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TITLE: THE INTERNATIONAL CONVENTION FOR THE CONTROL AND MANAGEMENT OF SHIPS' BALLAST WATER AND SEDIMENTS 2004: A CRITICAL APPRAISAL

BY

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Research dissertation submitted for the approval of the Senate in fulfillment of part of the requirements for the degree of Masters of Laws. The other part of the requirement for this qualification was the completion of a programme of courses.

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DECLARATION

I, KADIRI TEMITOPE EMMANUELA, hereby declare that I have read and understood the regulations governing the submission of the Master of laws dissertations, including those relating to length and plagiarism, as contained in the rules of this University, and this dissertation conforms to those regulations.

DATE: 15th FEBRUARY, 2007

SIGNATURE:

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CHAPTER ONE

1.1 Introduction

Oceans cover more than 70 per cent of the earth's surface, and over 60 per cent of human population resides along the coast. A significant proportion of human protein supply comes from the sea, while the majority of global biodiversity and over 97 per cent of the biosphere is marine and is unknown. Invasive marine species are one of the four major threats to the world's oceans; the other three major threats are land-source marine pollution, over-exploitation of living marine resources and physical alteration and destruction of habitat[1].

A number of non-native aquatic organisms have established themselves in waters throughout the world; particularly, the introduction of several species into coastal waters has caused significant damage. Many of these introductions have been attributed to the discharge of ballast water from ships[2]. Marine transportation particularly shipping moves over 80 percent of cargo volumes in international trade and transfers approximately 3 to 5billion tonnes of ballast water annually. Shipping underpins global economic development with over 85000 ships in world fleet. Thus modern society depends totally on shipping[3]. A similar volume of ballast water and cargo may be transferred domestically within countries and regions each year[4].

What is ballast water?

Ballast is any material used to weight and/or balance an object. Ballasting occurs when

[1] Power point presentation by Adnan Awad of Globallast Cape Town in 2004. www.gisp.org.
[2] Ballast Water-Environmental Protection-Ships and Operations. www.tc.gc.ca/MarineSafety/Ships-and-opeartions-standards/Environmental-Protection/Ballast-Water.htm.
[3] Power point presentation by Adnan Awad of Globallast Cape Town in 2004. www.gisp.org.
[4] J. Firestone and J. J. Corbett: Coastal and Port Environments: International Legal and Policy Responses to Reduce Ballast Water Introductions of Potentially Invasive Species, Ocean Development and International Law (2005), vol 36, pg 291; Global Ballast Water Management Programme: The Problem. http//globallast.imo.org/index.asp?page=problem.htm&menu=true.

ships take in sea water on board their tanks, to provide stability and balance particularly when they are unladen and also to help enhance safe voyage[5]. Historically, ships have used solid materials such as rocks, sand or metal as ballast but since the advent of steel hulled ships in the 19th century, sea water has been used for reasons of economy and efficiency[6]. The use of sea water as ballast was originally thought to be a practical and an environmentally innocent solution, as it was assumed that it had no adverse effects on the environment. But in the last few decades, bigger ships have been made which have made travelling faster but require larger quantities of ballast water exchange[7]. The intake or discharge of ballast water usually occurs either in or enroute to and from port areas, or in waters close to the coastline of a country, and coastal waters have been known to be filled with plant and animal organisms in various stages of life cycles. Coastal waters are also a host to pathogens that may have entered port waters through sewage outlets; land based marine pollution sources or discharge from ships. These organisms can live for long periods of time in the water and sediments taken from coastal waters and pumped into the ballast tanks in the ship[8]. Once they are released into an environment they either become part of the background flora and fauna or become invasive, thus dominating the native flora and fauna[9]. Hence, the problem of contamination is dual; first, partly relating to the alteration of the ecosystem by introducing invasive alien species and secondly, the direct introduction of toxic or harmful organisms[10]. The management of ballast water has attracted a lot of attention as research is ongoing on the means to prevent introductions of marine invasives through ballast water. International programmes such as the Globallast project, and the International Convention for the Control and Management of Ships' Ballast Water and Sediments[11], have provided valuable information, and techniques to

[5] Michael Tsimplis: Alien Species Stay Home: The International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004, International Journal of Marine and Coastal Law (2005), vol 19, no 4, pg 411; J. Firestone and J. J. Corbett: op cit, pg 291.
[6] Moira L. McConnell: Ballast and Biosecurity: The Legal, Economic and Safety Implications of the Developing International Regime to Prevent the Spread of Harmful Aquatic Organisms and Pathogens in Ships Ballast Water, Ocean Year Book (2003), vol 17, pg 218.
[7] Michael Tsimplis: op cit pg 412.
[8] Op cit, pg 218.
[9] Nicholas Bax, Angela Williamson, Max Aguero, Exequiel Gonzalez, and Warren Geeves: Marine invasive alien species: a threat to global biodiversity, Marine Policy (2003), vol 27, pg 314.
[10] Op cit, pg 412.
[11] The International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004. www.imo.org.

assist in the prevention of such introductions at national level. This paper will discuss and describe the provisions of the Convention on ballast water management in preventing the introduction of marine invasives in national jurisdictions affected by these problems and steps that have been taken by them to implement the convention, and mitigate marine invasion, and subsequently, assesses the challenges the Convention and national jurisdictions might face in the implementation of the Convention's provisions.

1.2 Overview of marine invasive alien species

The spread of marine organisms or species beyond their natural habitat takes place in two ways; firstly, through range expansion, which is dispersal by natural mechanisms, and secondly, through introductions[12]. Introductions of marine invasive species or organisms are mediated by human movement through ships, and have been accidentally and/or intentionally moved around the world's oceans since man first began navigating the seas[13]. The intentional introductions of marine invasive species are commonly associated with aquaculture, canal development, aquarium trade and oil and gas development activities. While accidental introductions are often associated with shipping through ballast water and hull fouling[14].

Historically, ever since international trade began growing, ships have inadvertently carried pests and marine organisms with them. A wooden sailing vessel in the 17th century could carry up to 120 marine organisms fouling, boring into or nestling on the hull, and another 30 found in dry ballast and the anchor chain, but with the advent of steel hulled ships, 10,000 different species can be transported in ballast tanks alone at any given moment[15]. For instance, since the early 19th century at least 16 micro-algae have become an integral part of the North Sea phytoplankton, of which 10 have been observed regularly since the 1990s, and a similar pattern is reported for harmful species, increasing

[12] Through introduction means the arrival, establishment and subsequent diffusion of species in a community in which they did not previously exist.
[13] Tamara Bridgett Robinson: Marine alien species of South Africa: threats and opportunities, PhD thesis (UCT), July 2005, pg 3.
[14] Nicholas Bax et al: op cit, pg 313; Tamara Bridgett Robinson: supra, pg 3.
[15] Ibid: pg 313.

in cell numbers and blooming events in many regions all over the world[16]. Unfortunately, most of these potential invaders often do not survive the dark and often dirty conditions in ballast tanks over a long voyage as they need light for photosynthesis. But some other organisms or species such as the dinoflagellates commonly form cysts when conditions are unfavorable, and these cysts tend to accumulate in the sediments in ballast tanks where they remain in a state of dormancy until they are deposited in a suitable environment[17], establishing a reproductive population in the host environment and may even become invasive, out competing native species and multiplying into pest proportions[18]. As a result of this, whole ecosystems have been disrupted. For instance, the Mediterranean mussel, which is native to Europe, has dominated the rocky shores of the South African coast from Cape Point to Luderitz in Southern Namibia. The European green crab indigenous to the Atlantic coasts of Europe and North Africa is a voracious predator of the marine environment, which has invaded numerous coastal communities outside its habitat including South Africa, Australia and coasts of North America. The Louisiana crayfish known as the red swamp crayfish is native to the southern parts of the U.S and Northern Mexico. But, it is a highly adaptable species which quickly becomes established in any environment it is introduced to. It has been introduced to other regions primarily to diversify local fisheries or for aquaculture purposes; an example is its introduction to Kenya in 1970[19]. The crayfish thrived, and a decade later the population grew to a density of four individuals per square meter of shoreline. But unfortunately, the crayfish population was consuming vast quantities of indigenous aquatic vegetation of the lake and consequently they disappeared. The Tilapia fresh water fish is another marine invasive species that is indigenous to different parts of Africa and the Middle East but has been introduced to other African countries like the South and Western parts of Africa, and the rest of the world as a sport fish, aquarium fish, or even as bio-control

[16] Jeroen C. J. M, Van den Bergh, Paulo A. L. D Nunes, Harm M. Dotinga, Wiebe H. C. F, Engel G. Vrieling, Louis Peperzak: Exotic harmful algae in marine ecosystems: an integrated biological-economic-legal analysis of impacts and policies, Marine Policy (2002), vol 26, pg 61.
[17] Africa Invaded: The growing danger of invasive alien species, pg 41. www.gisp.org.
[18] GlobalBallastWaterProgramme:TheProblem;http//globallast.imo.org/index.asp?page=problem.htm&menu=true.
[19] Introduced to the Lake Naivasha, situated in the Rift Valley in Kenya. A flourishing fishery exported millions of the crayfish to France, Holland and Belgium, where they where served in top city restaurants.

agents. They are prolific breeders with rapid population growth[20]. The list goes on with hundreds of other examples of catastrophic introduction around the world occurring through human mediated activities. This catastrophic introduction of marine invasives not only has ecological or environmental impacts on its host environment but also has economic and health impacts as well.

1.3 The impacts of marine invasive species

Invasive alien species impact on a multitude of sectors and they know no political boundaries. Their spread has been recognized as a major threat to marine and coastal environments as their rapid invasion and competitive advantage allows them to dominate local ecosystems to the detriment of native species, thereby resulting in ecological/environmental alterations, human health impacts and economic losses world wide[21]. Thus, marine invasives have potential impacts on human health, the ecosystem and the economy.

What is the ecological impact of marine invasive species introduction?

Manifest impacts of marine invasives include rapid production rates that give rise to dominant populations, extinction of native species due to population growth, transfer of pathogens and modifications to the food chain. For instance, many planktonic species have long-lived reproductive stages (spores, cysts or eggs) that remain viable in unfavourable conditions[22], altering the physical environment either directly or indirectly by changing the way nutrients are recycled through the system[23].

Economic /Commercial impacts

The discharge of ballast water into the marine environment introduces harmful aquatic organisms (including diseases, bacteria and viruses) thereby degrading commercially

[20] Africa Invaded: op cit, pgs 42-47 and 52-53
[21] Lesley A. MacDougall et al: Marine invasives in North America: Impacts, pathways and management; Ocean Year Book (2004), vol 20, pg 435.
[22] Ibid: pg 438.
[23] Global strategies on invasive alien species 2001: pgs 20-21, www.gisp.org. Last assessed on 29 Nov, 2006; Tropical Asia invaded: The growing danger of invasive alien species, 2004, pg 6. Last assessed on 29 Nov, 2006.

important fisheries[24], aquaculture, tourism and marine infrastructure[25]. To curtail the transfer of marine invasives from ballast water, new methods of treatment are necessary that will require equipment installation especially on older vessels. Two methods that result in increased operating costs for ships are on board ballast water treatment systems and deep water ballast exchange. The International Maritime Organization has suggested that ballast water exchange could add 160 million U.S dollars to annual shipping costs. Marine invertebrates can cause damage to coastal infrastructure or obstruct waterways. Examples of such marine invertebrates are the zebra mussel, asian clams and ship worm. They threaten native species, damage coastal infrastructure, clog water intake pipes and cause serious damage to docks and ships[26]. The commercial cultivation of non native species (aquaculture) poses serious threats to the local ecosystem and its native species, for example, the release of parasites especially when such species or animals escape as they can transmit diseases and parasites to their immediate environment and well as compete with native species for habitat and food requirements. Although aquaculture provides strong economic benefits, its negative impact is as significant as its economic benefits[27].

Health impacts

Ballast water is also capable of transporting viral and bacterial pathogens, including the bacterium that causes cholera[28] and the resistant cysts of toxic dinoflagellates that can lead to harmful algal blooms and shellfish poisoning[29], which can pose significant danger to human health when they enter the food chain. For instance, in 1991, a freighter from South Asia emptied its bilges off the coast of Peru.

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[24] Tropical Asia invaded: supra, pg 6, www.gisp.org.
[25] Nicholas Bax et al: op cit, pg 315.
[26] David Pimentel, S. McNair, J. Janecka, J.Wightman, C. Simmonds, C. O'Connell, E. Wong, L. Russell, J. Zern, T. Aquino, T. Tsomondo: Economic and environmental threats of alien plant, animal and microbe invasions, Agriculture, Ecosystems and environment (2001), vol 84, pg 12. www. siteresources.worldbank.org/EXTABOUTUS/Resources/gss-economiic-environment-threats-ias.pdf.
[27] Nicholas Bax et al: op cit, pgs 448-449.
[28] G. M Ruiz, T. K Rawlings, F. C Dobbs, L.A Drake, T. Mullady, A. Huq, R. R Colwell: Global spread of microorganisms by ships, Nature,(2000), vol 48, pgs 49-50.
[29] Nicholas Bax et al: op cit pg 314; Toxic dinoflagellates are a type of algae known to cause paralytic shellfish poisoning in humans, and dinoflagellates can reproduce simply by splitting in two, allowing multiplication wherever conditions are favourable; Focus on IMO: Alien Invaders-putting a stop to the ballast water hitchhikers, August 1999, pg 10. www.imo.org.

Along with the waste water came a strain of cholera that reproduced well in the unusually warm coastal waters with abundant pollution. The epidemic began simultaneously at three separate ports. The strain made its way into shellfish and through this to humans, spreading in an epidemic killing a reported 5,000 people. In addition, the unchlorinated water supply in Peru's cities carried the cholera strain into people's houses. This devastating epidemic extended along South America affecting more than a million people and reportedly killing more than 10,000 by 1994[30].

1.4 Pathways and vectors of marine invasive species

Marine transportation has long been a suspect, as an important vector of species transfer[31], and the principal vectors that have aided the transfer of species are hull fouling, ballast water, dry ballast, unintentional introductions associated with the importation of mariculture species, and deliberate introductions of exotic species for mariculture. More recently discovered vectors include those associated with the aquarium trade, recreational water users, drifting/floating marine debris, and gas and oil development activities[32].

Shipping transports more than 80 per cent of the world's goods annually and simultaneously 12 billion tonnes of ballast water. A single bulk cargo ship of 200,000 tonnes can carry up to 60,000 tonnes of ballast water[33] and more than 7,000 species of microbes, plants and animals at any one time[34], but with the development of steel hulled ships, increased ballast volume and reduced trip duration has increased the probability of successful establishment by exotic species[35].

Marine invasive species are not only introduced through ballast water and sediments but

[30] Moira L. McConnell: op cit, pg 222; South America invaded: The growing danger of invasive alien species (2005), pg 55, www.gisp.org
[31] Lesley A. MacDougall et al: op cit, pg441.
[32] Nicholas Bax et al: loc cit, pg 315; Best practice for the management of introduced marine pests: A review (2004), pg 28, www.gisp.org last assessed 1 Dec, 2006; Lesley A. MacDougall et al: supra, pg443.
[33] Nicholas Bax et al: ibid, pg 315; Ibid: pg 441; Marine Bioinvasion: An overview, www.dr.nio.org/drs/bitstream/2264/166/3/gbwmp_1st_rd_4pdf, Last assessed 4 Dec, 2006
[34] Power Point presentation by Adnan Awad of Globallast Cape town in 2004.
[35] Ibid: pg 441.

also by fouling organisms on ship hulls. The wide usage of antifouling paints[36] and the increase in speed of modern vessels have reduced hull fouling as a vector, but hull fouling still occurs especially for smaller vessels[37], and with the continued transfer of ballast water of ships, in particular bulk carriers and container ships of different design and dimensions[38]. Species prone to transport as hull foulers are often also amenable to transport in mariculture shipments; many species may be able to travel as larvae in ballast water or as juveniles and adults in sea chests or as hull foulers[39].

Aquaculture or mariculture is one of the fastest growing sectors of the global food economy, increasing by more than 10 per cent yearly and currently accounting for over 30 per cent of all consumed finfish and shellfish[40]. It was suggested by Nicholas Bax et al that mariculture could be responsible for up to 25 per cent of exotic species establishment through deliberate and /or accidental releases of target organisms along with their 'hitchhiking' pathogens or parasites[41]. An example of such parasite is the polydoride polychaete that bores into oysters and abalone shells which has been introduced to Hawaii and California on commercial products. Also, harvested products[42] have the potential to result in special introduction, for example, white spot syndrome virus is a highly virulent disease of prawns with a wide range of potential hosts[43]. Similarly, the intentional or accidental releases of aquarium species into coastal ecosystems have the potential to create instability in the ecosystem. A well known example is the caulerpa taxifolia, an algae native to the tropics that was accidentally released from the oceanographic museum of Monaco in 1984[44].

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[36] Including the soon phased out TBT.
[37] Nicholas Bax et al: op cit, pg 315.
[38] Stephen Gollasch: Removal of barriers to the effective implementation of ballast water control and management measures in developing countries: Report (2003), pg 2, www.gollaschconsulting.de/download/IMO_report.pdf last assessed 4 Dec, 2006.
[39] Nicholas Bax et al: op cit, pg 315.
[40] Best practice for the management of introduced pests: op cit, pg 34, www.gisp.org, last assessed 4 Dec, 2006.
[41] Lesley A. MacDougall et al: op cit, pg 443; Best practice for the management of introduced pests: op cit, pg 34.
[42] Whether frozen or live.
[43] Nicholas Bax et al: pg 316, op cit; Best practice for the management of introduced pests: op cit, pgs 35-36.
[44] Lesley A. MacDougall et al: op cit, pg 443; Ibid: pg 316; Best practice for the management of introduced pests: op cit, pg 33.

Canals and other navigable waterways provide significant pathways for marine introductions. The construction of new canals and seaways has facilitated the active or passive dispersal of marine invasive species as a result of shortened international shipping routes and the inception of regional barge traffic[45]. Drifting marine debris poses significant environmental threats to the marine environment as a pollutant and as a vector for invasive hitchhikers over long distances. Floating plastics, packing cases and other artificial debris can form substitute substrates for natural debris such as seaweed rafts, mats of terrestrial vegetation and logs etc. Before the entry into force of Annex V of MARPOL, it was estimated that the shipping industry had discarded 639,000 plastic containers into the marine environment each day[46]. Studies have also shown that bryozoans and barnacles have crossed the Tasman and the Caribbean Seas and the North Atlantic Ocean while attached to drifting marine debris[47].

Oil and gas drilling platforms act as vectors for marine invasives. Drilling units often spend extended periods in a port or port anchorage before and after tows to and from remote work sites, typically in shallow shelfal waters. Their extended stays in both port and coastal waters provide many fouling organisms increased opportunities to settle, grow to maturity and spawn[48].

As mentioned at the beginning of this sub-topic, the main or principal vectors of accidental introductions of marine invasive alien species into the marine environment are considered to be through ballast water from ships and through hull fouling and other ship structures and mariculture. Therefore, controlling these vectors is likely to have the effect of significantly reducing the number and severity of invasions.

[45] Best practice for the management of introduced pests: op cit, pg 30; Lesley A. MacDougall et al: op cit, pg 445.
[46] Approximately 233billion containers annually.
[47] Best practice for the management of introduced pests: op cit, pg 32-33; Ibid: pg 445.
[48] Best practice for the management of introduced pests: op cit, pg 40.

CHAPTER TWO

2.0 Background to developing an International Convention on Ballast Water Management

As has been pointed out earlier that marine invasive species pose a major threat to the economic and environmental health of marine ecosystems as well as a substantial risk to human health[49], several global and regional measures contain general legal obligations for States to prevent the introduction of marine invasive species. The most prominent among them is the United Nations Convention on the Law of the Sea (UNCLOS), the Convention on Biological Diversity, The International Maritime Organization Resolution A. 868(20), and the Marine Environmental Protection Committee (MEPC) adopted Guidelines on Ballast Water Management[50].

2.1 United Nations Convention on the Law of the Sea 1982

Part XII of UNCLOS imposes a number of general obligations on its State parties relevant to the control of alien invasive species[51]. Article 192 requires Parties to 'protect and preserve the marine environment'; to take 'measures necessary to prevent, reduce and control pollution of the marine environment from any source', which one will believe to include pollution discharge from ships' ballast tanks[52].

The question to be asked is whether organisms or species found in ballast water discharged from ships into the marine environment fit into the definition of pollution in Art 1(4) of UNCLOS?[53]. Art 1(4) defines pollution of the marine environment as 'the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of

[49] Nicholas Bax, et al: op cit, pg 317.
[50] Jeroen C. J. M, et al: op cit, pg 66.
[51] J. Firestone and J. J. Corbett: op cit, pg 302; Michael Tsimplis: op cit, pg 413; Ibid: pg 66.
[52] Article 194(1) of UNCLOS; Ibid: pg 302.
[53] Ibid, pg 302; Moira L. McConnell: op cit, pg 236.

quality for use of sea water and reduction of amenities'. Thus, are marine invasive organisms or pathogens 'substances or energy' within the meaning of the definition above? For the purpose of this paper it will be taken that marine invasive species are substances that pollute the marine environment and which must be controlled. Art 194(2) requires States to 'take all measures necessary' to ensure that 'activities under their jurisdiction or control' neither cause pollutant damage to other States and their environment nor result in the spread of pollution 'beyond the areas where they exercise sovereign rights'; such measures include those actions designed to protect and preserve 'rare and fragile ecosystems' and habitat and depleted, threatened or endangered species and other forms of marine life[54]. This is a source of Flag State responsibility for the primary regulation of ships[55]. Thus, Flag States would be required to prevent the introduction of aquatic organisms from ballast water to the extent that their introduction into a given marine environment would cause 'deleterious effects' to marine ecosystems or habitats[56]. Art 211(2) also requires Flag States to adopt laws and regulations to prevent, reduce and control vessel source marine pollution that have at least…the same effect as that of generally accepted international rules and standards established through the competent international organization or general diplomatic conference[57].

Art 196 specifically addresses the issue of alien species introduction and marine pollution[58]. It place two obligations on States to control technology impacts[59] and prevent the transfer of species that may be harmful to another marine environment[60]. This provision also provides coastal and port States with the means to control ships flying the flag of other States when those ships are in Coastal and Port State jurisdictional waters by imposing obligations on them.

Art 19(1) and Art 52 provides ships with the right of innocent passage, and further states

[54] Article 194(5) of UNCLOS
[55] J. Firestone and J. J. Corbett: op cit, pg 302.
[56] Moira L. McConnell: op cit, pg 238.
[57] Ibid: pg 238; another source of flag States' responsibility for regulation of ships.
[58] Moira L. McConnell: op cit, pg 236; J. Firestone and J. J. Corbett: op cit, pg 303.
[59] Ibid: pg 303.
[60] Ibid: pg 236.

that for passage to be innocent, it must not be 'prejudicial to the peace, good order or security of the coastal State'. Hence, a foreign vessel's passage will be considered 'prejudicial' if it engages in 'willful and serious pollution' or 'any other activity not having a direct bearing on passage'[61]. Thus, a Coastal State can adopt laws and regulations related to conserving marine living resources with respect to innocent passage through its territorial sea, provided such laws and regulations do not concern the design, construction, manning or equipment of a foreign vessel, unless implementing an international mandate[62]. Hence, a State may be able to prohibit the discharge of ballast water from ships in transit in its territorial sea.

Port States can also control or prevent the pollution of their marine environment by setting conditions for entry into their ports. Art 25(2) UNCLOS permits a Port State to take 'necessary steps' to prevent a breach of port entry conditions. Thus, a Port State could set conditions for ships to have an onboard ballast water treatment system that is capable of complying with national ballast water discharge requirements while that ship is in its territorial sea and exclusive economic zone[63].

2.2 The Convention on Biological Diversity 1992 (CBD)

Article 8(h) of the Convention imposes a general obligation on parties to 'as far as possible prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species'. This obligation applies not only to a State's territory but also to jurisdictions beyond a State's territory[64].

In 1995, the 2nd conference of parties (COP) to the Convention adopted the Jakarta Mandate on Marine and Coastal Biological Diversity on the recommendation of the Convention on Biological Diversity's Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA), who recognized the significance of alien species

[61] Article 21(1) & (2) of UNCLOS.
[62] Article 19(2)(h)&(l) 0f UNCLOS.
[63] J. Firestone and J. J. Corbett: op cit, pgs 304-305.
[64] Article 4(b) CBD; Moira L. McConnell: op cit, pg 239.

introductions as a threat to marine and coastal biodiversity[65]. This Mandate was followed by a detailed Programme of Work that identified alien species as one of its thematic areas, which means that alien species introductions be addressed comprehensively as a stand-alone issue[66]. The objectives of the Programme of Work include:

- To better understand the causes and impacts of introductions;
- To identify gaps in legal instruments, and
- To track incidents of invasions[67].

The Convention on Biological Diversity's secretariat developed Interim Guiding Principles for the Prevention, Introduction and Mitigation of Impacts of Alien Species[68], and adopted them in 2002 at the 6th Conference of Parties meeting[69]. These guiding principles were broadly formulated and can be applied to alien species introductions in the terrestrial and marine environment[70]. The Interim Guiding Principles are fifteen principles grouped into four sections[71]. Section 3 on introduction of species principle consists of two principles on intentional and unintentional introduction of species[72]. Principle 11 applies to unintentional introduction of species, and it suggests that States need to identify common pathways leading to unintentional introductions and should take steps to minimize introductions[73]. These principles also support a sequenced approach, with a focus on prevention, then eradication, and long term control where eradication is not possible[74]. Also, at the 6th Conference of Parties meeting in 2002, the International

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[65] Maas M. Goote: The Convention on Biological Diversity: The Jakarta Mandate on Marine and Coastal Biological Diversity, pg 381, The International Journal of Marine and Coastal Law, Vol 12, No 3, 1997; Lyle Glowka: Bioprospecting, Alien Invasive Species, and Hydrothermal Vents: Three Emerging Legal Issues in the Conservation and Sustainable Use of Biodiversity, pg 338, Tulane Environmental Law Journal, Vol 13, Hein Online, 1999-2000.

[66] The Programme of Work was drawn up in 1998 and was reviewed and updated in 2004; Draft joint work plan for the management of marine invasive alien species: pg 7, compiled by GISP, in association with CBD and UNEP, October 2005. UNEP/CBD/SBSTTA/11/INFO/10; J. Firestone and J. J. Corbett: op cit, pg 294; Maas M. Goote: Supra, pg 340.

[67] Meinhard Doelle: The Quiet Invasion: Legal and Policy Responses to Aquatic Invasive Species in North America, pg 6, The International Journal of Marine and Coastal Law, Vol 18, no 2, 2003.

[68] Which was presented to the 5th COP in May 2000, and they are non-binding principles.

[69] J. Firestone and J. J. Corbett: op cit, pg 294.

[70] Jeroen C. J. M, et al: op cit, pg 66.

[71] Section 1: General principles; Section 2: prevention principles; Section 3: Introduction of species principle; Section 4: Mitigation principle.

[72] Principles 10 and Principle 11.

[73] Lyle Glowka: op cit, pgs 346-347

[74] Meinhard Doelle: op cit, pg 6.

Maritime Organization was urged to complete the preparation of an international instrument to address ballast water[75].

2.4 IMO Resolution A. 868(20) 1997-Guidelines for the Control and Management of Ships' Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens

The international Maritime Organization has been considering the implications of the introduction of aquatic organisms from ballast waters for the past three decades[76]. In 1973, a Resolution 18 on 'Research into the Effects of Discharge of Ballast Water containing Bacteria of Epidemic Diseases' was passed by the IMO at an International Conference on Marine Pollution, drawing the world's attention to the transporting of aquatic organisms and pathogens around the world in ships ballast tanks[77]. Towards the end of the year 1990, the Marine Environment Protection Committee (MEPC) formed a Working Group to consider research information and solutions proposed by Member States of the IMO and by Non-Governmental Organizations. The conclusion of the Working Group was that voluntary guidelines were the first and appropriate step in addressing the problem of marine invasive species from ballast water[78]. Thus, in 1991 non binding guidelines were adopted by the Marine Environmental Protection Committee at its 31st session[79].

The Guidelines were aimed at providing Administrations and Port State authorities with information on procedures to minimize the risk from the introduction of unwanted aquatic organisms from ships' ballast water and sediment. They also noted that the ability of aquatic organisms and pathogens to survive after transportation may be reduced by

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[75] J. Firestone and J. J. Corbett: ibid, pg 294.
[76] Ibid: pg 294.
[77] Moira L. McConnell: op cit, pg 239; S. Gollasch: op cit, pg 76, www.gollaschconsulting.de/download/imo_report.pdf, last assessed 15 Dec, 2006.
[78] Ibid: pg 76.
[79] MEPC 50(31): Guidelines for Preventing the Introduction of Unwanted Organisms and Pathogens from Ships' Ballast Waters and Sediment Discharges; Focus on IMO: Alien Invaders-Putting a stop to the ballast water hitchhikers, pg 2, August 1999. www.imo.org.

insignificant differences in prevailing surrounding conditions[80]. The Guidelines also recommended care in loading ballast water to ensure only clean water and clean sediments were taken on board; where it was impossible to discharge ballast water, ballast water exchange in the open sea provides a means of limiting the introduction of unwanted species, as deep ocean water contains few organisms and those that do exist are unlikely to adapt readily to a new coastal or freshwater environment[81]. These Guidelines were further developed in the light of more experience and adopted in 1993 at the 20th International Maritime Organization General Assembly. This International Maritime Organization Resolution requested the Marine Environmental Protection Committee and the Marine Safety Committee to keep reviewing the Guidelines as a basis for a new annex to MARPOL 73/78[82], and in 1994, the Working Group, began to examine the possibility of adopting legally binding regulations that try to address the safety issues[83]. In early 1997 before the adoption of the revised Guidelines, the Maritime Safety Committee and the Marine Environmental Protection Committee approved a joint circular on Guidance on Safety Aspects relating to the Exchange of Ballast Water. The circular also pointed out safety issues which needed to be considered such as avoidance of over and under pressurization of ballast tanks and the need to be aware of weather conditions[84]. Then in March 1997; the International Maritime Organization General Assembly adopted Resolution A. 868(20) that revised the earlier Guidelines. One of the significant features of the revision was the formal adoption of a risk minimization management approach to the problem as reflected in the new title of the Guidelines. These Guidelines differ from the usual International Maritime Organization's regulatory strategy that emphasizes flag State responsibility and control[85]. Rather, they contain guidance and strategies for the adoption of uniform management and control measures by port, flag and coastal States[86]. The focus of the Guidelines is on procedure; it encourages

[80] Such as salinity, temperature, nutrients and light intensity.
[81] Alien Invaders: op cit, pgs 2-3.
[82] IMO Resolution A. 774(18) titled International Guidelines for Preventing the Introduction of Unwanted Aquatic Organisms and Pathogens from Ships' Ballast Water and Sediment Discharges; Alien Invaders: ibid, pg 4.
[83] Moira L. McConnell: op cit, pg 239.
[84] Alien Invaders: op cit, pg 4.
[85] Moira L. McConnell: op cit, pg 240.
[86] Jeroen C. J. M, et al: op cit, pg 67; Ibid: pg 240.

vessels to develop and have effective ballast water management plans[87], and to cooperate with ports in their implementation. It recommends open ocean sediment removal and ballast water exchange where possible[88] and keeping a record of ballast water intake and discharge that can be reported to port authorities. Ships and ports administrations are to make use of a Standardized Ballast Water Reporting Form. The Guidelines also recommend that ships adopt the precautionary approach in preventing or reducing the risk of uptake of ballast water at night, in shallow water, or where a propeller may stir up sediments; removing tank sediment regularly; and practicing either open sea exchange, minimal or no release of ballast water discharge into reception facilities or use of treatment options. The Guidelines also recommend a risk minimization approach that involves consideration by the port State of factors that put a vessel at low risk for species transfer[89]. The Guidelines are non-binding guidelines because they are recommendations agreed on by IMO Member States, that countries taking national action on this issue adopt a standardized approach. The main concern of the International Maritime Organization developing these Guidelines was to encourage States that felt the need to address this issue to do so on the basis of internationally agreed practices that seek to ensure ecological protection, subject to securing ship and human safety[90]. Although, the Guidelines are voluntary or non-binding they still possess legal status under international law, as section 11 of the Guidelines states that countries are to implement and enforce the Guidelines through national legislation[91].

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[87] Meinhard Doelle: op cit, pg 7; Ibid: pg 240.
[88] Ibid: pg 7; S. Gollasch: op cit, pg 77.
[89] Moira L. McConnell: op cit, pgs 240-241.
[90] McConnell, M. 2002: GloBallast Legislative Review-Final Report, pg 11. GloBallast Monograph Series No 1. IMO London. http//globallast.imo.org.
[91] Ballast Water News issue 16, January-March 2004, pg 5. http//globallast.imo.org

CHAPTER THREE

3.0 The International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004

3.1 Essential Features of the Convention

Having looked at the historical background leading to the development of the Convention, it is pertinent here to have a look at the Convention itself and analyze its provisions. The Convention has 22 articles and an Annex of Regulations which stipulates technical standards and requirements. The main features of the Convention are outlined below.

3.2 Modalities and Implementation of the Convention

Background

The Marine Environment Protection Committee considered various drafts of a consolidated text of the convention before agreeing to it in principle at its 2001 meeting; it contemplated adding the consolidated text as an Annex to the MARPOL 73/78 Convention but this was rejected, probably as suggested, due to MARPOL's entry and amendment conditions and the emphasis MARPOL places on Flag State obligations as compared to Port State control, and possibly due to a recognition of the need to surpass the narrower vision embodied in the concept of pollution prevention toward a more expansive and affirmative vision of biodiversity conservation[92]. The Marine Environment Protection Committee agreed to a final draft of the Convention at its 49th session in July 2003, and also agreed to hold a diplomatic conference in February 2004 to formally adopt the text of the Convention in accordance with the agreed timetable already approved by the Council[93]. The text of the Convention was finally adopted by consensus at a Diplomatic Conference at the International Maritime Organization's headquarters in

[92] J. Firestone and J. J. Corbett: op cit, pg 295; Alien Invaders: op cit, pg 5; Louise de La Fayette: The Protection of the Marine Environment-1999, Environmental Policy and Law, Vol 30, pg 53, 2000.
[93] [IMO NEWS]: The International Convention for the Control and Management of Ships' Ballast Water and Sediments set for adoption in 2004.http://cgls.uscg.mil/pipermail/imo-news/2003-December/000003.html.

London on Friday 13 February 2004 after 14 years of complex negotiations between IMO Member States. The Conference was attended by representatives of 74 Member States, non-governmental international organizations[94]. Eight countries have signed the convention as at July 2005 subject to ratification[95]. The Convention is expected to enter one Associate Member, and observers from two inter-governmental organizations and 18 into force 12 months after ratification by 30 States representing 35 percent of the world merchant shipping tonnage[96]. The Convention currently has 6 contracting States representing 0.62 per cent of the world tonnage[97], and no African State is yet a signatory to the Convention.

Objective of the Convention

The purpose of the Convention is to 'prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments'[98].

Obligations of the Convention

The Convention imposes a number of general obligations on its State parties to prevent, minimize and ultimately eliminate transfer of harmful aquatic organisms and pathogens. Article 2(1) urges State parties to give full and complete effect to the provisions of the Convention and its Annex in order to prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments; they have the right to take, individually or jointly with other parties more stringent measures with respect to prevention, reduction or elimination of the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments,

[94] Globallast Legislative Review: op cit, pg 14; Ballast Water News: op cit, pg 3; Moira L. McConnell: op cit, pg 242.
[95] Argentina, Australia, Brazil, Finland, Maldives, The Netherlands, Spain and the Syrian Arab Republic. Maldives became the first contracting party to the Convention after depositing its instrument of ratification on 22nd June 2005; www.imo.org.
[96] Articles 18 of the Convention.
[97] As at November 30, 2006; www.imo.org.
[98] Article 2(1) of the Convention.

consistent with international law[99]. The measures to be taken must not cause adverse effects to the environment, human health, property or resources, of any State and in any case not cause more harm than benefit[100]. Art 2(5) encourages parties to continue to develop and improve on the efficiency of ballast water management; encourages parties to encourage ships which are subject to the Convention and flying their flag to avoid as far as practicable the uptake of contaminated ballast water or sediments[101]. The Convention places a duty on State parties to collaborate within the International Maritime Organization's framework to protect ecosystems vulnerable to ballast water pollution within the high seas[102]. Parties are obliged to provide technical assistance 'as appropriate' to 'cooperate actively' in technology transfer 'subject to their national laws', and to enhance regional cooperation, particularly in enclosed and semi-enclosed seas[103].

Parties also have obligations regarding monitoring, data collection and sharing, inspection and enforcement, and are required to inform the International Maritime Organization and other parties of domestic ballast water management requirements and procedures, and reception facilities for ballast water and related sediments[104]. The Convention also imposes the obligation of undertaking and sharing of the results of scientific and technical research, including observation, measurement, sampling, evaluation and analysis of treatment technologies, and of any adverse impacts caused by the discharge of organisms or pathogens[105].

3.3 Enforcement

Rights of Inspection

The Convention gives Coastal States a general right to inspect ships flying the flags of

[99] Article 2(3); Michael Tsimplis: op cit, pg 417; J. Firestone and J. J. Corbett: op cit, pg 296, www.imo.org; IMO: New Convention on Ballast Water-Preventing Alien Invaders, Environmental Policy and Law, Vol 34, pg 121, 2004.
[100] Article 2(6) & (7); Ibid: pg 417; Ibid: pg 296; IMO: New Convention on Ballast Water-Preventing Alien Invaders, op cit pg 121. www.imo.org
[101] Art 2(8); Ibid: pg 417; Ibid: pg 296; www.imo.org.
[102] Art 2(9); Michael Tsimplis: op cit, pg 418; Ibid: pg 296; www.imo.org.
[103] Art 13-14; Michael Tsimplis: op cit, pg 423; Ibid: pg 296.
[104] Art 5 and Art 6; Ibid: pg 296; IMO: New Convention on Ballast Water-Preventing Alien Invaders, op cit pg 121.
[105] Ibid: pg 296.

other parties to the Convention for the purpose of determining whether the ship is complying with the provisions of the Convention[106]. The Convention also imposes a duty on Port States to inspect ships that another party requests it to inspect, so long as there is 'sufficient evidence that a ship is operating or has operated in violation of a provision' of the Convention[107]. Generally, inspections are limited to the verification of a ship having a valid international ballast water management certificate, inspecting the ship's ballast water record book, and sampling the ballast water in accordance with guidelines to be developed by the International Maritime Organization[108]. A Port State is allowed by the Convention to undertake a more detailed inspection if a ship lacks a valid certificate or there are 'clear grounds' for believing that either the ship does not conform substantially to the certificate or the master or crew are not familiar with essential ballast water management procedures or have failed to implement those procedures[109]. Where these clear grounds exist, the Port State is required to take steps to prevent the discharge of ballast water until such time as the ship can do so without 'presenting a threat of harm to the environment, human health, property or resources'[110]. Also, when samples indicate that a ship will pose such threats of harm, the party in whose waters the ship is operating is required to prohibit the discharge of ballast water until such times as the threat is removed[111].

Flag State Enforcement

The Convention has also imposed rights and obligations on Flag States. When an inspection indicates a violation, the inspecting party is required to notify the ship and the 'Administration'[112].

Coastal State and Port State enforcement

Art 8 of the Convention requires Flag, Coastal and Port States to establish sanctions for

[106] Art 9(1); Ibid: pg 296; Michael Tsimplis: op cit, pg 421.
[107] Art 10(4); Ibid: pg 296; Ibid: pg 421.
[108] Art 9(1) and Regulation B-2(6); J Firestone and J. J. Corbett: op cit, pg 297; Ibid: pg 42, Ibid: pg 121.
[109] Art 9(2); Ibid: pg 297; Ibid: pg 421.
[110] Art 9(3); Ibid: pg 297; Ibid: pg 421.
[111] Art 10(3); Ibid: pg 297; Ibid: pg 421.
[112] ie the government of the flag state; Art 1(1) and Art 11(1); Ibid: pg 297.

violations of the provisions of the Convention[113]. Sanctions made by Port and Coastal States are meant to address violations that occur within their jurisdiction[114]. Port and Coastal States have the authority to institute proceedings against any violations that occur in their jurisdiction as well as informing the Flag State of such violation and proceedings instituted[115]. In a case where a Port or Coastal State chooses to inform the Flag State of a violation instead of instituting proceedings, the Flag State is required to investigate the matter and undertake to institute proceedings as fast as possible[116]. Art 8(1) requires the Flag State to promptly inform the State that reported the violation and the International Maritime Organization of the action taken[117], and the Flag State should give a report to the International Maritime Organization one year after the report of the violation where no action has been taken within this period. While art 8 does not require a specific sanction, it does require that parties adopt sanctions that 'shall be adequate in severity to discourage violations of the provisions of the Convention wherever they may occur'[118]. In addition to the sanctions stipulated in art 8, the Convention grants Flag and Port States the authority to 'warn, detain or exclude' an offending ship[119]. In the event a State takes action under articles 9(3), 10(2) or 10(3), the officer of that State is required to notify the Flag State of the circumstances leading to the action[120], and the Port State is also required to notify the next port of call for the offending vessel[121].

3.4 Application of the Convention

The Convention applies to all ships with a few exceptions: certain vessels that by design or usage do not exchange water for ballasting, and are not subject to the Convention are exempted[122].

[113] Art 8; Ibid: pg 297; Michael Tsimplis: op cit, pg 420.
[114] Presumably in internal waters, territorial seas, archipelagic waters, continental shelf and exclusive economic zone; Art 8(1); Ibid: pg 297.
[115] Art 8(2); Ibid: pg 297; Ibid, pg 420.
[116] Art 8(1); Ibid: pg 297; Ibid: pg 420.
[117] Art 8(1); Ibid: pg 297; Ibid: pg 420.
[118] Art 8(3); Ibid: pg 297.
[119] Art 10(2); J Firestone and J. J. Corbett: op cit, pg 298.
[120] Art 11(2); Ibid: pg 298.
[121] Art 11(3); Ibid: pg 298.
[122] Art 3(2)(a)&(f); Vessels presumed to be exempted are tugs, similar small vessels and car ferries that have free board restrictions and carry solid ballast; Michael Tsimplis: op cit, pg 418.

Pleasure craft and craft used primarily for search and rescue that carry ballast water are required to comply with the provisions of the Convention, except if they are less than 50 metres in length and have a maximum of eight cubic metres of ballast water capacity are then allowed to attain equivalent compliance[123]. State operated vessels including warships and non-military ships on non-commercial service are exempted[124]. Lastly, ships that do not cross borders of different countries are also exempted. Thus, where a vessel operates within the jurisdictional area of one party[125] or within the jurisdictional area of a party and on the high seas a Coastal State party may grant exemptions[126]. In granting these exemptions, the Coastal State must consider whether its environment as well as the environment of any other State, be it a party to the Convention or not would not be impaired or damaged[127].

3.5 Entry into force, Amendment and Dispute Resolution

A State can become a party to the Convention either through signature, whether subject to ratification, acceptance or approval or not, or through accession[128]. Where a State has more than one territorial unit applying different systems of law it has the option to declare by express written notification to the depositary which of the units the Convention will be applicable to[129]. Hence the Convention may not be applicable even within a State party. The Convention is expected to come into force when 30 States covering at least 35 per cent of the world's gross tonnage have unreservedly become parties to the Convention[130]. After its entry into force, the Convention will then come into force in respect of new parties three months after each new party has deposited the required instrument[131]. No special mechanisms are provided for dispute resolution except for general provisions including all the possible peaceful mechanisms[132].

[123] Regulation A-5 of the Annex to the Convention; Michael Tsimplis: op cit, pg 419.
[124] Art 3(2)(e); Ibid: pg 419.
[125] Art 3(2)(b)-(c); Ibid: pg 419.
[126] Art 3(2)(c); Ibid: pg 419.
[127] Art 3(2)(b)-(d); Ibid: pg 419.
[128] Art 17(2)(a)-(c); Michael Tsimplis: op cit, pg 424.
[129] For example, the European Community. Art 17(4); Ibid: pg 424.
[130] Art 18(1); Ibid: pg 424.
[131] Art 18(2) & (3); Ibid: pg 424.
[132] Art 15 of the Convention; Ibid: pg 424.

The amendment procedure of the Convention is complex, and it was suggested by Michael Tsimplis that its complexity was presumably necessary in order to provide alternatives for changes in the major parts of the Convention as well as the Annex. The procedure for amendment in the Convention is the consideration and adoption of an amendment while a further acceptance is needed in order to bring the amendment into force. The amendment procedure of the Convention is very different from that of the Annex. The convention is amended by the Conference of Parties, and this requires a request to the International Maritime Organization supported by one-third of the parties[133] and an adoption of the amendment by two-thirds of the voting parties[134]. The Conference of Parties may determine the requirements for entry into force of such amendment; otherwise the requirements designed for internal modification of the Convention will apply[135]. Alternatively, the Convention also adopted a tacit amendment procedure. The mechanism for amending is essentially internal to the International Maritime Organization and it specifically utilizes the Marine Environment Protection Committee even though all parties to the Convention are entitled to participate even if they are not members of the IMO[136]. Hence, all amendments proposed by a party will be considered by the Marine Environment Protection Committee[137] after at least six months of submission to the Secretary-General, and adopted by at least one-thirds of the parties at the MEPC and two-thirds of the parties voting in favour of the amendment[138]. The Secretary-General is then expected to circulate the adopted amendment to the parties for acceptance. An adopted amendment is taken to be accepted by the Conference of Parties or the MEPC when two-thirds of the parties notify their acceptance to the amendment, and it enters into force for parties that have accepted it six months after the date when the last required numbers of parties have sent their notice of acceptance[139]. In amending the Annex, the Convention has also adopted the tacit amendment procedure for regulations

[133] Art 19(3) (a); Michael Tsimplis: op cit, pg 425.
[134] Art 19(3) (b); Ibid: pg 425.
[135] Art 19(3) (c); Ibid: pg 425.
[136] Art 19(2) (b); Regulation D-5 of the Annex; Ibid: pg 425.
[137] Art 19(2) (a); the proposal must be submitted to the Secretary-General and also distributed to other parties; ibid: pg 425.
[138] Art 19(2) (c); Ibid: pg 425.
[139] Art 19(2) (e) (i) &19(2) (f) (i); Ibid: pg 425.

contained therein. Acceptance of an amendment to the Annex is an automatic one, after twelve months or after another period set by the Marine Environment Protection Committee has passed unless more than one-third of the parties have objected to the amendment during this period of time, and this objection must be notified to the Secretary-General[140]. An amendment of the Annex accepted enters into force six months after a period set by the Marine Environment Protection Committee has expired unless one-third of the parties object to it. The amendment enters into force for all parties except for any State that has formally submitted an objection[141] or has notified the Secretary-General of its objection. The Secretary-General in turn has to inform all parties in respect of dates of entry for each party and in general, as well as in respect of any notifications[142]. Parties that object to the entry into force of an accepted amendment must also notify the Secretary-General that entry into force of such accepted amendment is still subject to further notification[143]. Parties that object to an accepted amendment will be treated as a non party in respect of the relevant amendment and not otherwise[144]. All parties to the Convention can announce their withdrawal from the Convention two years after it comes into force but will not take effect until another year passes[145].

3.6 The Regulations for the Control and Management of Ships' Ballast Water and Sediments-Annex

The Annex to the Convention expatiates on how the general provisions of the Convention will be applied and thus, it can be said to be the most important part of the Convention. Art 2(2) of the Convention states that the Annex is an integral part of the Convention, and it is concerned with detailed arrangements concerning the management of ballast waters and sediments which are technical in nature[146].

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[140] Art 19(2) (e) (ii); Ibid: pg 426; J Firestone and J. J. Corbett: op cit, pg 296.
[141] Art 19(2) (f) (ii); if the objection has not been withdrawn; Michael Tsimplis: op cit, pg 426; Ibid: pg 296.
[142] Art 19(6) (a) & Art 19(b); Ibid: pg 426.
[143] Art 19(2) (f) (ii); Ibid: pg 426.
[144] Art 19(4); Ibid: pg 426.
[145] Art 20(1)&(2); The Secretary-General who acts as a depositary for the Convention is under an obligation to inform the parties of all new participants or denunciations of the Convention; Ibid: pg 426.
[146] Michael Tsimplis: op cit, pgs 424 & 427.

The Annex is divided into five sections: Section A deals with the general provisions of the Annex; Section B deals with the management and control requirement of ships; Section C deals with additional measures; Section D deals with standards of ballast water management; and Section E deals with survey and certification requirements for ballast water management[147]. The important sections will be discussed in details below.

Section B-Management and Control Requirements of Ships

The ballast water management plan (BWMP) is a requirement for all ships on board and must be approved by the Flag State in accordance with relevant IMO Guidelines[148]. The Ballast Water Management Plan must include all the relevant information on the management of ballast water in the working language of the ship[149]. A vessel must also have a ballast water record book onboard which must record activities relating to ballast water management onboard the vessel and which can be in an electronic form[150]. This record book must be kept onboard ship for two years and in the owning/managing company for another three years[151], and must be available for inspection on request by officers authorized by a party[152], who are entitled to copy parts of it and also ask the master of the ship to certify that a true copy has been made. These certified copies are admissible as evidence in judicial proceedings[153].

The Management of Onboard Sediments

Regulation B-5 provides that sediments are to be managed in accordance with the approved Ballast Water Management Plan. The regulation further provides that ships constructed after 2009 should be designed to minimize the amount of sediments taken in and entrapped in the ballast tanks and to provide easy access for sampling and removal of

[147] The International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004; http//globallast.imo.org, pg 2.
[148] Regulation B-1of the Annex; ibid: pg 427; IMO: New Convention on Ballast Water-Preventing Alien Invaders, op cit, pg 122.
[149] Regulation B-1(1)-(7); Ibid: pg 427.
[150] The information that must be recorded in the record book is stated in details in Appendix II to the Convention; Regulation B-2(1)&(5) and Appendix II, 3(1)-3(5); Ibid pg 427.
[151] Regulation B-2(2); Michael Tsimplis: op cit, pg 428.
[152] Regulation B-2(4) & B-2(6).Where the vessel is unmanned and under tow, the towing ship must hold the record book; Ibid: pg 428.
[153] Regulation B-2(6); Ibid: pg 428.

sediments[154]. For ships that have been in existence before 2009 there is a requirement for similar action where practicable[155].

Section D-Standards for Ballast Water Exchange

There is the ballast water exchange standard (RegD-1) and a ballast water performance standard (Reg D-2), and the exchange standard could be used to meet the performance standard[156]. The ballast water exchange standard involves the pumping of water through the ballast water tanks three times[157] or a minimum of 95 per cent exchange of ballast water in volume, meaning that if the ballast tanks are flushed less than three times then it is left to the ship to prove that the 95 per cent limit has been exceeded[158]. The ballast water performance standard is set in terms of volumetric concentration of viable organisms[159] as well as a maximum of concentration for harmful microbes in the ballast water discharged. The plan of the International Maritime Organization Member States during the negotiation of the Convention is that regulation D-2 will gradually phase out regulation D-1[160]. Regarding the concentration-based ballast water performance standards in the Convention regulations, first, for those organisms greater than or equal to 50 micrometers, the discharge is required to have less than 10 viable organisms per cubic metre[161]. Secondly, for those organisms greater than or equal to 10 but less than 50 micrometers, the discharge is limited to less than 10 viable organisms per milliliter[162]. Thus, the exchanged ballast water should include less than one colony forming unit (cfu) of two strains of cholera and less than 100 cfu of intestinal enterococci and less than 250 cfu of Escherichia coli per 100 millilitres[163].

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[154] Reg B-5(2).
[155] Reg B-5(2).
[156] The International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004: op cit, pg 3; IMO: New Convention on Ballast Water-Preventing Alien Invaders, op cit, pg 123.
[157] Reg D-1(2); J Firestone and J. J. Corbett: op cit, pg 300; Ibid: pg 428; Ibid, pg 123.
[158] Reg D-1(1) of the Annex; The International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004: op cit, pg 3; Ibid, pg 123.
[159] Reg D-2 of the Annex.
[160] Ibid: pg 428.
[161] Reg D-2(1) of the Annex; Michael Tsimplis: op cit, pg 429; Ibid: pg 300; Ibid, pg 123.
[162] Reg D-2(1) of the Annex.
[163] Reg D-2 of the Annex; Ibid: pg 429; Ibid, pg 123.

Treating ballast water in order to clean it of live or viable organisms and pathogens or better still diluting it enough to reduce its concentration, would need research and the development of systems that will automate the procedure and standardize the ballast water thrown back to the sea[164]. The ballast water management systems must be approved by the Flag State, whose approval must be in accordance with the International Maritime Organization Guidelines, including systems that use additional substances to make ballast water comply with the regulation[165]. These systems must be safe for ships, their equipment and crew[166].

Regulation D-4 provides for prototype ballast water treatment technologies. It allows ships participating in national experimental programmes approved by the 'Administration' to test and evaluate promising ballast water treatment technologies to have a leeway of five years before having to comply with the requirements[167]. Such research programmes must be in accordance with the International Maritime Organization Guidelines and only a minimum number of ships will be allowed to participate[168]. It also allows ships that should have been complying with regulation D-2 to have a leeway for five years if such ships participate in research programmes aiming to improve the standards under regulation D-2[169]. Such ships are to operate the new systems 'consistently and as designed'[170]. Regulation D-5(1) stipulates expressly that the Marine Environment Protection Committee must review the criteria in Regulation D-2 three years before they become effective, so that when a ballast water treatment technology is developed, its cost will not prove too prohibitive for financially weaker States thereby rendering the criteria in Regulation D-2 inapplicable[171].

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[164] Michael Tsimplis: op cit, pg 430.
[165] Regulation D-3(2). Additional substances include the use of chemicals or biocides, organisms or biological mechanisms; or which alter the chemical or physical appearance of the ballast water. If permission to use these additional substances is withdrawn then their use must stop after one year. The International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004: op cit, pg 3; Michael Tsimplis: op cit, pg 431; Ibid, pg 123.
[166] Reg D-3(3) of the Annex: Ibid: pg 431.
[167] Reg D-4; Ibid: pg 3; Ibid, pg 123.
[168] Reg D-4(3)&4(4); Ibid: pg 431.
[169] Reg D-4(2); the five years starts from the day the new treatment technology is installed; Michael Tsimplis: op cit, pg 432.
[170] Reg D-4(4) of the Annex; Ibid: pg 432.
[171] Ibid: pg 432.

Michael Tsimplis suggests that the three years referred to before Regulation D-2 becomes compulsory for ships, will be three years before 2012. The review must assess the availability of appropriate technology, socio-economic impacts to developing countries, safety considerations for ship and crew, environmental acceptability, compatibility with ship design, cost effectiveness, and biological effectiveness[172]. Thus, the implementation of Regulation D-5(1) is hinged on the development of cheap and efficient treatment[173].

The application of Regulation D-1 and D-2 has been scheduled for different implementation dates; a complicated system depending on the volume of ballast water and date of construction has also been adopted, and after the implementation date for each type of ship has passed, compliance would be required at the first relevant survey of a ship[174]. Regulation B-3(6) provides that where there is a reception facility for discharged ballast water, none of these requirements will apply, and regulation B-3(7) further states that other methods will be accepted as alternatives to the ballast water exchange standards and ballast water performance standards provided they comply with the same minimum standards approved by the Marine Environment Protection Committee[175].

Restriction in Areas Where Ballast Water Can Be Exchanged

The Annex places restrictions on oceanic regions where ballast water exchange is permissible when ships are complying with regulation D-1. Hence, ballast water exchange can take place at least 50 nautical miles from the baseline and in waters deeper than 200 metres, or 200 nautical mile distance and in waters deeper than 200 metres[176]. But Regulation B-4(3) is an exception to this, and it states expressly that a ship should not deviate from its intended voyage, or the delay in voyage just to comply with any of the requirements in paragraph (1). The purpose of the above exception is in two fold: first, it is meant to improve on existing ballast water exchange practices and to minimize

[172] Reg D-5(1) & D-5(2) (1)-(5) of the Annex; Ibid, pg 123.
[173] Ibid: pg 432.
[174] Reg B-3(2); Michael Tsimplis: op cit, pg 433.
[175] Ibid: pgs 433-434.
[176] Reg B-4(1) (1) & (2) of the Annex; Ibid: pgs 434-435; J Firestone and J. J. Corbett: op cit, pg 299; IMO: New Convention on Ballast Water-Preventing Alien Invaders: op cit, pg 122.

the risks involved rather than establishing a thorough and protective regime for the coastal waters, and secondly, where the safety of ship and crew is in question. Hence, the suggestion that a ship should travel 200 miles before taking or discharging its ballast water may affect the stability of the vessel especially in bad sea weather conditions. For instance, a ship that is designed for immediate ballasting will not be able to go 200 nautical miles before taking in water or discharging and therefore regulation B-4(3) will apply[177]. Regulation B-4(4) states further that this is a decision to be taken by the master of the ship, if he feels that such exchange will threaten the safety or stability of the ship, its crew, or passengers because of adverse weather, ship design or stress, equipment failure, or any other extraordinary condition, then the ship will not need to comply with the requirements of regulation D-1(1) & (2). All this information must be recorded in the ballast water record book[178].

Ships that trade within the 50 mile limit are not expected to comply with regulation B-4 as the distance/depths requirement may be impossible for them to meet particularly in enclosed or shallow oceanic regions[179], but a Port State in consultation with adjacent States may designate restricted areas for ballast water exchange[180].

Section C-Additional Measures

The measures on depth/distance where ballast water can be taken or discharged are considered to be minimum measures, and the Convention allows for additional measures to be imposed by parties, which must be in accordance with international law, if deemed necessary by those parties in order to comply with the principles of the Convention[181]. Before a party introduces any additional measures it must consult with the other parties that may become affected by such measures[182]. Such measures must comply with IMO

[177] Michael Tsimplis: op cit, pg 435.
[178] Reg B-4(5); Ibid: 435.
[179] Ibid: pg 436.
[180] Reg B-4(3).
[181] Reg C-1(1).
[182] Reg C-1(2); Ibid: pg 122.

Guidelines[183], must not compromise ship safety[184], and will only be introduced after the party has notified the International Maritime Organization of them[185], except in epidemic or emergency situations[186]. Where the Law of the Sea Convention requires that such measures be approved by the International Maritime Organization[187], the party introducing the measures must seek IMO's approval and the measures must not conflict with other Conventions that apply to the ship[188]. Also, the party must notify mariners indicating alternative routes and also making available all appropriate services so that no ship is overburdened[189]. In areas where there are specified risks, the party can issue warnings to the mariners and to other Coastal States that might become affected and to the International Maritime Organization under Regulation C-2(2) when applied and when no longer applicable[190]. Such warnings can only be issued near sewage outfalls[191], where harmful organisms or pathogens exist permanently or temporarily or where 'the tidal flushing is poor or times during which a tidal stream is known to be more turbid'[192]. Hence, a party can restrict the intake or discharge in polluted areas but arguably cannot issue warnings for areas that are reasonably clean and which it wishes to keep clean[193]. The area around the sewage outfall which should be closed to ballast water exchange is not defined by the Convention, and so the decision to close an area around a sewage outfall will be left to the party issuing the warnings[194]. There are exceptions to Regulation C: first, A ship will be exempted from complying with this regulation if the intake and discharge of ballast water and sediments takes place for the purpose of saving the ship or saving life at sea[195]; secondly, accidental discharge or uptake following damage to a ship or its equipment are also exempted[196] provided that the owner, company or officer in

[183] Reg C-1(3)(2).
[184] Reg C-3(5)
[185] Reg C-1(3)(2). It must also inform the IMO of the precise coordinates to which the measures will be applicable.
[186] Michael Tsimplis: op cit, pg 437.
[187] Reg C-1(3)(3).
[188] Reg C-3(5). Conventions that apply to the ship could be bilateral, regional or international.
[189] Reg C-3(4).
[190] Michael Tsimplis: op cit, pg 438.
[191] Reg C-2(1) (2).
[192] Reg C-2(3).
[193] Ibid: pg 438.
[194] Ibid: pg 438.
[195] Reg A-3(1).
[196] Reg A-3(2).

charge[197] did not cause the damage willfully or recklessly and that every reasonable precaution aimed at minimizing the discharge /uptake has been taken before and after the accident[198]; the third exception is when the uptake or discharge of ballast water is being used for the purpose of pollution prevention or minimization[199]; the fourth exception is if high seas water is used as ballast and discharged back to the high seas[200]; and the fifth exception is where the water used as ballast is discharged back in the same location where it was taken without it being mixed with any other water from another location[201].

In addition to these exceptions, the Convention has granted each party the right to grant additional exemptions to any or all of the requirements under Regulation B-3 and C-1 in specific situations. Such exemptions can only be granted to ships which move exclusively between specified ports[202] and which only exchange water and sediments at the specified ports[203], and a risk assessment on the basis of the IMO Guidelines must have been carried out before these exemptions can be granted, and will only be granted for a period not more than five years[204]. An exemption that will cause damage to any other State irrespective of whether the State is a party to the Convention or not will not be granted[205]. Any exemptions granted must be recorded in the ballast water record book[206].

Section E- Certification and Survey Requirements for Ballast Water Management

The implementation of the Convention is dependent on the issuance of certificates of compliance to ships. The aim is that every ship that complies with regulation D-2 on every voyage will be issued with this certificate which can then be verifiable by Port States[207].

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[197] Reg A-3(2) (2).
[198] Reg A-3(2) (1).
[199] Reg A-3(3).
[200] Reg A-3(4).
[201] Michael Tsimplis: op cit, pg 440.
[202] Reg A-4(1) (1).
[203] Reg A 4(1) (3).
[204] Reg A-4(1) (4). The exemptions will become effective when the relevant information has been communicated to the IMO and the parties (Reg A-4(2)).
[205] Reg A-4(3).
[206] Reg A-4(4).
[207] Michael Tsimplis: op cit, pg 441.

Every ship subject to the Convention and larger than 400 gross tonnage[208] must have this certificate[209] after passing appropriate surveys. The administration may authorize a person or organization to survey and issue a certificate but even with that it is the administration that still remains responsible for the certificate[210]. Regulation E-3(1) further provides that the administration may request another party to survey the ship and issue a certificate, and the certificate will contain a statement that it is equivalent to a certificate issued by the administration[211]. A copy of the survey report and the certificate issued must be sent to the administration as well[212]. The language of the certificate should be that of the issuing party irrespective of whether it is the Flag State or another party[213], and in English, French or Spanish if the official language is not one of them[214].

Certificates are issued only to ships flying the flag of a State party, and the period of validity of the certificate is to be decided by the administration but should not be more than five years[215]. The Certificate issued will become invalid for a number of reasons; one, if the vessel fails a survey[216]; two, where the survey did not take place within the nominated times[217]; three, where the ship is transferred to another State[218]; and four, where there are significant changes in the systems of the ship which are relevant to ballast water management and subsequently the vessel fails her initial survey[219]. Surveys are to be carried out by officers of the Flag State or by appropriately recognized organizations or surveyors[220]; survey requirements include initial, renewal, annual,

[208] For other ships such as floating platforms, floating storage units(FSU) and floating production storage offloading units(FPSO), Reg A-1(2) requires their administration to establish appropriate procedures to test compliance; Ibid: pg 441.
[209] Reg E-2; the certificate should be issued by the Flag State after surveying the vessel and should be accepted by all parties.
[210] Reg E-1(1)(8).
[211] Reg E-3(3).
[212] Reg E-3(2).
[213] Acting as issuing party after a request from the Flag State.
[214] Reg E-4.
[215] Reg E-5(1).
[216] Reg E-5(9)(4).
[217] Reg E-5(9)(3).
[218] Reg E-5(9)(2). If transfer takes place between parties then the new administration can ask the previous administration within three months of the day of transfer for the copies of the survey report and the certificates.
[219] Reg E-5(9) (1).
[220] Reg E-1(1) (3).

intermediate and additional surveys. Initial survey means that an initial survey is conducted on a ship before it has been put to service; this will cover the ballast water management plan and the ship's relevant equipments and structure[221]. A renewal survey covers the same issues as the initial survey and it is done at periods of less than five years as specified by the administration[222]. Where a renewal survey is conducted within three months from the expiry date or after the expiry date of the existing certificate, the new certificate will be valid for up to five years from the date of expiry[223]. Intermediate and annual surveys are done around the anniversary date, which is defined as the date of the year that corresponds to the date of the expiry of the certificate[224]. Thus, annual surveys are required within three months before and after the anniversary date, and these only certify that the relevant equipment has been maintained in an appropriate manner[225]. The second and third annual survey to be carried out is the intermediate survey which must be more thorough than the first survey and full compliance must be ensured with the applicable ballast water requirements[226].

An additional survey may be required when significant modifications are made to the ship or her equipment[227]. All surveys carried out must be endorsed on the certificate[228]. No modifications which are relevant to ballast water management will be allowed after the issuance of a certificate[229]. Where ballast water management is inconsistent with the certificate or the ship is unable to comply with the Convention then the surveyor must notify the administration and the Port State, and the certificate will not be issued or where issued already will be withdrawn[230]; in addition to this, the Port State must assist the surveying entity in complying with article 9 of the Convention. The owner, operator or other persons in charge of the ship must report any accident or defects to the ship that

[221] Reg E-1(1) (1).
[222] Reg E-1(1) (2).
[223] Reg E-5(2) (1) and Reg E-5(2)(2).
[224] Reg A-1 (1).
[225] Reg E-1(1)(4).
[226] Reg E-1(1)(4).
[227] Reg E-1(1) (5). Only modifications relevant to ballast water management survey would call for an additional survey. Michael Tsimplis: op cit, pg 443.
[228] Reg E-1(3)-(5).
[229] Reg E-1(1)(10).
[230] Reg E-1(1)(6).

may substantially affect the compliance of the ship to the provisions of the Convention[231].

3.7 Strengths and Weaknesses of the Convention

As good as the Ballast Water Convention is, it still has its weaknesses and strengths. The strengths will be discussed first. Firstly, in the preamble of the Convention it is expressly stated that the Convention acknowledges the threat that ballast water poses to the conservation and sustainable use of biological diversity, as this is what the Convention in itself is trying to regulate as it states in art 1(8) that the 'Convention regulates the discharge of those organisms and pathogens that may…impair biological diversity'. Thus, the decision of the International Maritime Organization to adopt a Convention to regulate ballast water rather than annex it to the MARPOL 73/78 suggests an expanded regulatory horizon for the International Maritime Organization to engage in biodiversity protection as well as pollution prevention[232]. Secondly, Art 9(1) and Regulation B-2(6) are a strength for the Convention because, by giving Port States authority to sample ballast water in order to determine compliance with ballast water discharge standards in the absence of 'clear grounds' for believing that the ship has not conformed substantially to the Certificate, it represents a significant departure from MARPOL, and also authorizing compliance sampling rather than merely examining a paper is a major step that should enhance compliance with the Convention[233]. Thirdly, Art 8 of the Convention gives Flag, Coastal and Port States the authority to establish sanctions for violation, as this takes on an added significance given the ability to Port States to engage in compliance sampling. The Convention is thus an expanded vision of Port State Control[234]. Article 19(2)(f)(ii) prescribes the procedure for the entry into force of accepted amendments for the Annex but the described arrangements for amendments provide a lot of flexibility in the way that amendments are treated but could also be the source of complications if too many amendments especially in the Annex are introduced and objected to by some parties[235].

[231] Reg E-1(1)(7).
[232] J Firestone and J. J. Corbett: op cit, pg 295.
[233] Ibid: pg 297.
[234] Ibid: pg 297.
[235] Michael Tsimplis: op cit, pg 426.

The regulation on ballast water performance standards (D-2), although impressive, in practice cannot be monitored on board by the crew unless the mariners' training is extended to cover procedures for sampling and microbiological analysis and the ships are required to carry the relevant equipments[236]. Furthermore, regulation D-3(3) provides that ballast water management systems must be approved by the IMO, and that they 'must be safe in terms of the ship, its equipment and the crew'. This wording as suggested by Michael Tsimplis is quite narrow and can be taken to mean that such additives need not be safe to the cargo or to the environment, to the extent that under art 2(7) there is the general obligation that 'the practices used….do not cause greater harm than they prevent to their environment, human health, property or resources, or those of other States'. Thus, the regulation may be considered either as reducing or emphasizing the general obligation, hence appearing confusing and unnecessary[237].

The testing of prototype ballast water treatment technologies/systems is facilitated by allowing parties to delay for five years the application of regulation D-2 to vessels that participate in national experimental programmes for the treatment of ballast water[238]. This provision is dependent on who bears the cost of the experimental treatment technology installation and removal in case it proves unable to satisfy the standards under regulation D-2[239]. Article 8(3) requires parties to the Convention to adopt sanctions that 'shall be adequate in severity to discourage violations wherever they occur', which suggests that the drafters of the Convention were concerned with general deterrence as opposed to specific deterence[240]. Regulation C-2(1) provides that where there is a specified risk of harmful organisms existing either permanently or temporarily in an area, the party can issue warnings to the mariners prohibiting the uptake of ballast water in such areas but in areas that are reasonably clean such warnings cannot be issued. This is the most striking feature of the contrast between environmental interests and the shipping industry. While environmentally the protection of the biodiversity of the cleaner areas is

[236] Ibid: pg 429.
[237] See also Reg D-5. Michael Tsimplis: op cit, pg 431.
[238] Reg D-4.
[239] Michael Tsimplis: op cit, pg 432.
[240] J Firestone and J. J. Corbett: op cit, pg 297.

a priority and arguably more important than the cleaning up of the polluted areas, it is more justifiable in the logic of commerce to impose restrictions only where there are direct threats from existing pollution. The Convention is designed under the second way of reasoning and arguably allows very little room for measures protecting the biodiversity in unpolluted coastal areas. The warning issued should contain the area of the restriction and, if possible, alternative areas where ballast water may be exchanged[241]. Regulation B-2 provides that ships built after 2009 should be designed to minimize the amount of sediments taken in and trapped in ballast tanks, but the lack of specific criteria on the standards against which minimization would be assessed indicates that the sediment management issues have not been considered as important as the ballast water exchange issues[242].

After the adoption of the Convention in 2004, the Marine Environment Protection Committee has adopted series of Guidelines developed to assist in the implementation of the Convention.

3.8 MEPC Adopted Guidelines on Ballast Water Management

At the 53rd meeting of the Marine Environment Protection Committee held in London at the International Maritime Organization's Headquarter from 18 to 22 July 2005, 5 resolutions were adopted.

1. Resolution MEPC. 123(53)-Guidelines for Ballast Water Management Equivalent Compliance(G3): This resolution applies to pleasure craft used for the sole purpose of recreation or competition or craft used primarily for search and rescue of less than 50 metres in length and with a maximum ballast water capacity of eight cubic metres.

2. Resolution MEPC. 124(53)-Guidelines for Ballast Water Exchange(G6): This applies to all those involved with ballast water exchange, ranging from ship owners and operators, designers, classification societies and ship builders. The Guidelines define

[241] Michael Tsimplis: op cit: pg 438.
[242] Michael Tsimplis: op cit, pgs 437-438.

responsibilities, ballast water exchange requirements, safety precautions associated with ballast water exchange, crew training and familiarization issues.

3. Resolution MEPC. 125(53)-Guidelines for Approval of Ballast Water Management Systems(G8): This Guideline applies to the approval of ballast water management systems in accordance with the Convention and to ballast water management systems intended for installation onboard all ships required to comply with Regulation D-2 of the Convention. The aim of this Guideline is to ensure a uniform and proper application of the standards contained in the Convention. The Guidelines are to be updated as the state of knowledge and technology so requires.

4. Resolution MEPC.126(53)-Procedure for Approval of Ballast Water Management Systems that make Use of Active Substance(G9): This describes the approval and withdrawal of ballast water management systems that make use of Active Substances to comply with the Convention and their manner of application as set out in Regulation D-3 of the Convention. The objective of this procedure is to determine the acceptability of Active Substances and Preparations containing one or more Active Substances and their application in ballast water management systems concerning ship safety, human health and the aquatic environment. This procedure is a safeguard for the sustainable use of Active Substances and preparations, not intended for the evaluation of the efficacy of Active Substances. The goal of the procedure is to ensure proper application of the provisions contained in the Convention and the safeguards required by it. Thus, the procedure is to be updated as the state of knowledge and technology may require. New versions of the procedure will be circulated by the IMO following their approval.

5. Resolution MEPC. 127(53)- Guidelines for Ballast Water Management and Development of Ballast Water Management Plans: The objectives of this Guideline are to assist governments, appropriate authorities, ships' masters, operators and owners, and port authorities, as well as other interested parties, in preventing, minimizing and ultimately eliminating the risk of introducing harmful aquatic organisms and pathogens

from ships' ballast water and associated sediments while protecting ships' safety in applying the Convention. The Guideline is in two parts:

- Part A: Guidelines for Ballast Water Management; which contains guidance on the general principles of ballast water management.
- Part B: Guidelines for the Development of Ballast Water Management Plans; which contains guidance on the structure and content of ballast water management plans required by Regulation B-1 of the Convention.

The Guidelines apply to all ships and to flag administrations, port States, coastal States, ship owners, ship operators, and ships' personnel involved in ballast water management, ship designers, ship builders, and classification societies as well as other

interested parties[243]. Another set of Guidelines have been adopted by the Marine Environment Protection Committee at its 55th session in October 2006. They are: Ballast water exchange design and control standards (G11); Design and construction to facilitate sediment control on ships (G12); Designation of areas for ballast water exchange (G14); Sediment reception facilities (G1); and Ballast water reception facilities (G5)[244].

[243] Jukka Sassi, Satu Viitasalo, Jorma Rytkonen and Erkki Leppakoski: Experiments with Ultraviolet Light, Ultrasound and Ozone Technologies for the Onboard Ballast Water Treatment, pgs 76-77, VTT Tiedotteita Research Notes 2005, www.vtt.fi/inf/pdf.
[244] MEPC 55th sessions: 9-13, October 2006. www.imo.org

CHAPTER FOUR

4.0 AN OVERVIEW OF BALLAST WATER MANAGEMENT IN SOUTH AFRICA, CANADA AND AUSTRALIA

Despite the efforts of the International Maritime Organization in developing and implementing an international Convention for the management of ballast water, many countries, national jurisdictions and individual ports have gone ahead to develop or try to develop their own national or local legislation for the management of ballast water. Examples of countries that have implemented national legislation for ballast water management include amongst others Australia, Canada, Israel, New Zealand[245], etc. Australia, Canada and South Africa will be considered below, representing countries that have developed national legislation for ballast water management and the one that is trying to develop a national legislation for its ballast water management. Australia and Canada have signed the Convention but are yet to ratify it and are in the process of ratifying the Convention. They are one of the earliest nations to recognize the problem of ballast water or marine invasive species. They are also one of the countries that were actively involved in the negotiations of the now adopted Ballast Water Convention. As said earlier, South Africa is not a signatory to the Convention but is interested in signing the Convention soon. It is also one of the six pilot countries chosen for the Globallast programme of the United Nations, United Nations Development programme (UNDP), Global Environment Facility (GEF) and the IMO.

4.1 Overview of Ballast Water Management in South Africa

South Africa became aware of the issue of marine invasion from ballast water from the early 1990s[246]. There are fifteen known records of marine invasive species in South African waters namely four species of Ascidians, two species of snails, two species of phytoplankton, two species of crabs, one species of oyster, one species of sea anemone, one species of mussel, one species of prawn, and one species of whelk. Ballast water accounts for 41 per cent of marine introductions; aquaculture imports accounts for 13 per

[245] Signals NEP&I: the loss prevention newsletter for North of England members, signals special issue 9, January 2006, pg 3. www.nepia.com
[246] It was Australia that alerted South Africa about this issue in the early 1990s.

cent; ballast water or hull fouling account for 13 per cent; and hull fouling accounts for 33 per cent[247]. The port authorities then passed this information to an official in the Department of Environmental Affairs and Tourism (DEAT)[248], and shortly afterwards the DEAT began collecting data on ballast water discharges at its major ports[249]. The economies of South Africa and of many countries in the interior are dependent to a significant degree on imports and exports via South African ports. The ships that come into its ports to pick up cargoes for export often discharge large quantities of ballast water. It is estimated that of the 22 million tones of ballast water discharged within South African waters each year, approximately 8 million tonnes are discharged into the port of Saldanha in particular[250]. The threat ballast water poses is especially apparent in Saldanha because of the proximity of the port to sensitive resources such as the West Coast National Park, mariculture facilities, commercial fisheries and tourism. Out of the well known fifteen marine invasive species in the country, a port survey conducted by Globallast[251] in April 2001 showed the presence of eight alien species in the Saldanha bay, and since then marine invasive species have bloomed with some regularity over recent years[252].

The South African component of the Globallast programme got under way in June 2000. One of the first activities carried out was the establishment of a National Task Force or Steering Committee comprising representatives of the Department of Environmental Affairs and Tourism, the South African Maritime Safety Authority (SAMSA), the Department of Health (DOH), the Local Government in Saldanha, port authorities, the

[247] Power point presentation by Adnan Awad of Globallast: op cit.
[248] DEAT is the lead agency for environmental matters generally in South Africa. Country Profiles: South Africa. http://cvs.uwc.ac.za/viewscvs.cgi/wwwseawaste/archive/southafrica.asp?rev=HEAD, Last assessed on 23 January 2007.
[249] The collection of data was done with the assistance of the port authorities.
[250] The National Experience: South Africa, Module 3, pg 6. A short course conducted by the Globallast Programme office of Cape Town in 2006.
[251] The Globallast Programme is a cooperative initiative of the United Nations Development Programme (UNDP), the IMO and the Global Environment Facility (GEF).The purpose of the project is to raise awareness of the potential adverse effects of ballast water on biodiversity by targeting different sectors of the society such as government officials, ships crew and shore personnel's. Six pilot countries were chosen for the project Brazil, China, India, South Africa and Ukraine. The Programme is being implemented under the auspices of the DEAT in South Africa. http://wwwseawaste.uwc.ac.za/public/links.asp.
[252] The global Ballast Management Programme (Globallast) in Africa, www.botany.uwc.ac.za/pssa/articles/features/no53.htm

shipping industry, the non-governmental organizations and academics. The Department of Environmental Affairs and Tourism, through the Globallast programme is in the process of developing a pilot ballast water management plan for the port of Saldanha[253]. The plan is aimed at reducing the transfer of potentially harmful organisms in ships' ballast water[254]. Other specific activities that have been carried out by the Globallast Programme here in South Africa includes amongst others:

- Awareness raising on the issue of ballast water.
- A review of relevant national legislation and participation in an international legal review[255].
- The development of a draft policy on the management of ballast water in South Africa, and participation in a national task team on Invasive Alien Species.
- The establishment of a Regional Task Force on Ballast Water Management and the development and part implementation of a Regional Action Plan.
- Customization and delivery of the training course on ballast water.
- Supporting local efforts in developing an effective ballast water treatment system.
- A schools outreach programme aimed at introducing the subject into school curricula and providing teachers with relevant training and materials.
- A community outreach programme focused on communities in and around Saldanha.
- Training for national team in ballast water risk assessment.
- System designed and implemented for Saldanha bay.
- National Ports Authority building databases for nation replication.

A national policy for ballast water management was drafted which recommended the approach South Africa should take in managing its ballast water issues. The approach recommended is the blanket approach which regards all vessels carrying ballast water as

[253] Which will act as a model for other ports.
[254] Globallast Outreach Programme for the Global Ballast Water Management Programme South Africa, www.eeu.uct.ac.za/project_summaries/globallast.html.
[255] The Legal Review was done by Prof Jan Glazewski of UCT assisted by Emma Witbooi in 2001.

posing a potential risk and requires them all to take specified measures to reduce or eliminate that risk. It goes further to recommend that the ballast water exchange method should be accepted as a temporary and interim measure to minimizing or eliminating risks as the method is an inadequate means of reducing risks, and which should be replaced with ballast water treatment techniques that will be safer and more effective as soon as possible[256]. The draft policy also recommends that in order not to disrupt commercial activities or to minimize disruptive effects on trade, the introduction of ballast water control measures be phased in gradually and increase progressively the standards required as improved techniques and technologies become available. With the approach of phasing in, the draft policy would have to be communicated to stakeholders so as to give them the opportunity to become involved in the finalization and in the development of any new legislation that may be required.

The draft policy further recommends that irrespective of the efforts directed into reducing the risks of introduction, invasions will still occur; hence it will be necessary to develop a contingency plan to respond and deal with such invasions. And in responding to such invasions the Government should establish financial mechanisms to ensure that the necessary funds are available for emergency responses to invasions and also to recover some of the costs associated with ballast water management programmes[257]. The draft policy also established goals which are grouped into five themes which are meant to define the main areas where government intervention is needed in ballast water management. The five themes are: Improving the information base for decision making; establishing port ballast water management programmes; Integrating ballast water management into national biosecurity framework; Ship board matters; and International matters[258].

4.2 Overview of Ballast Water Management in Australia

Australia had long recognized the potential of ballast water creating problems since the

[256] Module 3: country Profile, op cit, pgs 9-10.
[257] Module 3: op cit, pg 11.
[258] Ibid: pg 11.

late 1970s but it was only in recent times that the issue became a significant one[259]. It was one of the first countries to seek international action on this problem through the International Maritime Organization. Australia is an island continent that is heavily dependent on international water borne transport for its international trade. It has a fragile marine ecosystem with important coral reefs and rare species, a marine capture fishery, and a coastal aquaculture industry with a particular focus on shellfish. Concern about invasive species in ballast water and on ship hulls was triggered by its impacts on the aquaculture industry and the human health risk posed by toxic organisms transported to Australia in ships' ballast water and entering the human food chain[260]. The Australia Quarantine and Inspection Service (AQIS) is an agency that has been designated as the lead agency for the management of ballast water risk in Australia. The AQIS, in playing its role of managing the issue of ballast water, introduced in 1990 'Voluntary Ballast Water Guidelines' in response to early concerns that ballast water from overseas ports may contain exotic species that have an adverse impact on the marine environment[261].

The Guidelines were refined and became mandatory on 1 July 2001 as the Australian Ballast Water Management Requirements[262]. The purpose of the mandatory ballast water management requirements is to reduce the risk of introducing harmful aquatic organisms into Australia's marine environment through ships' ballast water[263]. Australia then adopted a coordinated national approach to ballast water management in 1994 by supporting research into management techniques, developing a computer based Decision Supporting System (DSS) for targeting high risk vessels in order to avoid unnecessary inspection, introduced a ballast water research development levy on ships and cost recovery fees for inspection and documentation services. It also developed coastal ballast

[259] In 1973, studies in New South Wales gave warning that non-indigenous fish species were introduced; S. Gollasch: op cit pg 71.
[260] Ibid: pg 71
[261] The Guidelines are said to be a model for the 1991 IMO Guidelines.
[262] Ibid pg 71; Tony Snell and Karina McLachlan: Post Implementation Review for Australia's Mandatory Ballast Water Management Requirements March 2003, pg 3;
Environmental Fact Sheet: Ballast Water Management in Western Australia. Pg 1, www.freemantleports.com.au/Environmentsafety/caring/fact_sheets_2.pdf.
[263] The Department of Agriculture Fisheries and Forestry: Australian Ballast Water Management Requirements, pg3 www.aqis.gov.au/; Tony Snell and Karina McLachlan: ibid, pg 2.

water management guidelines on a pilot project basis[264]. The Federal Government has also established the CSIRO Centre for Research on Introduced Marine Pests (CRIMP)[265]. It initially focused on port surveys for Australia's major ports, with the aim of collating baseline data[266]. This baseline data has become the basis of the risk based Decision Support System (DSS). The DSS assesses the risks presented by each ship visit by looking at which ports the ship has previously called the baseline information for the destination port and the degree of matching of environmental habitats. The combination of all this information allows the likelihood of a successful translocation to be estimated and consequently, assignment of the most appropriate ballast water management options to the ship being granted permission to enter Australian waters. Most importantly, the master of a ship must obtain a written permission from a quarantine officer before discharging ballast water in Australian ports[267].

The purpose of the national approach adopted by the Australian government in 1994 was to work with State Territory government's agencies, marine industries, researchers and conservation representatives in developing a National System for the Prevention and Management of Marine Pest Incursions (The National System). The system will have three major components: Prevention, Emergency response, and On going control and management[268]. It will also have several supporting components that will include strategies for research and development, communications, monitoring, review and evaluation. The National Supporting System was implemented in October 2006. Through the National System, the Australian, Northern Territory and State governments are developing nationally consistent ballast water management arrangements.

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[264] Ibid: pg 71.
[265] The objectives of CRIMP are to develop and promote the application of tools for an earlier warning, more precisely, prediction and more effective assessment of risks and costs of marine pest species introduced to Australia, as well as the development of new methods or improvement of existing measures to control the spread and to minimize the impacts of introduced marine species. S. Gollasch: op cit, pg 38
[266] ie identification of marine pests that had already become established.
[267] Ballast Water Management in Western Australia: Environmental Facts Sheet, pgs 1-2.
[268] Prevention: prevention systems to reduce the risk of introduction and translocation of marine pests (including management arrangements for ballast water and biofouling); Emergency response: A coordinated emergency response to new incursions and translocations; Ongoing control management: managing introduced marine pests already in Australia.

These arrangements are requirements that will be consistent with the Ballast Water Convention and also allow Australia to manage the risk from marine pest introductions from both internationally and domestically sourced ballast water and sediments. The National Ballast Water Requirements are currently being developed[269].

The 2001 mandatory requirements prohibit the discharge of high risk ballast water in Australian ports or waters; prohibit sediment discharge into Australian waters; provide options for ballast water management which include using the ballast water decision support system, tank to tank transfer, non discharge of high risk ballast water, full ballast water exchange at sea, sequential exchange (which involves emptying tanks a few at a time of high risk ballast water at sea before refilling them with clean water from the deep ocean), flow through method, and dilution methods. The requirements also provide that all vessels arriving from international waters into the Australian ports must submit a 'Quarantine Pre-Arrival Report' to the Australian Quarantine and Inspection Service. The report will provide information about the vessel, human health, pet animals/birds on board and recent visits by the vessel to places where organisms of concern to quarantine are known to exist. The Mandatory Requirements further provides for verification inspection to be carried out by the AQIS officers onboard vessels to ensure compliance with the Requirements. They also set standards for every option for managing ballast water. For instance, the sequential exchange method will require that at least 95 per cent of the water in a given tank must have been drawn from the deep ocean on arrival in Australia. The residue that remains at the end of the emptying phase must be less than 5 per cent of the total volume contained in the tank on arrival in Australian waters[270].

4.3 Overview of Ballast Water Management in Canada

Canada and Australia were the earliest countries to raise the concerns on invasive species from ballast water, and in 1988 Canada presented to the International Maritime Organization a study report titled 'The Presence and Implication of Foreign Organisms in

[269] The National System for the Prevention and Management of Marine Pest Incursion.
[270] Department of Agriculture, Fisheries and Forestry: op cit, pgs 4-11.

Ship Ballast Water Discharged in the Great Lakes'. Canada's concern stems from the significant economic impact of the introduction and spread of a non native mussel species in the St Lawrence Seaway and Great Lakes. St Lawrence and the Great Lakes are water systems shared by the United States and Canada, and as far back as 1954 they both adopted a 'Convention on Great Lakes Fisheries' which created a 'Great Lakes Fisheries Commission' to control the introduction and eradication of the non native highly invasive Atlantic Sea Lamprey. The Canadian Coast Guard in 1989 developed a 'Voluntary Guidelines for the Control of Ballast Water Discharges from Ships Proceeding to the St Lawrence River and the Great Lakes'. This voluntary guideline requires that all ships file a Ballast Water Exchange report on entry into the St Lawrence and also provides for a designated alternative discharge zone where deep water exchange was possible for reasons of safety or the voyage route. The Guidelines were rescinded and replaced in September 2000 but modified in June 2001 by another guideline called 'The Canadian Ballast Water Management Guidelines' and amended again in 2001[271]. The application of the Guidelines was expanded to cover all waters under the Canadian jurisdiction and renamed 'The Guidelines for the Control of Ballast Water Discharge from Ships in Waters under Canadian Jurisdiction' TP 13617[272].

On the side of the United States, the US Coast Guard in 1993 introduced Mandatory Regulations that required ballast water exchange for ships travelling to the Great Lakes. These Regulations were amended in 2004 to make reporting mandatory in all United States waters, and further amended in 2005 to make ballast water management mandatory in all United States waters. The 2001 Guidelines were developed by the Canadian Marine Advisory Council (CMAC)[273], and were not considered as law in Canada but it was believed that they would become Regulations in 2002, as there was legislative authority to adopt such regulation under the Canada Shipping Act.

[271] The Guidelines are intended to implement the IMO Guidelines with regional annexes setting out specific additional requirements; Globallast Legislative Review Final Report: op cit, pg 73.
[272] A Guide to Canada's Ballast Water Control and Management Regulations 2006, pg 4, www.tc.gc.ca/MarineSafety/TP/Tp13617/Tp13617E.pdf. Last assessed 6 February, 2007.
[273] The Council is a consultative body with a secretariat in the coordination and consultation Directorate of Transport of Canada, and it has both national and regional consultations and includes representatives from parties with interest in navigation, shipping and marine pollution.

In 1998, the Vancouver port authorities issued supplemental requirements called the 'Harbour Master Standing Order' requiring compliance with the Guidelines and mandatory ballast water management for vessels discharging more than 1000 metric tonnes of ballast water or from specified areas. These supplemental requirements comprised Annex 1 of the Guidelines. Then Transport Canada introduced a Bill in June 2005 to make certain voluntary measures contained in the Guidelines mandatory for all ships carrying ballast water and entering waters under the Canadian jurisdiction[274].

On June 28, 2006 new National Ballast Water Management Regulations entered into force and they supersede the Vancouver port authority's Ballast Water Standing Order. The Regulations are part of the Canada Shipping Act and Transport Canada is the federal government department responsible for the compliance and enforcement of these regulations[275]. The new Regulations apply to all ships in waters under the Canadian jurisdiction that are designed to carry ballast water; they recognize four ballast water management options, which can be used separately or in combination[276]; ballast water taken on in areas outside waters under Canadian jurisdiction should not be discharged in waters under Canadian jurisdiction, unless one of the ballast water management options has been successfully performed. And any method used must not compromise the safety of ship or crew and must minimize the potential of introduction of harmful aquatic introductions; ships must carry on board and implement ballast water management plans which must set out safe and effective procedures for ballast water management as required by the Regulations; and also ships proceeding to ports on the West Coast must submit ballast water reporting forms either by email or fax and a copy of every submitted form must be carried onboard ship for 24 months. The Regulations also set standards for ballast water exchange and ballast water treatment; prohibit the discharge of sediments anywhere except a reception facility and also provide that ballast water management is unnecessary for ships operating exclusively between ports, offshore terminals or

[274] Globallast Legislative Review Final Report: op cit, pg 74; St. Lawrence Centre: Managing Ballast Water to Reduce the Risk of Invasion by Non Indigenous Species. www.qc.ec.gc.ac/csl/inf/inf061_e.html, Last assessed on 6 February, 2007.
[275] Ballast Water Control and Management Regulations Information Pamphlet December, 2006: pg 2. www.pacificgatewayportal.com/pgpsite/static/. Last assessed 6 February, 2007.
[276] Treatment, discharge to reception facility, retention on board ship and exchange. Ibid, pg 2.

anchorage areas situated on the West Coast of North America, North of Cape Blanco. They have also designated alternative exchange zones for ships that cannot go into deep waters for ballast water exchange due to exceptional circumstances but such exchange can only take place in these designated zones after notifying the authorities [277].

[277] Ibid: pg 2-4.

CHAPTER FIVE

5.0 GLOBAL CHALLENGES FACING THE IMPLEMENTATION OF THE CONVENTION

Having mentioned in chapter three that the Convention is yet to come into force since its adoption, it is imperative to look at the problems, barriers or challenges that might weaken the effective implementation of the Convention when it eventually comes into force.

1. Ratification

This is the main problem the Convention is currently facing as per its entry into force. For the Convention to see the light of the day rapid ratification must be encouraged so as to ensure a uniform international regime instead of a plethora of differing unilateral regulatory responses currently faced by the industry[278].

2. Awareness

Many countries particularly developing countries do not consider the ballast water issue as a major problem nor do they know the danger that marine invasive species can pose to their marine environment.

3. Ballast water management plan

The technical aspect of the Convention is hinged on this plan as it emphasizes that all ships must have a plan and also carry it for inspection purposes. This must be ensured by Flag States, Port States and Coastal States.

4. Ballast water treatment

At present, there is no proven treatment yet for treating ballast water on ships. But numerous problems must be overcome if ballast water treatment is to be introduced within the timescale required by the Convention. One of the problems is safety of the ship, the crew or equipment. Treatment to be developed must not pose a threat to the life

[278] Dandu Pughuic: Ballast Water Problem—A New Challenge for the shipping industry, pg 13. www.pmaesa.org/Maritime/GAOCMAO%20Paper.doc.

how to safely operate any treatment system installed on the ship.Another problem is that one system will not be used for all ships due to their various sizes, design, age, type, trading routes, type of trade, the ships pumping capacity, the available space in the engine room and the cost of purchasing, installing and operating the system. Space constraints in a ship's engine is also a problem as any new system that will be installed must be compact and flexible as much as possible; also energy constraints may pose another problem as there is only a limited amount of energy a ship can generate; thus, any system developed must be energy efficient. Also, any system developed must be able to comply with the performance standards at the pumping capacity of a ship's ballast pump so as not to cause any significant delay in loading or offloading cargo which could lead to problems with shippers or receivers and disputes between charterers and owners. Another problem envisaged is the cost of procuring, installing, operating and maintaining the new system which when added to the cost of training a ship's crew to operate and maintain the system must not be prohibitive[279].

5. Reception facilities at ports and coastal states for discharged ballast water must be provided for ships that cannot conduct ballast water exchange in the open sea and also as an alternative to other options of managing ballast water.

6. <u>The management of onboard sediments</u>

Specific criteria for the amount of sediments that can be trapped in a ballast tank must be set by the IMO so that ship designers will know by what standards a ballast tank should be designed in reducing the amount of sediments that can be trapped in it.

7. The Convention requires that sediment reception facilities must be provided in ports and terminals where cleaning of and repair of ballast tanks takes place. They are intended to provide a safe disposal of sediments and operate without causing undue delay to ships[280].

[279] Signals Special Issue 9, January 2006: op cit, pg 5
[280] Signals Special Issue: op cit, pg 6.

8. Ballast water exchange at sea

It has a number of practical problems that it must overcome for there to be a practical compliance. Firstly, there is no guarantee that at the place where ballast is exchanged the water there will be clean; secondly, where ships can comply with exchanging ballast water in a designated place, investigations have raised a lot of concern for the safety of many existing ship types when using the pump through or flow through method; thirdly, the effect of increased ballast water exchange on the paint coating of a ship's tank must be considered. It is thought that if a ship carries out ballast water exchange more frequently then there will be the need to keep re-coating the ship as frequently as the exchange is been done. This could mean that more time will be spent in dry-dock and increased paint and labour; and fourthly, the master of the ship's decision not to comply with the requirements of the Convention if such an exchange would threaten the safety or stability of the ship, its crew or its passengers because of adverse weather, ship design or stress, equipment failure or any other extraordinary conditions must be considered carefully since the local authorities at the ports may think that such decision is unreasonable[281].

5.1 CONCLUSION

The International Convention for the Control and Management of Ships' Ballast Water and Sediments is the first international attempt so far to provide a legal and technical instrument for a risk that has not been covered by any legal regime[282], and it has ushered in a new era in more than one way. For instance, it suggests a continuing move by the International Maritime Organization away from the MARPOL approach and towards a stand-alone environmental convention with different entry into force and amendment requirements than contained in MARPOL. It also suggests that the global community has come to recognize that near exclusive flag state control is outmoded and that flag state prerogatives must be complemented by, and in some circumstances give way to, coastal

[281] Signal Special Issue: op cit, pg 4.
[282] Michael Tsimplis: op cit, pg 411.

and port state jurisdiction in an era where crew safety, while still paramount and reasonably a flag state interest, has been joined by biodiversity protection, primarily a port or coastal state interest. And it also provides evidence that the global community has begun take seriously the threat posed by organisms and pathogens contained in ballast water[283].

5.2 RECOMMENDATIONS

- General awareness raising and training must be provided for all crews in the issue of ballast water management otherwise the objectives of the Convention will not be achieved. For instance, training must be provided on how the crew can complete the ballast water reporting form and submit to shore based authorities when arriving for ballast[284].

- As several research studies have shown that each single vessel has the potential to introduce alien invasive species, all International Maritime Organization member States must be encouraged to ratify the Convention as soon as possible, as the purpose of the Convention is to reduce the introduction of unintentional transported organisms in ballast water[285].

- Regional cooperation on ballast water control and management should be encouraged amongst developing countries and be coordinated through existing regional structures and mechanisms[286].

- Developing countries must be assisted in drafting national policies for the implementation of the Convention.

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[283] Jeremy Firestone and J. J. Corbett: op cit, pg 308.
[284] Dandu Pughuic: op cit, pg 13.
[285] S. Gollasch: op cit, pg 147.
[286] Dandu Pughuic: op cit, pg 11.

- The International Maritime Organization should encourage Port and Coastal States to designate particular areas for ballast exchange so as to simplify the provisions of the Convention[287].

- There must be international standards and procedures in place for the evaluation and approval of new ballast water treatment systems.

- Effective ballast water treatment technology/systems must be developed in time so that new ships will be designed around these new technologies.

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[287] Ibid: pg 11.

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