found that no agent has experienced any feedback or queries regarding the ballast, and it is therefore assumed that the exercise is merely a paper exercise with no real value to the environment.

### **6.3 Recommendations**

The following recommendations are made as a result of the study

#### **6.3.1 Finalise and Implement the Legislation**

A decade has passed since the draft Ballast Water Management Policies were produced. The draft Maritime Policy was produced in 2008. Neither of these documents were finalised and implemented.

It is imperative therefore that the progress of the latest draft legislation is monitored carefully to ensure that it is promulgated and the regulations effectively implemented.

#### **6.3.2 Implement the Port Operational BWMP's**

The TNPA BWMP's must be implemented effectively in all the Ports of South Africa. Strategic appointments must be made and disciplinary action taken on parties who do not comply. Monitoring and enforcement of the regulations must be conducted on a regular basis in order to add some credibility to the procedures, and to avoid the perception that it is "just a paper exercise".

### **6.3.3 Education**

The need to properly educate the officials within the relevant authoritative departments as to what ballast water is and how it affects the environment has been identified and recommended frequently in the literature. It is a recommendation to source qualified experts who are able to effectively mentor these officials.

An in depth educational session undertaken with visual aids and case studies can assist the participants in understanding the reasoning behind the requirements, which is likely to result in a far better response to the regulations.

### **6.3.4 Create Awareness**

A policy cannot be implemented successfully if the responsible parties are unaware of its requirements. Buy-in must be obtained from the responsible parties. Awareness can be enhanced by conducting training for the port users and other related parties.

## **6.4 Recommendations for Future Studies**

There are three areas of interest which can be considered for future studies.

One, the literature refers to the possibility of creating a multi-functional authority which can conduct numerous inspections within the port environment. The feasibility of this idea should be researched. Two, the implementation of ballast water management policies will require extensive funding for skills training, equipment and personnel. The funding model for this implementation and sustainability thereof should be considered. Finally, an investigation should be undertaken on what control measures have been implemented to control the new invasions introduced through hull fouling, which has been identified as having an even more severe effect on the environment than ballast water.

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**Appendix 1: Full summary of ships agents experience and awareness (Section 4.4.4 and 4.4.5)**

Respondent	RBAY		DBN		EL		NGQ		PE		MOSS		CPT		SBAY	
	BWMP in place?	Respondent Experienced	BWMP in place?	Respondent Experienced	BWMP in place?	Respondent Experienced	BWMP in place?	Respondent Experienced	BWMP in place?	Respondent Experienced	BWMP in place?	Respondent Experienced	BWMP in place?	Respondent Experienced	BWMP in place?	Respondent Experienced
1			✗	✓									✗	✓	✓	✓
2							✓	✓								
3									✗	✓			✗	✓	✓	✓
4	✓	✓	✓	✓	✓	✓			✓	✓			✗	✓		
5			✓	✓												
6							✓	✓	✓	✓						
7	✓	✓														
8	✓	✓														
9	✗	✓	✗	✓	✗	✓			✗	✓			✗	✓	✓	✓
10	✗	✓	✗	✓											✓	✓
11	✗	✓	✓	✓											✓	✓
12			✓	✓					✓	✓						
13	✗	✓	✗	✓					✗	✓			✗	✓	✓	✓
14			✓	✓												
15	✓	✓	✗	✓							✓	✓	✗	✓	✓	✓
16			✓	✓												
17													✗	✓		
18	✗	✓	✓	✓											✓	✓
19	✓	✓	✓	✓					✗	✓			✓	✓	✓	✓
20	✗	✓	✗	✓							✗	✓	✓	✓	✓	✓
21			✗	✓					✗	✓			✗	✓	✓	✓
22													✓	✓		
23					✓	✓			✓	✓						
24			✓	✓												
25															✓	✓
26			✗	✓									✗	✓	✓	✓
27	✗	✓	✗	✓	✗	✓							✗	✓	✗	✓
28			✗	✓									✗	✓		
29	✗	✓	✗	✓					✗	✓			✗	✓	✓	✓
30													✗	✓		
31													✗	✓	✓	✓
32			✗	✓			✓	✓					✗	✓		
	5	13	9	21	2	4	3	3	5	11	1	6	2	16	14	15
		38.46%		42.86%		50.00%		100.00%		45.45%		16.67%		12.50%		93.33%

## Appendix 2: Full Summary of Respondent replies to Question 9 and 10 (Section 4.4.7)

Respondent	What should be done?	Other Comments
1	More Government involvement	Awareness has been created. Subject is of more concern to the environmentalists than to the agents
2	Stricter mngt by port / SAMSA	No further responsibilities must be placed on the agent when the BWMP's are enforced. No info as to what happens after BWRf submitted - Capt goes ahead and discharges without further feedback from the port
3	No comment	S Bay strict, but no other ports implement checks. Never had any issues or risks noted on BW discharges.
4	No comment	No comment
5	No comment	No comment
6	No comment	No comment
7	More involvement by port, terminals, environmental officers	Ballast schedules are not required unless requested - and they have never been requested. Respondent always collects the form as a
8	Should not be just a paper exercise - need to protect our waters	Every coal ship calling at RBCT is in ballast condition - all BWM records are accepted in good faith, however it may be worth reconsidering the situation as 70% of ballast is ex India and China (high risk areas).
9	Strict ctrl / inspections / testing / written procedures - only 1 found (S Bay)	There is a draft policy of BM for SA however none noted specific to each port by TNPA
10	Port authorities to introduce proper mngmt	No comment
11	Have person on board all cargo loading vsls to check BW logs	No comment
12	All vsls should be inspected - not randomly	Basis comment alongside, researcher asked if his vessels had ever been inspected. Respondent advised that he did not know - nobody notifies them and he just "presumes" authorities board vessels for random checks
13	All ports should be regulated for ballast	Saldanha has a different ecological plateau to other ports which is why
14	water in ballast tanks must be treated	Never had any inspection/other for ballast on his ships
15	No comment	No understanding at grass roots level of the problem - people need to be educated. No clear policy/procedures in place - no legislation in place - general decline on implementation and enforcement procedures
16	No comment	"All SA ports have ballast water"

## Appendix 2: (continued)

Respondent	What should be done?	Other Comments
17	Clear guidelines to be sent to agents with requirements, and routine inspections/monitoring of vsIs should be done by TNPA	In 20 years has never had any request regarding ballast from the port. It is to be noted that respondent only handles small vessels.
18	TNPA need to focus on this - but currently too intrinsically focussed.	Need to take action in order to avoid issues which developed over Great Barrier reef due to the wood chip vessels trading betw Australia and
19	No comment	Never had any inspection/other for ballast on his ships
20	Need a system of monitoring and enforcement in order to successfully	Does not consider this to be a high priority for Gov't / port authorities
21	Have officers attend on all vsIs to inspect and discuss procedures with the Captain	Saldanha Bay has an eco-friendly reserve adjoining the Langebaan Lagoon and also has a very wide opening and therefore cannot be boomed off like other ports in SA making it vulnerable. There are also no storm water drains channeled into the ports, and therefore it has a more
22	No comment	No comment
23	BW to be treated prior to discharge. Better communication is required between the agent, vessel and port control	Port will not allow a vessel with untreated water to discharge ballast, however, respondent has never had a port official attend on board to check ballast water records
24	No comment	No comment
25	No comment	No comment
26	Awareness seminars are needed. Permission must be obtained before vessel	Angola bans deballasting - SA must follow systems or treat ballast on board
27	Authorities need to do more checks	Not aware of any instances where his vessels have been checked
28	Agents/Masters should be made aware of requirements	No comment
29	Samples to be taken; Master to acknowledge receipt of regulations; random checks of ballasting op's; Penalties for	Need to monitor last 3 months ballast uptake in order to screen for high risk areas and measures to be taken
30	SAMSA must conduct testing	No comment
31	No comment	No legislation is in place. A draft policy exists.
32	Implement sample testing / inspection. DOH to take responsibility	Countries like Australia are very strict as it is known that inspectors will board vessels and take samples. If they do not comply - vessel can get banned. For this reason, extra precautions are taken when calling at

### Appendix 3: Informed Consent Letter

Dear Respondent,

**MBA Research Project**

**Researcher:** Fiona Calitz (083 251 6973)

**Supervisor:** Dr. Mihalis Chasomeris (031 260 2575)

**Research Office:** Ms Phumelele Ximba (031 260 3587)

I, Fiona Calitz, an MBA student at the Graduate School of Business and Leadership at the University of KwaZulu-Natal, invite you to participate in a research project entitled: **“The Status of Ballast Water Management in the Ports of South Africa.”** The aim of this study is to determine the present status of ballast water management within the Ports of South Africa, and, if necessary, what steps could be taken to improve the situation.

In participating you will be invited to comment on the ballast water management policies as well as the methods of monitoring and enforcement where required. The results of the questionnaire are intended to assist in my analysis and possible recommendations for improvement.

Your participation in this project is voluntary. You may refuse to participate or withdraw from the project at any time with no negative consequence. There will be no monetary gain from participating in this study. Confidentiality and anonymity of records identifying you as a participant will be maintained by the Graduate School of Business and Leadership, UKZN.

If you have any questions or concerns about completing the questionnaire or about participating in this study, you may contact myself or my supervisor at the numbers listed above.

The attached letter of consent and the questionnaire should take you about 20 minutes to complete. Please complete the questionnaire and then return it via mail to [fionacalitz@yahoo.com](mailto:fionacalitz@yahoo.com) or fax it to **(031) 202 9620**.

I appreciate your assistance and taking the time to complete the forms.

Sincerely

**Fiona Calitz**

Student number: 210 511 792

Cell number: 083 251 6973

UNIVERSITY OF KWAZULU-NATAL

SCHOOL

**MBA Research Project**

**Researcher:** Fiona Calitz (083 251 6973)

**Supervisor:** Dr. Mihalís Chasomeris (031 260 2575)

**Research Office:** Ms Phumelele Ximba (031 260 3587)

**LETTER OF CONSENT**

I.....(full names of participant) from..... (full name of company or organisation), in the position of ..... (designation), hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.

Please check the relevant box below:

I hereby give permission for my name and the name of my company to be disclosed in the research.

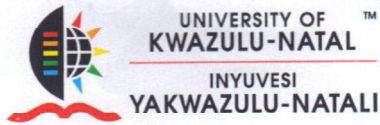
I request anonymity for my name and the name of my company.

SIGNATURE OF PARTICIPANT

DATE

.....  
**This page is to be retained by researcher**

## Appendix 4: Ethical Clearance



18 September 2012

Mrs Fiona Calitz 210511792  
Graduate School of Business and Leadership  
Westville Campus

Dear Mrs Calitz

Protocol reference number: HSS/0908/012M  
Project title: The Status of Ballast Water Management in the Ports of South Africa.

### EXPEDITED APPROVAL

I wish to inform you that your application has been granted Full Approval through an expedited review process.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Professor Steven Collings (Chair)

/pm

cc Supervisor: Dr M Chasomeris  
cc Academic Leader: Dr S Bodhanya  
cc School Admin: Mrs Wendy Clark

Professor S Collings (Chair)  
Humanities & Social Sc Research Ethics Committee  
Westville Campus, Govan Mbeki Building  
Postal Address: Private Bag X54001, Durban, 4000, South Africa  
Telephone: +27 (0)31 260 3587/8350 Facsimile: +27 (0)31 260 4609 Email: ximbap@ukzn.ac.za / snymanm@ukzn.ac.za  
Founding Campuses: ■ Edgewood ■ Howard College ■ Medical School ■ Pietermaritzburg ■ Westville

INSPIRING GREATNESS



# Appendix 4: Turnitin Originality Report

Turnitin Originality Report

Page 1 of 49



## Turnitin Originality Report

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