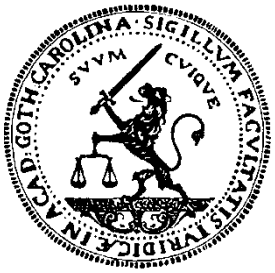

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Ballast Water Management
Legal Approaches

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Contents

Summary

The introduction of invasive marine species into new environments by ships' ballast water and via other vectors has been identified as one of the four greatest threats to the world's oceans and yet this problem has gained little public attention. In the last few decades dramatic invasions, such as *e.g.* the spread of the zebra mussel in the Great Lakes marine area of the USA and Canada, have brought the issue to the attention of the world's policymakers. The international response has in largely consisted of voluntary measures that have been focused on ballast water exchange. This method has become the most commonly implemented ballast water management measure, despite the fact that it is increasingly considered as unsafe and inadequate for controlling unintentional species transfer.

In 2004 the IMO concluded the International Convention on the Control and Management of Ships' Ballast Water and Sediments, the first comprehensive and binding international legal instrument on the issue, expected to enter into force during 2013. The convention includes ballast water exchange as a requirement, but this method will be phased out and replaced by a more stringent ballast water performance standard. This will require onboard treatment systems to ensure that the amounts of viable organisms that are released with the ballast water are at a minimum. The convention is a significant step forward, but its success will depend on if it can be acceded and implemented globally, also by the less-industrialised states. The disparity amongst states in terms of resources will be the greatest challenge, a challenge that hopefully can be overcome by international cooperation and the sharing of resources and knowledge.

Regional cooperation is as important as the global perspective for solving the ballast water problem. In Europe the EU has responded slowly and indecisively and there is currently no common EU policy on ballast water. This is unfortunate and could adversely affect both the marine environment of the whole region and trade for some of the EU states. This thesis suggests that the EU common strategy on invasive species, which is currently being developed, should contain a common approach on ballast water management based on mandatory measures.

Having both important shipping routes and sensitive marine environments such as the Baltic Sea to consider it may appear as surprising that Sweden has no ballast water regulations that are in effect. However, Sweden has acceded the international convention and made the adequate preparations for its entry into force. The new Swedish ballast water law has transformed the substance of the convention into Swedish law, and it will become effective following the convention's entry into force. That these are the only steps that have been taken is reasonable considering the EU membership and that the union has not yet decided on possible common measures.

Sammanfattning

Spridningen av främmande invasiva arter i den marina miljön genom barlastvatten och andra bärare har blivit fastställt som ett av de fyra största hoten mot världshaven, men trots detta har problemet blivit lite uppmärksammat av allmänheten. Under de senaste decennierna har spektakulära fall av invasioner, såsom t.ex. spridningen av vandringsmusslan till de amerikanska och kanadensiska Stora sjöarna, gjort att problemet uppmärksammats internationellt. Responsen har till stor del utgjorts av frivilliga åtgärder som mestadels har varit fokuserade på skifte av barlastvatten. Detta har gjort att denna metod har blivit den vanligaste implementerade åtgärden, trots att metoden allmänt anses som förknippad med risker och som otillräcklig för att kunna begränsa den oavsiktliga spridningen av arter.

2004 färdigställde IMO den internationella barlastvattenkonventionen, det första övergripande och bindande dokumentet inom internationell lag på området, som beräknas träda i kraft under 2013. Konvention har inkluderat skifte av barlastvatten som ett krav för en del fartyg men metoden kommer att fasas ut och ersättas av en strängare standard. Denna standard kräver att det finns barlastvattenhanteringssystem ombord för att säkerställa att antalet livskraftiga organismer som släpps ut med barlastvattnet hålls på ett minimum. Konventionen är ett stort steg framåt men dess framgång kommer att bero på om den lyckas etablera sig globalt och om utvecklingsländer ansluter sig och kan implementera den. Resursskillnaden stater emellan är den största utmaningen, vilken förhoppningsvis kan överkommas genom internationellt samarbete och därigenom spridning av resurser och kunskap.

Samarbete på regional nivå är lika viktigt som att ha ett globalt perspektiv om barlastvattenfrågan ska få en lösning. För Europas del har EU varken agerat snabbt eller bestämt i frågan och det finns för närvarande ingen gemensam barlastvattenpolicy. Detta är olyckligt för den marina miljön men även för handelsmöjligheterna för en del av EU:s medlemsstater. Det är åsikten av denna uppsats att den gemensamma EU-strategi angående invasiva främmande arter, som för närvarande håller på att upprättas, bör innehålla ett gemensamt ställningstagande i barlastvattenfrågan. Detta ställningstagande bör utmynna i obligatoriska åtgärder.

Då Sverige måste ta hänsyn både till viktiga fartygsleder och känsliga marina miljöer såsom Östersjön så kan det uppfattas som förvånande att Sverige saknar gällande regleringar för barlastvatten. Dock har Sverige anslutit sig till den internationella barlastvattenkonventionen och gjort de förberedelser som anslutningen kräver. Barlastvattenlagen har omvandlat konventionens legala substans till svensk lag och den nya lagen kommer att träda i kraft när konventionen träder i kraft. Med hänsyn till Sveriges medlemskap i EU och då unionen ännu inte har beslutat om eventuella gemensamma åtgärder är det rimligt att inga ytterligare åtgärder vidtagits.

Abbreviations

AIS	Alien Invasive Species
AOT	Advanced Oxidation Technology
Barcelona Convention	Convention for the Protection of the Mediterranean Sea Against Pollution
Bern Convention	Convention on the Conservation of European Wildlife and Natural Habitats
Bucharest Convention	The Convention on the Protection of the Black Sea Against Pollution
BWM Convention	International Convention for the Control and Management of Ships' Ballast Water and Sediments
CBD Convention	The Convention on Biological Diversity
CFP	Common Fisheries Policy
COP	Conference of the Parties
EEZ	Exclusive Economic Zone
EU	European Union
EUR	Euro
HELCOM	The Helsinki Commission
Helsinki Convention	The Convention on the Protection of the Marine Environment of the Baltic Sea Area
IMO	International Maritime Organization
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978
MEPC	Marine Environment Protection Committee

Oslo Convention	Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft
OSPAR Convention	The Convention for the Protection of the marine Environment of the North-East Atlantic
Paris Convention	Convention for the Prevention of Marine Pollution from Land-based Sources
Paris MOU	Paris Memorandum of Understanding
SMHI	Swedish Meteorological and Hydrological Institute
UNCED	United Nations Conference on Environment and Development
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USA	United States of America
USD	United States dollar
WSSD	World Summit on Sustainable Development

1 Introduction

"The best time to plant a tree was twenty years ago. The next best time to plant a tree is today."
- Old Chinese proverb

1.1 Background

Over 90 % of world trade by volume is seaborne.[1] To say that shipping is important for international trade is an understatement; in fact it is essential. There are several environmental issues to be considered with regard to shipping but one of the greatest threats to the marine environment caused by shipping is largely unknown to the general public. Every year several billion tonnes of ballast water is transferred internationally by vessels carrying at least 7000 marine species.[2] These hitchhikers are in some waters causing ecosystem collapses with severe consequences for both marine life and humans alike.

The international response to the ballast water problem has been slow but the International Convention for the Control and Management of Ships Ballast Water & Sediments (BWM Convention) of the International Maritime Organization (IMO) is expected to enter into force before the end of 2013. Much hope has been invested in the convention but according to the critics the convention regime is not stringent enough. Making the situation worse is that measures need to be globally consistent to be truly efficient, because of the transboundary nature of the problem. It would make no sense, and could hinder international trade, to implement ballast water management measures in *e.g.* one state if the neighbouring states have chosen not to regulate.

Ballast water exchange is today the most commonly used method of managing ballast water. This method is in many ways inadequate in regard of environmental protection and concerning the safety of ship and crew. More efficient ballast water treatment systems have been, and are currently being developed by companies from various countries. However, solving the technical problems may not solve the availability of such systems for developing countries. The disparity in wealth from a global perspective may further slow down developments in this field. Ballast water management is, as evident from the above, a very complex issue that must be addressed internationally as well as at regional and national level and by combining several different scientific approaches such as international law and ecology.

[1] Matej & Gollasch, *EU shipping in the dawn of managing the ballast water issue*, Marine Pollution Bulletin 56, pp. 1966-1972, 2008.
[2] Rolim, Maria Helena, *The International Law on Ballast Water: Preventing Biopollution*, 2008, p. xii.

1.2 Aim

How to avoid the spread of alien invasive species via ballast water and sediments is a question that requires knowledge of several academic fields such as *e.g.* law, biology, technology and economics to fully answer. The aim of this thesis is to describe and analyse the legal approaches to this complex problem, from an international, regional and national perspective. For the purposes of this thesis the European Union is considered as the regional perspective and Sweden as the national approach. In order to determine if they can function without conflict the existing legal frameworks at each of these different levels are identified and analysed. The focus is the adequacy, the effectiveness and the viability of the relevant laws.

1.3 Delimitations

Alien invasive species (AIS) is a very broad topic in itself but it is for the purposes of this thesis limited to a cursory introduction and to the transfer of alien aquatic species by ballast water and sediments. Shipping is the main vector of aquatic species transfer and any issues pertaining to aquaculture are outside the scope of this thesis. The subject is laws for the management and control of ballast water and for this reason hull fouling is not discussed or analysed, even though it is known that a significant number of species also travel on the hull of ships.

The commercial aspects of ballast water management, such as costs for ship owners and other enterprises, are mentioned but not analysed or investigated in any detail.

The European Union (the EU) and Sweden are, respectively, the selected regional and national approach to ballast water management. The EU is investigated as a region and any specific national laws of countries within the community, except Sweden, are not described or discussed.

1.4 Disposition

To facilitate the understanding of the problem an introduction to ballast water, ballasting procedures, marine life in ballast water and ballast water management techniques and technologies is given in chapter 2. The thesis is then structured from the broad to the narrow, starting with an overview of the international legal framework in chapter 3 and continuing with the European perspective in chapter 4 and the Swedish perspective in chapter 5. The BWM Convention is expected to come into force next year and, as this convention is presently the most important international development within this field, a more detailed presentation of the convention is made in chapter 3. The significance of the BWM Convention is discussed throughout the

thesis. In chapter 4 the relevant EU legislation is presented and discussed. This chapter also includes a presentation of the Regional Seas programmes relevant for Europe as well as an introduction to pertinent parts of the 1979 Bern Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). Chapter 5 provides a presentation of the Swedish approach to ballast water management. Each chapter is concluded with pertinent observations made in regard to the content of that chapter. Finally a summarising discussion is presented along with the author's conclusions.

1.5 Method and Material

As ballast water management involves not only legal analysis but requires a basic understanding of many scientific disciplines, the research for this thesis started with contacting expertise, *e.g*. a marine biology researcher and with the developers of Pureballast, the first ballast water treatment system to receive final approval by the IMO. Interviews and correspondence with these experts were used to gain an overall better comprehension of the subject but not used as sources of facts or opinions. Contacts were also made with experts at Globallast and at Transportstyrelsen. Because of the limited amount of written material that is available concerning the Swedish approach to ballast water management the email correspondence with Transportstyrelsen has been included as reference for certain information.

Basic materials for this thesis are publications such as textbooks, articles and official publications by *e.g.* the IMO and the Swedish Government. Official websites and online databases of international organisations, governments, conventions and projects were consulted for updated information. Legal source material, such as the published versions of laws, treaties and legal propositions *etc*., provide the basis for much of the analysis.

The thesis is written in a descriptive form with analytical and normative elements incorporated both in the main body of text and in the concluding chapter.

2 Ballast Water

Ballast has always been required in shipping to ensure safe operation of ships. Before the 20th century ballast was usually carried in the form of solid, heavy materials such as rocks or sand. From the 1880s and onward ballast in the form of water became the most popular solution as it prevented instabilities due to the shifting of solid ballast that could occur during the voyage.[3] Today, as global shipping is the most commonly used way of transporting goods around the world, a vast amount of ballast water is being released in waters outside all shipping destinations. Naturally the worst affected locations are the major ports for large-volume bulk cargo shipments such as those located in Australia, Indonesia and the USA. In total, it has been estimated that 10 billion tonnes of ballast water are annually transferred around the world carrying with it millions of marine organisms, several thousands of species being transported with every ship.[4]

2.1 Ballast Water & Ballasting

Ballast water is defined by the BMW Convention as: "… water with its suspended matter taken onboard a ship to control, trim, list, draught, stability or stresses of the ship."[5] This definition includes both the water carried onboard the ship in the ballast tanks as well as the sediments that accumulates therein. This is important as the transfer of alien aquatic organisms can be both through the release of water and through the release of sediments.

When a ship is fully loaded there is no need for ballast, as the cargo will provide for stability. However, when the ship's cargo space is empty or only partially loaded ballast is needed for providing stability, reducing the stress on the hull, controlling the submergence of the propeller and for aiding manoeuvrability. Many different types of vessels carry ballast water and accordingly there are great variations in ballast systems, which are inevitably complex. The amount of water taken onboard can vary from several cubic meters for smaller fishing or sailing vessels up to hundreds of thousands cubic meters for large tankers.[6]

Ballast water is usually taken onboard while the ship is in port by using either pumps or gravity feed. During the duration of the voyage the

[3] National Research Council (U.S.) Commission on Engineering and Technical Systems, Committee on Ships' Ballast Operations, *Stemming the tide: controlling introductions of nonindigenous species by ships'ballast water*, 1996, p. 22.
[4] Leppäkoski, Gollasch & Olenin (eds.), *Invasive Species of Europe. Distrubution, Impacts and Management*, 2002, p. 485.
[5] International Convention for the Control and Management of Ships' Ballast Water and Sediments, article 1 (2).
[6] See *supra* note 3, p. 23.

appropriate amount of ballast water may change in which case additional ballast water may be taken on *en route*.[7] When the ship has arrived at its port of destination the ballast water is discharged during the loading process.

2.2 Alien Organisms and Species in Ballast Water

Scientist have noted since the beginning of the 20th century that shipping is causing the unintentional transfer of alien species between areas vastly distant from each other. However, the issue did not receive much attention until the 1970's when the first documented studies by sampling of ballast water were carried out.[8] Today is has been estimated that at least 7000 different species are transported around the world in the ballast tanks of ships.[9] According to another estimate on average 3000-4000 species are each day transported between continents in this way.[10] These species range in size from microorganisms to whole fish and can include viruses, bacteria, fungi, plants (*e.g.* algae), and animals (*e.g.* molluscs and crustaceans).[11] Life in ballast tanks is tough and the majority of the organisms will not survive the journey, as most of them are likely to die from the lack of food or light or because of the wrong water temperature. Nevertheless, as studies have shown, plenty of species can survive these harsh conditions and remain in a viable state during several months on end.[12] Even for the sturdiest of organisms the challenge to survive does not end with the journey. The introduction to a new environment, when these microscopic stowaways are finally discharged with the release of ballast water, is seldom successful. Most of the individuals do not establish themselves after release but disappear.[13]

That some organisms do manage to establish themselves in a new area is not always a problem or a threat to the biodiversity of the new habitat; in fact most of alien organisms are benign and able to live in harmony with the native inhabitants. Some non-native species can even be beneficial by *e.g.* becoming a source of food that can boost local populations of fish.[14] However, in some cases the accidental introduction of an alien species can have catastrophic effect on the local marine environment if the species introduced becomes invasive. Invasions occur when an alien species has been carried, safely in the ballast tanks, over the natural environmental

[7] See *supra* note 3, p. 27-29.
[8] See *supra* note 4, p. 218.
[9] See *supra* note 2, p. xii.
[10] See *supra* note 4, p. 218.
[11] See *supra* note 3, p. 15.
[12] IMO Assembly Resolution A.868(20), *Guidelines for the control and management of ships' ballast water to minimize the transfer of harmful aquatic organisms and pathogens*, 1997, chapter 1(1).
[13] See *supra* note 3, p. 16.
[14] See *supra* note 2, p. 16.

barriers and later released in distant waters that are optimal for their survival in terms of temperature etc. but lacking natural predators and competitors. In some instances this can lead to the explosive and uncontrollable spread of the newly introduced species, often with an irreversible and very harmful impact on local marine life.[15]

There are many definitions and terms used to describe alien species but in general an alien species is considered as a species that is found outside its normal distribution area in a region where it is non-native, if the introduction has been directly or indirectly caused by the movement of a human agent.[16] Alien species that threatens ecosystems, habitats or species are often referred to as alien invasive species (AIS).

There are several very well known situations around the world where the unintentional introduction of an alien aquatic species has caused environmental disaster. One of the most famous examples is the zebra mussel (*Dreissena polymorpha*) and its journey to the Great Lakes of Canada and the USA. The zebra mussel is indigenous to Europe but it has spread through shipping to North America where it was first discovered in the Great Lakes during the late 1980s.[17] The zebra mussel is a fresh water animal but it is also capable of living in brackish water.[18] This flexibility increases the mussel's chances of survival when moved to a new environment. When the mussel is introduced to a suitable habitat it can reproduce in large numbers, forming substantial colonies by attaching themselves to whatever solid underwater material that comes in their way. The enormous amounts of zebra mussels that are now present throughout most of North America has affected not only local marine life but also infrastructure, local business and the recreational use of beaches. The zebra mussel reduces the available food sources for local species of fish by filtering large amounts of phytoplankton from the water and is also disruptive in that its presence alters the physical conditions of the water.[19] With less phytoplankton in the water it becomes clearer which increases light and contributes to algae blooms. The mussel is currently costing the United States and Canada vast amounts to keep submerged objects such as pipes, conduits and the hulls of ships free from the invaders. The cost for controlling the mussel has been estimated to amounts ranging from 100 million USD to 400 million USD annually.[20]

Another well-known example of aquatic AIS is the North American comb jelly (*Mnemiopsis leidyi*). The comb jelly has been transferred to Europe where it has established itself in the Black Sea region, most likely as an unintentional effect of ship borne trade. The invader has since its

[15] See *supra* note 2, p. 17.
[16] *ibid*, p. 10.
[17] Cohen, *Ships' Ballast Water and the Introduction of Exotic Organisms into the San Francisco Estuary: Current Status of the Problem and Options for Management*, 1998, p. 13.
[18] See *supra* note 4, p. 135.
[19] See *supra* note 17, p. 13.
[20] http://dnr.wi.gov/invasives/fact/zebra.htm (2012-02-22, 15:28).

introduction to this new environment conquered many native species, destroyed local ecosystems and caused major damage to the fisheries and the livelihoods of the region's inhabitants.[21]

The risk of unintentionally introducing alien species by the release of ballast water is dependent on many different factors, depending on which that are relevant for the survival of a certain species. These factors may include, *inter alia*, water temperature, salinity, level of oxygen, light, available food sources, predators and competitors. Some species are able to survive significant changes from their normal surroundings such as *e.g.* being transported from a cold-water port to a warm-water port or from fresh water to brackish. Such conditions in a specific area may change with the seasons, increasing the difficulty in predicting when and where a certain species could be able to establish itself. The release of untreated ballast water has because of this complexity been called ecological roulette; it can be virtually impossible to properly identify risk free scenarios.[22]

2.2.1 Effects of the Unintentional Transfer of Aquatic Organisms by the Discharge of Ballast Water

According to the IMO and the Organisation's Global Ballast Water Management Programme the unintentional introduction of invasive marine species into new environments by ships' ballast water, attached to ships' hulls and via other vectors is one of the four greatest threats to the world's oceans. The other three threats are, according to the IMO, the overexploitation of living marine resources, land-based sources of marine pollution and the physical alteration or destruction of marine habitat.[23] It is important to note that biological pollution, such as the unintentional transfer of AIS, is different from other sorts of physical or chemical marine pollution because of its permanent and irreversible effect. Once AIS have established themselves it is unfortunately very rare with successful attempts to eradicate them.[24]

As previously discussed, the transfer of aquatic alien invasive species poses a very serious threat to marine biodiversity as it can lead to destruction of local ecosystems and eradication of native species. This can in turn have severe adverse effects on local industry, tourism and for people that are dependent on marine life for business or as a daily source of food. The example of the zebra mussel clearly shows that the spread of aquatic AIS can become a costly affair for governments and industry if it leads to obstruction of waterworks and damages to other types of infrastructure. Releasing untreated ballast water can also have other effects that are more

[21] See *supra* note 2, p. 16.
[22] See *supra* note 3, pp. 16-17.
[23] http://globallast.imo.org/index.asp?page=problem.htm&menu=true (2012-02-02, 13:39).
[24] See *supra* note 2, pp. 16-17.

directly of concern for human health. Diseases such as certain types of cholera can travel with the ballast water, as can parasites.

2.3 Ballast Water Management Techniques & Technologies

Ballast water management techniques and technologies comprise of different mechanical, chemical and biological methods intended to reduce or eliminate the risk of unintentionally transferring organisms with ballast water. Some of these techniques and technologies are described below.

2.3.1 Ballast Water Exchange

Ballast water exchange takes place before a ship's arrival at the port of destination and is carried out by emptying and filling the tanks in deep ocean areas or on the open seas, using a sequential or flow-through exchange method.[25] This is today the most commonly implemented measure used for limiting the transfer of non-indigenous species from one area to another. Worryingly, both the sequential and the flow-through exchange method can expose the ship and crew to risk and the methods are far from perfect in their effectiveness.

When using the sequential exchange method the ballast tanks are emptied when the ship is out in a deep ocean area, away from the coast. When the tanks have been emptied they are refilled with open seawater. This method is more frequently used than the flow-through exchange method as the sequential method takes less time and as work can continue on deck while the procedure is being performed.[26] The method is unfortunately associated with risks for the ship and crew as the pressure on the ship increases when the ballast tanks are empty and as the re-ballasting operation may affect stability.[27] These risks are naturally more serious in case of bad weather, which sometimes can come on suddenly and unexpectedly when sailing on the open seas.

The flow-through exchange method consists of pumping in new water to the ballast tanks from the bottom of the ship and discharging the water already in the tanks through outlets on deck. This is, as the sequential exchange method, performed while the ship is on the open sea or in a deep ocean area before the ship arrives at its port of destination. The flow-through exchange method does not affect the stability of the ship in any significant way. This means that ballast water exchange can be performed safely even under weather conditions that would not be suitable when using the sequential

[25] See *supra* note 3, p. 37.
[26] Anwar, *Ballast water management*, 2010, p.17.
[27] *ibid*, pp. 17-18.

method.[28] The clean open seawater is pumped through the tanks with a volume equal to several times the tank capacity, ensuring that most of the water is replaced.[29] Using the flow-through exchange method is regarded as more time-consuming than the sequential method but it is also considered to be safer and more efficient. However, one risk that is associated with this method is that pressure on the ballast tanks can build up during the ballast water exchange procedure to exceed the maximum pressure that the tanks are designed to withhold. Other disadvantages include that no work can be carried out on deck while the ballast water exchange operation is being performed, that very cold weather conditions may affect the possibility to carry out the procedure and that the use of this method can cause concerns in regard of maintenance if the water during discharge flows through air pipes.[30]

Safety is not the only concern when relying on ballast water exchange for reducing the risk of unintentional species transfer. Exchanging the ballast water is based on the presumption that most coastal organisms, that are likely to be found in water collected in ports or from estuaries, will not survive if they are released in deep ocean areas and that, similarly, oceanic organisms in general will not survive being released in coastal waters, due to the change in salinity.[31] This presumption has been proven to be false, as studies have shown that some organisms can survive even great variations in salinity.[32] Adding to the problem is that exchanging the ballast water never completely removes all organisms. It has been shown that three times volume metric exchange of ballast water approximately results in removal of 95% of the viable algae cells and 60% of the zooplankton organisms.[33] These figures are not enough to eliminate or even sufficiently reduce the risk of transferring invasive species.

Ballast water exchange is sometimes combined with water treatment methods in order to kill any remaining organisms before discharge. Some of the available treatment technologies, that are use in combination or by themselves, are briefly presented below.

2.3.2 Treatment Technologies

There are today many ballast water treatment methods available, several of which have already obtained approval from the IMO, and many more are currently being developed by companies around the world. The technologies for treatment of ballast water can roughly be divided in to three categories: mechanical treatment such as filtration, physical treatment such as UV-light,

[28] See *supra* note 26, p. 19.
[29] *ibid*
[30] *ibid*, p. 20.
[31] *ibid*, p. 11.
[32] See *supra* note 4, p. 510.
[33] *ibid*, p. 489.

heat, electric currents or ozone and chemical treatment such as the use of biocides. A combination of various methods can also be used.

Mechanical treatment such as filtration and separation is often used as the first stage in the treatment process. After the ballast water has been passed through filters or been subjected to hydrocyclone treatment it is still likely to contain viable organisms and thus additional treatment will be required. Filtration consists of passing the water through specially designed mesh filters that collect particles up to a certain size. How effective this procedure is depends on the size of the mesh, flow capacity and the regularity of maintenance. However, even at its most efficient the use of this method will not produce ballast water that is sufficiently cleaned from not only larger organisms but also from microscopic such. Hydrocyclone technology is used as an alternative to filtration and consists of subjecting the water to a rotational movement at high velocity, which provides enhanced sedimentation forcing solid particles and organisms downwards.[34] When the particles and water have been separated the cleaned water can be returned to the ocean as particles and organisms remain collected in the equipment. Additional treatment after the mechanical procedure has been carried out is, as previously mentioned, often required whether performed by filtration or by the use of hydrocyclone to ensure that a sufficiently low number of organisms remain within it.

Physical ballast water treatment can include such various methods as heating the water up to a temperature that is lethal for marine organisms or suffocating them by depriving the water from oxygen. Heating can seem as a straightforward solution as no aquatic organisms can survive if the ballast water is heated to 40° C. [35] However, when considering the vastness of ballast tanks on large tankers, some can carry about 60, 000 tonnes of ballast water, and the amount of power that would be needed to heat up such huge quantities of water it is not, at least not with today's technology, a reasonable alternative. Depriving the water of oxygen can be done by purging it with inert gas or by adding a chemical additive that binds the oxygen. Oxygen deprivation is effective for killing marine animals at different stages of their development and for destroying certain types of bacteria but is not effective against *e.g.* algae, spores and other types of bacteria.

Other physical treatment methods include, *inter alia*, UV-radiation, ozone-treatment, PH-adjustment and the use of electric currents. The water can *e.g.* be sterilised by subjecting the water to UV-radiation, as this will destroy microorganisms such as bacteria and viruses. This treatment method is less effective on water containing suspended organisms and it should therefore preferably be used on water that has been previously filtered. Both oxygen deprivation and UV-radiation should primarily be considered as partial solutions and to ensure clean ballast water these methods should be

[34] Lloyd's Register, *Ballast water treatment technology Current status February 2010*, 2010, p. 8
[35] See *supra* note 4, p. 498.

combined with other treatment methods. PH-adjustment or treating the ballast water with ozone can be very effective methods for destroying living aquatic organisms. Unfortunately both these methods are more suitable for use in land based reception and treatment facilities. For PH-adjustment this is due to the large quantities of residue that is produced during the process, which would be impractical to handle onboard. Ozone treatment is due to the nature of the oxidant extremely corrosive. This means that very advanced equipment would be required onboard to ensure that ship and equipment are not exposed to corrosion.

Chemical treatment of ballast water by adding biocides, such as *e.g.* chlorine, can at least in some cases be very effective, depending on what biocide that is being used, the target organisms, contact time, PH level *etc*. Chemical treatment is also a relatively easy method in that it does not demand a lot of special equipment taking up valuable space onboard and requiring maintenance by the crew. The use of biocides does however come with concerns for both the shipboard safety and for the environment. The chemicals must be carried onboard the ship, which requires safe storage and proper training. Even with the right equipment and training the biocides may still accidentally end up in the ocean where they could cause great harm to the marine life that they were being used to protect.

2.4 Pertinent Observations

The use of ballast water is today an indispensable part of shipping as it is a cheap and practical solution that ensures stability during the voyage. Most vessels carry ballast water and the capacity of the ballast tanks range from several litres to several hundreds of thousand of litres. The ballast water and the sediment that accumulates within the ballast tanks do unfortunately carry with them a wide range of aquatic organisms that may cause a threat to the biodiversity of the environment into which they are released. On average 3000-4000 species are daily being transferred with ballast water between the continents and many spectacular invasions have already occurred. As an additional danger to potentially causing environmental disaster and financially affecting governments, industries and individuals, the ballast water can also carry with it disease in the form of viruses and bacteria. It is apparent that the management and control of ships' ballast water is a matter of pressing concern if further ecological disasters are to be avoided. Measures should be taken to ensure marine biodiversity as well as the wellbeing of people.

Biological pollution is very hard to control once the damage has been done. The successful establishment of a species in a new environment is often irreversible. Attempts to eradicate invasive species are rarely successful on land and could probably, without causing additional harm, be regarded as impossible in the marine environment. Preventive measures are thus essential. Ballast water is not the only medium carrying with it potentially invasive alien species; many of the marine hitchhikers attach themselves to

the hulls of ships or are transported with *e.g.* fishing gear. Regardless of this, the vast amounts of ballast water that is daily being transported around the globe should be considered. Ballast water discharge has been established as amongst the most prominent pathways for harmful aquatic species and ballast water management measures are surely an important part of the solution.

There are many options that can be considered in terms of ballast water management techniques and technologies. The most commonly implemented method is ballast water exchange. Ballast water exchange consist of emptying and filling the tanks before arrival at the port of destination while the ship is still on the open seas or in a deep sea area. This allows clean open seawater in to the tanks while some, or most, of the organisms that are present in the ballast water will be flushed out. This method is used presuming that coastal organisms collected at uptake will not survive when released in waters with much higher levels of salinity. However, studies have shown that this may be the case for certain types of organisms but not for others and that ballast water exchange, whether performed using the flow-through or the sequential method, does not ensure a sufficiently low number of viable organisms left in the tanks after the procedure has been carried out. By only relying on ballast water exchange there is still an unacceptably high risk of inadvertently transporting and releasing aquatic invasive species into new environments. Adding to the list of problems are the safety risks that ship and crew are subjected to when using this method. Performing ballast water exchange may in the worst-case scenario mean exposing people and property to risk without reducing bio pollution. The use of this method should for the above reasons be limited and better alternatives should be sought after.

Amongst the ballast water management treatment technologies filtration or separation in combination with physical treatment methods such as UV-light or together with the use of biocides is a promising option, although all methods have their disadvantages and none is able to ensure that all sorts of organisms are effectively killed. There are currently several treatment systems available that have obtained approval by the IMO and many more systems are being developed around the world.

3 The International Perspective

Environmental problems that may arise from shipping, such as those concerning the control and management of ballast water, are inherently transboundary and must be addressed at the international level for finding viable solutions. The international legal framework for issues pertaining to the oceans is based on international customary law, which to a great extent has been codified or derived from the milestone work the 1982 United Nations Convention on the Law of the Sea (UNCLOS). A presentation of international customary law and UNCLOS are therefore given below. Other, subsequent treaties and non-binding "soft law" instruments pertinent to international ballast water management measures are also briefly presented and discussed.

Despite the fact that it is not yet in force the BWM Convention is together with the voluntary IMO Guidelines for preventing the introduction of unwanted organisms and pathogens from ships' ballast water and sediment discharges (IMO Guidelines) the most important instruments in international law that directly address ballast water management and these instruments are treated in more detail. A brief introduction is also given to the guidelines that have been developed to ensure uniform implementation of the BWM Convention and of the GloBallast projects.

3.1 Customary International Law

The basis or legal background for treaty making is most commonly an aspiration or need to codify existing norms in state practice, *i.e.* customary international law. The concept of customary international law is elusive, not dependent on written law but nonetheless often deduced from written sources of law such as national laws or judicial decisions. Other manifestations of the legal behaviour of states, such as *e.g.* statements made by state representatives in judicial or political matters, at home or abroad, can also be used in determining the scope and content of customary international law. Although it may be too early to speak of specific ballast water management rules as customary international law there is still a customary law aspect of the issue. Many of the international laws on the subject are in part founded on customary international law obligations such as, in particular, the "no harm" principle. This principle encompasses the state responsibility to prevent, reduce and control pollution, which includes bio pollution, and to avoid causing environmental damage to other states.

Most legal scholars have accepted the obligation to avoid transboundary damage as one of the rules of customary international law.[36] This very important part of the "no harm" principle is applicable to ballast water

[36] See *supra* note 2, pp. 43-44.

management and it could possibly be argued that there is a responsibility on states under international customary law to prevent bio pollution by the transfer of ballast water. The obligation to avoid transboundary harm is not absolute, as with many of the international customary law rules there is a due diligence standard to be considered. This means that a state is not in breach of the obligations if the state has used its best endeavours to avoid transboundary environmental damage. This is reasonable, as it would be impossible to prevent even the risk of such harm without successfully isolating states, preventing any kind of interaction. Fulfilment of the due diligence requirement is determined by considering the level of risk in relation to the appreciable harm but also the economic and technical capabilities of states.[37] The due diligence standard could be interpreted as an expectation on developed states with a high level of economic and technical capability to observe a higher standard. This perspective is of course interesting when considering the requirements of the BWM Convention and the ability of developing states to implement those requirements when lacking in economic and technical resources. If states under customary international law must use their best endeavours to avoid transboundary environmental damage, is it then reasonable to draft treaties that are aimed at global implementation and containing the same requirements for developed and developing states alike, if these requirements hardly can be met without adequate resources? The Globallast projects, discussed below in subchapter 3.6.2, could be seen as a way of compensating for the disparity in resources by offering assistance to less-industrialised states.

3.2 United Nations Convention on the Law of the Sea

UNCLOS has been called the constitution of the oceans and is in many respects a landmark. The convention was the result of broad cooperation amongst many states and has like no other legal instrument codified and developed the international law of the oceans. UNCLOS contains some provisions on the prevention of bio pollution of the marine environment but they are general and wide in scope. UNCLOS can be regarded as an umbrella treaty and more detailed provisions can be found in subsequent instruments of international law.

Under UNCLOS states have a general obligation to protect and preserve the marine environment and this obligation includes the prevention of pollution.[38] The “no harm” principle is found in article 194 under which states are urged to take all necessary measures to prevent, reduce and control pollution of the marine environment from any source and by using the best practicable means at their disposal.[39] States should also according to this provision take all measures necessary to ensure that activities under

[37] See *supra* note 2, p. 45.
[38] United Nations Convention on the Law of the Sea, art. 192.
[39] See *supra* note 38, art. 194 (1).

their jurisdiction or control are conducted in a manner that does not cause damage by pollution to other states and their environment.[40] Pollution is defined by UNCLOS as:

> the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities.[41]

Presumably alien aquatic organisms are included under "substances" but this is an issue that has been debated. If the transfer of such organisms is within the scope of the pollution definition it could also be assumed that ballast water and sediments are included under article 194, which states that measures shall be taken to minimize to the fullest possible extent the pollution from vessels, in particular by preventing intentional and unintentional discharges.[42] Regardless of if disposal of ballast water and sediments are included under article 194 or not, the introduction of alien or new species is explicitly dealt with in article 196. This provision sets forth that states shall take the measures that are necessary to prevent, reduce and control pollution of the marine environment resulting from the intentional or accidental introduction of alien or new species to a particular part of the marine environment, if the introduction of such a species may cause significant and harmful changes to it.[43] The release of ballast water is not considered as dumping, as uptake and release of ballast water is part of the normal operations of vessels.[44]

The IMO plays an important role with regard to marine pollution from ships under the UNCLOS regime. The organisation has *e.g.* been given the legislative power on such issues. [45] It is also required that states adopt anti-pollution laws and regulations in compliance with the standards set by the IMO.[46] In addition to this states must seek the approval of the organisation for applying measures, within their own EEZ, in order to control marine pollution if these measures are stricter than those required under international law.[47]

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[40] See *supra* note 38, art. 194 (2).
[41] *ibid*, art. 1 (4).
[42] See *supra* note 2, p. 68.
[43] See *supra* note 38, art. 196.
[44] *ibid,* art. 1 (5) (b).
[45] *ibid,* art. 211 (1).
[46] *ibid,* art. 211 (2).
[47] *ibid,* art. 211 (6) (a).

3.3 Agenda 21

Agenda 21 was adopted during the United Nations Conference on Environment and Development (UNCED), held in 1992 in Rio de Janeiro, as a comprehensive action plan for global sustainable development. The action plan is considered as a "soft law" instrument, *i.e.* non-binding, and the participation by states is hence voluntary. It is notable that despite of its voluntary nature the Agenda 21 has had a substantial influence on subsequent legal developments. As an example of this influence the interpretation of UNCLOS should now be conducted in accordance with key principles, such as the precautionary principle, of the Agenda 21.[48] This demonstrates that soft law instruments, which are normally significantly easier for states to agree on than are binding treaties, can have a significant impact on the behaviour and reasoning of states.

Agenda 21 chapter 17 deals with the protection of the oceans and all kinds of seas. Affirming that the oceans are an essential component of the global life-support system the action plan calls for a new, precautionary and anticipatory approach towards marine management.[49] States have under Agenda 21 made a commitment to pursue the prevention of the marine environment and to reduce and control its degradation.[50] The fulfilment of this commitment should be carried out in accordance with the policies, priorities and resources of the individual states. States are encouraged to act individually, but also to cooperate with other states and within the framework of the IMO or other sub regional, regional or global relevant international organisations, to assess the need for additional measures for controlling pollution and the degradation of the marine environment caused by shipping related activities.[51] For this purpose states should consider to adopt appropriate rules on ballast water discharge to prevent the spread of non-indigenous species.[52]

During the World Summit on Sustainable Development (WSSD) that took place in Johannesburg in 2002, following up the Rio De Janerio Earth Summit held 10 years earlier, the commitment to Agenda 21 was reaffirmed. The WSSD plan of implementation urged IMO to finalize the BWM Convention and called for acceleration in the development of measures to address invasive alien species in ballast water.[53]

[48] Birnie, Boyle & Redgwell, *International Law & the Environment*, 2009, p. 384.
[49] Agenda 21, chapter 17 (1).
[50] *ibid*, chapter 17 (22) & 17 (22) (a).
[51] *ibid*, chapter 17 (30).
[52] *ibid*, chapter 17 (30) (vi).
[53] Plan of Implementation for the World Summit on Sustainable Development, 2002, 34(b).

3.4 United Nations Convention on Biological Diversity

United Nations Convention on Biological Diversity (CBD Convention) was together with Agenda 21 part of the 1992 UNCED Earth Summit efforts and the convention was opened for signature during the conference. The convention was created as a practical tool for translating the principles of the Agenda 21 into reality with the key objective of conserving biological diversity.[54] Maintaining biological diversity marine and aquatic ecosystems shall be considered for the purpose of the convention.[55] The CBD Convention applies to processes and activities carried out under the jurisdiction or control of a party, regardless of where the effects of such activities take place and both within and beyond the limits of national jurisdiction.[56] This wide scope of application is notable as mobility is an inherent characteristic of the AIS problem. The implementation of the CBD Convention shall be in accordance with the rights and obligations of states under UNCLOS.[57]

The CBD Convention contains no provisions that explicitly deal with the management and control of ballast water but does include provisions on alien species. According to article 8 the parties shall prevent the introduction of alien species and control or eradicate such species if they pose a threat to ecosystems, habitats or other species.[58] The control of alien species has furthermore been included as one of five key operational objectives, in regard of marine and coastal biodiversity, by the CBD Convention Conference of Parties (COP). [59] The Jakarta Mandate, which was adopted by COP in 1995, has identified achieving better understanding of the causes, pathways and impact of alien species and to put in to place mechanisms to control such pathways, including shipping, as a target focus. The COP has also made clear that it regards the BWM Convention is a key contribution by the IMO towards effective implementation of the CBD programme for the conservation of marine and coastal biological diversity.[60] Following this statement the COP concluded that the control and management of ballast water is of great concern, as ballast water has been indentified as a significant mechanism for the transfer of aquatic organisms to ecosystems to which these organisms could be invasive and harmful.

It is from the above apparent that COP is concerned about the ballast water problem and that measures to control and manage ballast water are

[54] Convention on Biological Diversity, art. 1.
[55] *ibid*, art. 2.
[56] See *supra* note 34, art. 4 (b).
[57] *ibid,* art. 22 (2).
[58] *ibid,* art. 8 (h).
[59] UNEP/CBD/COP/4/27, Report of the Fourth Meeting of the Conference of the Parties to the Convention on Biological Diversity, 15 June 1998, p. 85.
[60] *ibid*.

considered to be desirable. Parties to the CDB Convention are by the COP encouraged to adopt the BWM Convention in order to preserve the biological diversity of the marine environment. The CBD Convention currently has over 190 signatories and this recommendation could greatly benefit the BWM Convention, if it is responded to accordingly.

3.5 Guidelines for the Control and Management of Ships' Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens

In 1998 Canada brought the zebra mussel invasion in the Great Lakes to the attention of IMO. This event acted as an incentive for the formulation of ballast water management guidelines. In 1991 the IMO Marine Environment Protection Committee (MEPC) adopted and published "*Guidelines for preventing the introduction of unwanted aquatic organisms and pathogens by discharge of ballast waters and sediments*" as the first set of voluntary ballast water management guidelines. In 1992, following UNCED, the guidelines were revised and one year later adopted as an IMO Assembly resolution. In 1997 the guidelines were revised again resulting in a more comprehensive version that was adopted by the Assembly as resolution A.868(20) "*Guidelines for the control and management of ships' ballast water to minimize the transfer of harmful aquatic organisms and pathogens*" (IMO guidelines) and governments were urged to take action in applying them.[61] The guidelines are freestanding from the BWM Convention and can be used as a voluntary standard, regardless of the status of the convention.

The guidelines are directed to member states and may be applied to all ships, however it is left up to the port state authority to determine to what extent.[62] The aim is not to provide a certain solution but for the guidelines to be viewed as a tool that, if properly applied, can help to minimize the risks associated with ballast water discharges.[63] States are urged to assist in mitigating the problem by exercising due care and diligence to conform to the maximum possible extent with the guidelines. The objectives are to assist governments, ship owners and port authorities in minimizing the risk of introducing harmful aquatic species while also protecting the safety of the ship. [64] Balancing these two considerations is an important theme

[61] IMO, *Ballast Water Management Convention and the Guidelines for its implementation*, 2009, p. iii.
[62] IMO Assembly Resolution A.868(20), *Guidelines for the control and management of ships' ballast water to minimize the transfer of harmful aquatic organisms and pathogens*, chapter 3.
[63] *ibid*, chapter 1 (3).
[64] *ibid*, chapter 4 (1).

throughout the guidelines. Protecting the marine environment is one of the priorities and it is stated that the precautionary principle should be applied.[65] The other priority is safety; no measures should be required by port states that could risk the lives of seafarers or the safety of the ship.[66] The ballast water management plans, as suggested by the guidelines to be designed for each ship, should be individually assessed for their effectiveness from the environmental protection point of view as well as from the point of view of their acceptability in terms of structural strength and stability of the ship.[67] The ambition to protect the environment should not put ships or crew at risk.

As the guidelines are voluntary port states are encouraged to regulate ballast water management by national legislation. If any restrictions are applied through national legislation states should inform the IMO.[68] In addition to notifying the IMO any special requirements applied by member states in regard of ballast water and sediment discharge procedures should be verified and clarified in detailed information given by the port state to ships before arrival.[69] To avoid unnecessary delays, which could unfairly affect trade, it is stressed that the port state should make the adequate efforts to distribute information concerning ballast water requirements so that it is available to visiting ships.[70] Administrations are also encouraged to exchange information through the IMO and to provide the organization with facts such as if severe outbreaks of harmful aquatic organisms have occurred and may pose a risk, current domestic laws and regulations, technical and research information, education materials, the location and terms of use of alternative exchange zones, availability of shore reception facilities, fees *etc*.[71] Ships are also requested to share relevant information. If *e.g.* a ship flying the flag of a member state fails to comply with existing requirements for reasons such as adverse weather or force majeure, the IMO should be informed about the failure to comply and the reason for this failure.[72] The ship should also inform the port state as soon as possible. [73]

As previously mentioned the guidelines suggest that all ships should be provided with a ballast water management plan, specific to each ship.[74] A responsible officer should be appointed onboard to maintain appropriate records and to ensure that ballast water procedures are followed and recorded. [75] These records should be made available to port state authorities.

Suggested port state measures include making reception and treatment

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[65] See *supra* note 62, chapter 11 (1).
[66] *ibid*, chapter 11 (3).
[67] *ibid*, appendix 2 section 1 (2).
[68] *ibid*, chapter 11 (2).
[69] *ibid*, chapter 5 (2).
[70] *ibid*, chapter 5 (3).
[71] *ibid*, chapter 5 (1).
[72] *ibid*, chapter 5 (6).
[73] *ibid*, chapter 8 (1)(1).
[74] *ibid*, chapter 7 (1)(1) & 7 (1) (2).
[75] *ibid*, chapter 8 (1) (2) & 8 (1) (3).

facilities available for disposal of ballast tank sediments and the discharge of ballast water and providing ships with information regarding requirements for ballast water management, exchange zones and reception facilities.[76] Ships should also be informed about areas where ballast water uptake should be minimized, such as nearby sewage outfalls and where outbreaks of known populations of harmful organisms has occurred.[77]

Training and education is emphasised by the guidelines. Ships' masters and crews should, as appropriate, be subjected to training that should include instructions on the application of ballast water management and treatment procedures.[78] Governments are further encouraged to include knowledge of duties regarding the control of bio pollution by harmful aquatic organisms in their requirements for certificates.[79] Builders, owners and classification societies are asked to take the guidelines into consideration when designing new ships or modifying existing ships.[80]

The guidelines state that the application of ballast water management processes and procedures are at the core of the solution to minimize the introduction of harmful aquatic organisms.[81] Provided in the guidelines are some operational procedures that could be used and some ballast water management options are presented. Concerning operational procedures it is stated that loading of ballast water should be avoided in shallow waters, in areas that have been indicated by the port state as not appropriate for ballast water uptake; in darkness or where the propellers may stir up sediments and, if practicable, the ballast tanks should be routinely cleaned in port or dry dock.[82] In regard of ballast water management options it is stated that near-coastal organisms do not generally survive being released in mid-ocean and that ballast water exchange therefore should be conducted in deep water, as far as possible from shore.[83] In situations where the ship must conduct the ballast water exchange within 200 nautical miles from shore regional agreements should be considered. If the flow through exchange method is used at least three times the tank volume should be pumped through the tank.[84]

Some ballast water exchange risk assessment advice is given in the guidelines. It is stated that if there are significantly different conditions between the uptake and release zone it should be considered less likely that organisms will be able to establish themselves. It is however pointed out that some organisms may survive even extreme transfers.[85] The age of the ballast water is also a factor to be considered in determining the likelihood

[76] See *supra* note 62, chapter 7 (2) (1), 7 (2) (2) & chapter 8 (2) (1).
[77] *ibid*, chapter 8(2) (2).
[78] *ibid*, chapter 6 (1).
[79] *ibid*, chapter 6 (3).
[80] *ibid*, chapter 13.
[81] *ibid*, chapter 6 (2).
[82] *ibid*, chapter 9 (1) (1) & chapter 9 (1) (2).
[83] *ibid*, chapter 9 (2) (1).
[84] *ibid*.
[85] *ibid*, chapter 10 (1).

of organism survival, the older the ballast water, the less likely but a minimum of 100 days should be regarded as a minimum. It is also concluded that in many cases it is unknown for how long time different organisms can survive in the tanks and that organisms present in sediments are believed to be able to survive longer than those in the ballast water. [86] The presence at the uptake port of target species, *i.e.* species that are considered more likely to become invasive or to adversely affect environment or humans, should be considered when assessing the risk.[87]

Monitoring compliance with the guidelines should be done by port state authorities and may be performed by taking and analysing ballast water samples. [88] Such sampling should be conducted without causing undue delay to ships and the methods used for sampling, research and monitoring should be the responsibility of the individual port state.[89] Concerning areas that are particularly environmentally sensitive the port state may require that samples of ballast water and sediments be given before permitting a ship to release ballast water. If harmful aquatic organisms or pathogens are found in such samples the port state may submit the ship to any contingency plan that is in force.[90]

The measures suggested by the guidelines are mainly focused on ballast water exchange and risk assessment. As previously concluded these methods are more and more commonly recognized as inadequate for controlling the spread of harmful aquatic species but, even when considering this, the guidelines should not be regarded as being without purpose. Applying these guidelines may be the first step taken towards accepting and applying more stringent measures. However, the guidelines do not in themselves provide a durable solution. The guidelines have anticipated this and it is stated that new and emerging treatments and technologies may substitute for, or be used in conjunction with, ballast water exchange and that IMO should be notified about the results concerning the application and effectiveness of new ballast water management technologies for evaluation and, possibly, incorporation to the guidelines.[91] It is also concluded that the operational measures, such as ballast water exchange, may be an appropriate short term solution but that there is still need for further research to find a long term solution. As the development in this area progresses the guidelines should be revised and adjusted in accordance with the results of such research.[92]

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[86] See *supra* note 62, chapter 10 (2).
[87] *ibid*, chapter 10 (3) (1).
[88] *ibid*, chapter 11 (8) & 11 (9).
[89] *ibid*, chapter 11 (12).
[90] *ibid*, chapter 11 (14).
[91] *ibid*, chapter 9 (2) (4) (2).
[92] *ibid*, chapter 12 (1).

3.6 The International Convention for the Control and Management of Ballast Water and Sediments

Work with the BWM Convention began in 1997 at the twentieth session of the IMO assembly with resolution A.686(20), by which the voluntary ballast water management guidelines presented above were adopted. The resolution requested that MEPC should work towards the completion of legally binding provisions on ballast water management.[93] In 1999 the Ballast Water Working Group, which had already been established by MEPC in 1994, started preparations for the BMW Convention. In 2003 the IMO Council agreed to convene a conference to consider the adoption of the convention and in 2004 the International Conference on Ballast Water Management for ships was held in 2004 at the IMO headquarters in London.[94] During the proceedings of the conference the BWM Convention was finally adopted and shortly hereafter it was opened for signature.

Two requirements must be met before the BWM Convention enters into force: the convention must be accepted, approved or ratified by at least 30 states and these states must together have a combined merchant fleet constituting of at least 35 % of the gross tonnage of the world's merchant shipping fleet.[95] Currently the convention has been approved by more than 30 states and the first requirement is thus already met. It is expected that the gross tonnage requirement will be met during the course of 2012, as the major shipping nation Singapore and some other states, including a few of the Scandinavian countries, are joining the convention. The convention will enter into force 12 months after both requirements have been fulfilled.[96] It is thus probable that the convention will enter into force before the end of 2013.

In the preamble of the BWM Convention UNCLOS article 196(1) and the obligation on states under this provision to take all measures necessary to prevent, reduce and control pollution of the marine environment resulting from, *inter alia*, the accidental introduction of alien or new species to a part of the marine environment to which they may be harmful, is recalled and the objectives of the CBD Convention to conserve biological diversity are noted. It is clearly stated that nothing in the BWM Convention shall prejudice the rights and obligations under customary international law as reflected in UNCLOS.[97] Reference is also made to the precautionary principle and to the request of UNCED to consider the adoption of appropriate rules on ballast water discharge.[98]

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[93] See *supra* note 62*,* preamble.
[94] See *supra* note 61, p. iii.
[95] International Convention for the control and Management of Ships' Ballast water and Sediments, art. 18 (1).
[96] *ibid*.
[97] *ibid*, art. 16.
[98] See *supra* note 95, preamble.

The aim of the convention is stated as the prevention and minimization of risks to environment, human health and resources arising from the transfer of harmful aquatic organisms by controlling and managing the ballast water of ships.[99] Ultimately the goal is to eliminate these risks. The convention also aims at avoiding unwanted side effects from ballast water control measures and to encourage developments in related knowledge and technology. The convention applies to all ships entitled to fly the flag of, or that is operated, under the authority of a party.[100] Exempted are ships not designed or constructed to carry ballast water, ships only operated in waters under the jurisdiction of a party or only in waters under the jurisdiction of a party and on the high seas, warships and ships with permanent ballast water in sealed tanks, not subject to discharge.[101] To ensure that the ships of non-parties to the convention are not treated more favourable parties shall apply the requirements of the convention in respect of those ships, as may be necessary.[102]

In order to prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens parties are to give full and complete effect to the provisions of the convention and shall encourage the continued development of ballast water management and standards.[103] The convention is to be applied as a "minimum standard" and parties to the convention are thus not hindered from pursuing more stringent measures, if such measures are consistent with international law.[104]

Each party to the convention shall develop national strategies for ballast water management in its ports or waters under its jurisdiction to promote the attainment of the objectives of the convention.[105] Parties shall also endeavour to promote and facilitate scientific and technical research on ballast water management and monitor the effects of ballast water management in waters under their jurisdiction.[106] Relevant information concerning technical measures and the effectiveness of ballast water management programmes deduced from assessment programmes carried out by a member state should be made available to other parties.[107] Measures taken by a party, such as ballast water management procedures and regulations and reception facilities should, where appropriate, be reported to the IMO and the organisation shall notify parties about any such communications received.[108]

Some of the obligations under the convention are specifically directed at flag states or port states. Flag states are under an obligation to ensure that

[99] See *supra* note 95.
[100] *ibid*, articles 3 (1) (a) & (b).
[101] *ibid*, art. 3 (2).
[102] *ibid*, art. 3 (3).
[103] *ibid*, articles 2 (1) & 2 (5).
[104] *ibid*, art. 2 (3).
[105] *ibid*, art. 4 (2).
[106] *ibid*, art. 6 (1).
[107] *ibid*, art. 6 (2).
[108] *ibid*, art. 14.

ships entitled to fly their flag are in compliance and shall take effective measures to ensure this.[109] This includes a duty to ensure that ships are surveyed and classified in accordance with the regulations found in the annex to the convention.[110] Parties shall also encourage ships entitled to fly their flag to avoid, as far as practicable, the uptake of ballast water and sediments potentially containing harmful organisms by adequately implementing the recommendations developed by the IMO.[111] This means that not only the convention but also voluntary guidelines developed by the organisation should be considered.

Port states shall undertake measures to ensure that adequate reception facilities for sediments are provided for in ports or terminals where cleaning or repairs of ballast tanks occur.[112] Port states may, in accordance with the convention, inspect ships in order to monitor compliance. Port state control officers can subject ships, to which the convention applies, to inspection when the ship is in a port or offshore terminal belonging to that state.[113] This inspection shall be limited to verifying the existence of a valid certificate, inspection of the ballast water record book and sampling of the ship's ballast water. [114] Sampling shall be carried out in accordance with guidelines developed by IMO and without causing undue delay. If a ship is unduly detained or delayed it is entitled to compensation for any loss or damage suffered because of the delay.[115] Port state control and sampling of ballast water are controversial issues. Must sampling be carried out, shall sampling be carried out in accordance with the IMO guidelines or shall it be conducted in accordance with the more specific IMO protocols or can this be decided by the port state? These are all questions that so far lack a definite answer. The IMO is currently working on developing guidelines on surveys and port state control and hopefully these issues will have been clarified when the convention enters into force. Sampling techniques and the accuracy of results have also been debated as some parties have expressed concerns in regard of uncertainties in test results and regarding coherent application. Clear survey guidelines can contribute towards coherency in application but it remains to be seen if these issues will cause problems when the convention enters into force.

The BWM Convention emphasises cooperation amongst states. States are *e.g.* requested to cooperate in relation to ballast water management and under the auspices of IMO to address threats and risks to sensitive, vulnerable or threatened marine ecosystems in areas beyond the limits of national jurisdiction.[116] Parties that have common interests in protecting the environment, human health, property and resources in a given area shall endeavour to cooperate regionally to further the objectives of the

[109] See *supra* note 95, art. 4 (1).
[110] *ibid*, art. 7 (1).
[111] *ibid*, art. 2 (8).
[112] *ibid*, art. 5 (1).
[113] *ibid*, art. 9.
[114] *ibid*, art. 9 (1).
[115] *ibid*, art. 12 (2).
[116] *ibid*, art. 2 (9).

convention. [117] This request is in particular directed at states bordering enclosed or semi-enclosed seas. Cooperation concerning technical assistance is also encouraged; states should provide technical support, when requested and as appropriate, to other parties.[118] Such cooperation may be carried out internationally or regionally and could include assistance to train personnel, joint research programmes or other actions aimed at effective implementation of the convention. It is requested that parties actively cooperate in the transfer of technology but subject to national laws and regulations.[119]

Violations of the requirements of the convention, wherever they occur, shall be prohibited and subject to sanctions established under the law of the administration of the ship concerned.[120] If violations take place within the jurisdiction of a party they shall be prohibited and sanctioned under the law of that party.[121] Violations of this sort shall cause proceedings to be taken in accordance with national law and sanctions shall be severe enough to discourage breaches.[122] Parties shall cooperate for the detection of violations and for the enforcement of the convention. If a ship is detected as being in violation the flag state or the port state may take measures to warn, detain or exclude the ship.[123] If ballast water is sampled and the results of the sampling indicates that the ship poses a threat to the environment, human health, property or resources the party in whose waters the ship is operating shall prohibit such ship from discharging ballast water until the threat is removed.[124]

Located in the annex to the BWM Convention are more detailed regulations for the control and management of ships' ballast water and sediments. The annex is an integral part of the convention and any reference to the convention should be understood as also including the provisions of the annex, unless expressly provided otherwise.[125] The annex regulations are divided into 5 sections from A-E.

Section A contains general provisions such as definitions, general applicability and exceptions. In regulation A-2 it is stated that the discharge of ballast water shall only be conducted in accordance with the provisions given in the annex. However, the requirements shall not apply to uptake or discharge of ballast water that is necessary to ensure the safety of the ship in emergency situations or to accidental discharge resulting from damage to ship or equipment, provided that all reasonable precautions have been taken. The requirements shall neither apply to the uptake and subsequent discharge

[117] See *supra* note 95, art. 13 (3).
[118] *ibid*, art. 13 (1).
[119] *ibid*, art. 13 (2).
[120] *ibid*, art. 8 (1).
[121] *ibid*, art. 8 (2).
[122] *ibid*, art. 8 (3).
[123] *ibid*, art. 10 (2).
[124] *ibid*, art. 10 (3).
[125] *ibid*, art. 2 (2).

of the same ballast water when on the high seas or when no mixing with unmanaged ballast water from another area has occurred.[126]

Section B contains regulations for ships. Here it is stated that each ship shall have on board a ballast water management plan and a ballast water record book that shall have been implemented.[127] In regulation B-3 the standard that should apply to a specific ship is decided, depending on that ship's ballast water capacity and construction year. There are two different standards: D-1 and D-2, both described in Section D of the annex. The D-1 standard is a standard for ballast water exchange and it requires that ships shall perform with an efficiency of at least 95 % volumetric exchange of ballast water.[128] If the pumping-through/flow-through exchange method is used the water should be pumped through three times the volume of each ballast water tank, or, if the water is pumped through less than three times the volume, it shall be able to demonstrate that at least 95 % volumetric exchange has been performed.[129] The D-1 standard applies to ships constructed before 2009. The D-1 standard shall apply until 2014 (ballast water capacity of between 1500-5000 cubic metres) or 2016 (ballast water capacity of less than 1500 or greater than 5000 cubic metres) after which time the D-2 standard shall apply. A ship that is conducting ballast water exchange in accordance with regulation D-1 shall, whenever possible, conduct the exchange at least 200 nautical miles from the coast and in water at least 200 metres in depth.[130] When this is not possible the exchange shall be conducted as far from nearest land as possible, in all cases at least 50 nautical miles from the nearest land and in waters at least 200 metres in depth.[131] In areas where neither over the above criteria can be met the port state may designate areas where a ship may conduct ballast water exchange.[132] It should not be required that a ship must deviate from its intended voyage to met the requirements nor shall compliance with the standard be required if the master reasonably decides that it would threaten the safety of the ship or crew because of *e.g.* adverse weather.[133] In such cases the reason shall be entered into the ballast water record book.[134]

The D-2 standard is a ballast water performance standard which requires that ships conducting ballast management shall discharge less than10 viable organisms dimension per cubic meter greater than or equal to 50 micrometers in minimum and less than 10 viable organisms per millilitre less than 50 micrometers in minimum dimension and greater than or equal to 10 micrometers in minimum dimension. Furthermore the discharge of indicator microbes such as *Escherichia coli* shall not exceed concentrations

[126] See *supra* note 95, annex regulation A-3.
[127] *ibid*, annex, regulation B-1 & B-2.
[128] *ibid*, annex, regulation D-1 (1).
[129] *ibid*, annex, regulation D-1 (2).
[130] *ibid*, annex, regulation B-4 (1).
[131] *ibid*, annex, regulation B-4 (2).
[132] *ibid*, annex, regulation B-4 (3).
[133] *ibid*, annex, regulation B- 4 (3) & 4 (4).
[134] *ibid*, annex, regulation B-4 (5).

as are specified in the provision.[135] The D-2 standard shall apply to all ships constructed in or after 2012 with a ballast capacity of 5000 cubic metres or more.[136] Ships constructed in or after 2009, but before 2012, with ballast capacity of 5000 cubic meters or more shall, as a minimum requirement, met the D-1 standard until 2012 after which time the D-2 standard shall apply.[137] The convention has been constructed in this way to phase out ballast water exchange, the D-1 standard, over time. The D-2 standard will be applicable to all ships, to which the convention applies, by the latest 2016.

The BWM Convention does not focus on a particular method or ballast water management strategy but on setting a standard for effectiveness. Other methods of ballast water management than those mentioned in the convention may be accepted as alternatives if they ensure the same level of protection and are approved in principle by MEPC.[138] This is a good and flexible solution that allows any technique to be used, if proven to be sufficiently effective, and particularly when considering that ballast water treatment systems are continuously being developed. Some critics have expressed that the standard for effectiveness seems to have been arbitrarily set and that there is no guarantee that it will be adequate to ensure a sufficiently low risk of transferring harmful aquatic species. The risk of transferring species with ballast water can most likely never be completely avoided. The D-2 standard should be more efficient than conducting ballast water exchange or not taking any measures at all. If the standard proves to be insufficient an amendment could be made to the convention.

Section B of the annex also contains some sediment regulations. The obligatory ballast water management plan shall contain provisions on the removal and disposal of sediments. Ships constructed in or after 2009 should be constructed in a way that minimizes the uptake of sediments and that facilitate removal of them.[139] Older ships shall comply with this provision to the extent that is practicable.

Section C contains special requirements in certain areas. Here it is stated the parties can determine if measures additional to the measures required under the convention should be taken for certain, sensitive areas. [140] Any such measures may only be decided on if they are consistent with international law and the safety and security of the ship may not be compromised.[141] Before a state decides on taking additional measures it should first consult adjacent states that may be affected by the requirements.[142] The intention to introduce additional requirements shall be communicated to IMO, including

[135] See *supra* note 95, annex, regulation D-2 (1) & 2 (2).
[136] *ibid*, annex, regulation B-3 (5).
[137] *ibid*, annex, regulation B-3 (4).
[138] *ibid*, annex, regulation B-3 (7).
[139] *ibid*, annex, regulation B-5 (1) & 5 (2).
[140] *ibid*, annex, regulation C-1 (1).
[141] *ibid*, annex, regulation C-1 (5).
[142] *ibid*, annex, regulation C-1 (2).

coordinates and the reasoning for imposing such measures.[143] If a state introduces additional measures it should ease the burden on ships by endeavouring to make appropriate services available.[144] According to the regulations of section C parties shall endeavour to issue warnings to mariners regarding areas where the uptake of ballast water is deemed unfit.[145] Warnings may be issued for such areas as where it is known to contain outbreaks or infestations of harmful aquatic organisms or areas that are located near sewage outfalls. IMO shall also be notified about such areas.[146]

Section D contains the D-1 and D-2 standard. Here it is also stated that ballast water management systems must be approved by the administration of a party and in accordance with the IMO guidelines.[147] The systems used to comply with the convention must be safe in terms of ship, its equipment and crew.[148] Early critic of the convention regime often spoke of the lack of approved ballast water treatment systems as an implementation problem. This should not be considered a problem anymore, as there are now plenty of treatment systems available that have obtained approval.

Some environmental concerns may arise with regard to treatment alternatives that make use of chemicals and biocides. As the marine environment is continuously changing it is impossible to accurately measure the possible side effects that the release of great volumes of chemically treated ballast water may cause. As proposed by the Netherlands during the 49th MEPC meeting the use of such treatment options have been regulated and an approval and evaluations procedure has been put in place.[149] Any system that makes use of one or more active substances shall be approved by the IMO.[150]

The D-2 standard shall be reviewed by MEPC before the earliest effective date. The review shall determine if appropriate technologies are available to achieve the standard and assess the socioeconomic effect(s), especially in relation to the needs of developing societies.[151] The review of appropriate technologies shall take into account safety considerations, environmental acceptability, practicability, cost effectiveness and biological effectiveness.[152]

Section E of the annex contains survey and certification requirements

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[143] See *supra* note 95, annex, regulation C-1 (3).
[144] *ibid*, annex, regulation C-1 (4).
[145] *ibid*, annex, regulation C-2 (1).
[146] *ibid*, annex, regulation C-2 (2).
[147] *ibid*, annex, regulation D-3 (1).
[148] *ibid*, annex, regulation D-3 (3).
[149] BWM/CONF/19, *Consideration of the draft international convention for the control and management of ships' ballast water and sediments: Responsible use of chemicals for biocidal ballast water treatment*, submitted by the Netherlands, 21 January 2004, p. 2.
[150] Se *supra* note 95, annex, regulation D-3 (2).
[151] *ibid*, annex regulation D-5 (1).
[152] *ibid*, annex, regulation D- 5 (2).

3.6.1 Guidelines for the Implementation of the BWM Convention

The BWM Convention contains several references to guidelines to be developed and adopted by the IMO and the organisation was early on urged to start work with such guidelines with a view to facilitate global and uniform implementation of the convention before it enters into force.[153] The IMO responded by approving a programme for the development of implementation guidelines and procedures. This programme has since 2005 resulted in 15 sets of technical guidelines that have been approved by MEPC.[154]

The implementation guidelines have been developed to ensure technical compliance and they contain provisions on reception facilities, ballast water sampling, equivalent compliance, ballast water management and development of ballast water management plans, ballast water reception facilities, ballast water exchange, risk assessment, approval of ballast water management systems, approval and oversight of prototype ballast water treatment technology programmes, design and construction standards, emergency situations, designation of areas for ballast water exchange and ballast water exchange in the Antarctic Treaty area.

Two further guidelines are currently being prepared: survey guidelines and guidelines on port state control.

3.6.2 GloBallast

The project "Removal of Barriers to the Effective Implementation of Ballast Water Control and Management Measures in Developing Countries", referred to as the Global Ballast Water Management Programme or GloBallast, was a joint effort made by the IMO, the United Nations Development Programme (UNDP), member governments and the shipping industry aimed at assisting less-industrialised nations in regard of ballast water management. Six main developing regions of the world were for this purpose indentified and selected measures were taken aimed at reducing the transfer of harmful organisms from ship's ballast water, implementing the IMO ballast water guidelines and preparing for the BWM Convention.[155] The measures included *e.g.* education and awareness programmes, regional cooperation and introducing ballast water management schemes. The programme was concluded in 2004 but considered as such a success that it was followed up by the project "Building Partnerships to Assist Developing Countries to Reduce the Transfer of Harmful Aquatic Organisms in Ship's

[153] See *supra* note 95, attachment, Resolutions Adopted by the Conference, resolution 1.
[154] See *supra* note 62, p. iv.
[155] http://globallast.imo.org/index.asp?page=gef_interw_project.htm&menu=true (2012-03-14, 14:25).

Ballast Water", referred to as the GloBallast Partnerships. The GloBallast Partnerships programme aims at assisting developing countries in reducing the risk of ballast water mediated bio invasions and to prepare them for the implementation of the BWM Convention.[156] The GloBallast Partnerships will end in October 2012.

3.7 Pertinent Observations

The "no harm" principle is well established under customary international law and this means that there is a duty on states to prevent transboundary pollution, including bio pollution. Even tough it is too early to speak of any ballast water management rules as customary international law the "no harm" principle could well encompass the transfer of harmful aquatic organisms through the ballast water of ships. The due diligence standard should be considered to determine if a state is in compliance with customary international law. This implies that a state must have used its best endeavours to comply with the obligation, taking into account the capabilities of that particular state. There is no obligation for the wealthier states to assist less-industrialised nations. However, as measures to prevent environmental pollution must be geographically wide in scope to be truly efficient, this may be necessary to ensure the success of measures taken.

The BWM Convention has a solid international legal foundation. This is apparent when considering significant instruments of international law on environmental protection and invasive species. Under UNCLOS there is a duty on states to take measures that are necessary to prevent, reduce and control intentional or accidental introduction of alien or new species if the introduction of such a species may cause significant and harmful changes to the environment. According to Agenda 21 states should consider to adopt appropriate rules on ballast water discharge to prevent the spread of non-indigenous species. The Jakarta Mandate, adopted by the CBD Convention COP in 1995, identifies placing mechanisms to control pathways for alien species introductions, including shipping, as a target focus.

These statements and suggestions made from international law bodies are a few of the signs from the last three decades of the rising concern in regard of ballast water and AIS. That the ballast water problem has been listed by the IMO as one of the four greatest threats to the world's oceans has surely contributed towards raised awareness and acted as an incentive for debate and policymaking. IMO has developed the two most important international instruments in this field: the IMO guidelines for the control and management of ships' ballast water to minimize the transfer of harmful aquatic organisms and pathogens and the BWM Convention. The guidelines are voluntary but they have set a standard for ballast water exchange, risk assessment and training. Relying on ballast water exchange is, as previously

[156] http://globallast.imo.org/index.asp?page=GBPintro.html&menu=true (2012-03-14, 14:24).

concluded, neither efficient nor safe. The BWM Convention has despite the ongoing debate about this method included ballast water exchange as a requirement under the D-1 standard. Fortunately, the method will be phased out under the convention regime. By the end of 2016 all ships, to which the convention applies, will have to manage their ballast water in accordance with the D-2 standard and will not be able to rely on ballast water exchange to be in compliance with the convention. Phasing out ballast water exchange is an important feature of the convention that may help encourage the pursuit of better alternatives.

The D-2 standard does not focus on a particular ballast water management method but on the amount of viable organisms that remain in the water after discharge. This solution is flexible, allowing any IMO approved treatment system to be used, but it does require proper sampling and analysis of samples. It is because of this of great importance that coherency is ensured. Another drawback of the D-2 standard is that it requires onboard treatment systems that may be costly to install. These costs will however normally befall the ship owner, often meaning the representative of a large, multinational cooperation and the shipping industry as such should be able to afford fulfilling the requirements of the convention. For some states the limited access to resources and knowledge may cause additional implementation problems. The Globallast projects and other assisting measures are therefore vital. These measures should include awareness programmes, technical support and measures for aiding consistent implementation.

Much hope has been invested in the BWM Convention and it is gratifying that it most likely to enter into force before long. The convention may not hold all the answers but it is a significant step forward. If the convention succeeds in gaining, at least near, global accession the risk of unintentional species transfer via the ballast water of ships' should be greatly reduced. Even under the convention regime individual states maintain the possibility of introducing more stringent measures, if such measures are in compliance with international law and regulations. What should be kept in mind is that it is highly unlikely that smaller, less influential states will adopt and enforce more stringent measures on their own initiative. International and regional cooperation is the way forward, both within the framework of the BWM Convention and outside of it.

4 The European Approach

Transporting goods by sea has always been important for trade and development in Europe. Today almost 90 % of the external freight trade of the European Union (the EU) is seaborne, as well as about 40 % of the internal. European waters consist of several marine regions that have heavy ship traffic, which means that they are exposed to a high risk of unintentional species transfer. This has become evident during the last 50 years as the presence of alien and invasive species has increased significantly. Current estimates are that several hundreds of alien species have been introduced in the Mediterranean Sea, about 100 foreign species in the Baltic Sea and at least 59 species in the Black sea.[157] Some of the invaders, *e.g.* the infamous comb jelly, have caused severe damage to local ecosystems and local economies as the uncontrollable spread of one species has destroyed populations of commercially valuable fish. The estimated annual costs in Europe for controlling AIS (not distinguishing between invasive species on land or in European seas or lakes) ranges between EUR 960 million and EUR 12 700 million. [158] AIS are now considered a great threat to the European biodiversity.[159]

So far the EU's involvement in ballast water management has been limited. A few measures have been taken, mainly aimed at the adoption and implementation of the BWM Convention. *E.g.* it has been strongly recommended by the European Commission that the member states should adopt the convention. The European Commission has contended that the ratification and implementation of the BWM Convention would hugely benefit the prevention of AIS in relation to hitchhiker organisms brought in the ballast water of ships.[160] A European policy on invasive species has been developed under the Bern Convention, to which the EU is a party. This policy also strongly encourages the states of Europe to adopt the BWM Convention. Relevant EU law is presented and discussed in the following chapter.

There are four regional seas conventions of concern for Europe: the Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention), the Convention on the Protection of the Black Sea Against Pollution (Bucharest Convention), the Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention)

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[157] Panov, Gollasch, Leppäkoski, and Olenin, *International Cooperation in Aquatic Invasive Species Research, Information Exchange and Management in Europe*, Aquatic Invaders The Digest of National Aquatic Nuisance Species Clearinghouse Volume 13, pages 1-5, 2002, p. 1.
[158] COM(2008) 789 final, Communication from the Commission to the Council, European Parliament, the European Economic and Social Committee and the Committee of Regions: *Towards an EU Strategy on Invasive Species*, Brussels, 3 December, 2008, p. 5.
[159] *ibid*, p. 4.
[160] *ibid*, p. 6.

and the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention). These conventions and the ballast water management strategies that have been developed following them, including interim measures while awaiting the entry into force of the BWM Convention, are also briefly presented in the following chapter.

4.1 Convention on the Conservation of European Wildlife and Natural Habitats

The Bern Convention, adopted in 1979, was one of the earliest international conventions that in a comprehensive manner addressed the conservation of habitats and species. The convention has a modern approach to environmental protection based on precautionary considerations and cooperation. It should in this context be noted that the precautionary principle as such was not internationally endorsed until 1982 (UN World Charter for Nature).[161] Currently the convention holds 50 ratifications including most members of the Council of Europe, the EU, Morocco, Tunisia, Burkina Faso and Senegal. States outside of Europe can become members to the convention if invited by the Committee of Ministers of the Council of Europe.[162]

Parties to the convention are requested to "strictly control the introduction of non-native species".[163] Ballast water is not addressed in the convention text but has been included as an issue to consider in regard of invasive species during later discussions. In 1992 the Bern Convention Group of Experts on Invasive Alien Species was established. This has provided a forum where parties to the convention can evaluate efforts to control AIS. In 2003 the European Strategy on Invasive Alien Species was adopted.[164] According to this strategy parties should support and rapidly adopt the BWM Convention.[165] The Bern Convention Standing Committee has recommended that its member states should, while awaiting the entry into force of the BWM Convention, apply IMO's technical guidelines on ballast water management in order to minimize the unintentional transfer of alien species. The Committee has also recommended that the parties should hastily take steps towards adopting the BWM Convention.[166]

[161] A/RES/37/7, World Charter for Nature, 28 October 1982, art. 11 (b).
[162] Convention on the Conservation of European Wildlife and Natural Habitats, 1979, art. 20 (1).
[163] *ibid*, article 11 (2) (b).
[164] See *supra* note 158, p. 8.
[165] T-PVS (2003) 7 revised, Convention on the Conservation of European Wildlife and Habitats, Standing Committee 23rd meeting, *European Strategy on Invasive Alien Species: Final version*, 5 December 2003, p. 28.
[166] *ibid*.

4.2 Directives of the European Parliament and Council

In this subchapter the EU directives that affect the management and control of ballast water are presented and discussed.

4.2.1 Marine Strategy Framework Directive

Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (the Marine Strategy Framework Directive) is considered to be the main environmental element of the EU marine policies. This directive establishes why and how the EU should work with marine environmental concerns, clearly focusing on coordinating efforts within the community and striving away from previously less coherent approaches. It is stated that the marine environment is a precious heritage that must be protected and preserved by the community and that the aim of such efforts should be to provide clean, healthy and productive oceans and seas with maintained biodiversity.[167] It is according to the directive evident that the European community must reduce its impact on marine waters, regardless of where the effects of that impact occur,[168] and that a strategy should be developed to address all human activities that have an effect on the marine environment.[169] It is furthermore pointed out that the EU legislative framework needs to be coherent and that the directive hopefully fosters integration of environmental concerns into other policies enabling coordinated and consistent action.[170] The directive aims at contributing to coherence between the different policies, agreements and legislative measures that affect the marine environment and at integrating environmental concerns into these policies and measures.[171]

The directive applies to all marine waters over which a member state has jurisdictional rights under UNCLOS (with a few listed exceptions) and shall take into account the transboundary effects that may occur on the quality of the marine environment of third states in the same marine region or subregion.[172] The transboundary nature of marine environment is noted as a reason why member states should cooperate with both other member states and with third countries, to ensure the coordinated development of marine strategies for each marine region or subregion.[173] The directive identifies

[167] Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy, Official Journal of the European Union, L 164/19, 25.6.2008, preamble (3).
[168] *ibid*, preamble (2).
[169] *ibid*, preamble (5).
[170] *ibid*, preamble (9).
[171] *ibid*, art. 1 (4).
[172] *ibid*, art. 2 (1).
[173] *ibid*, preamble (13).

four European marine regions: the Baltic Sea, the North-east Atlantic Ocean, the Mediterranean Sea and the Black sea.[174] To ensure coherent and coordinated measures member states shall develop a marine strategy and programme of measures for its waters and cooperate with other member states with which they share a marine region or subregion.[175] Such marine strategies shall apply an eco-system based approach to the management of human activities for enabling sustainable use of marine goods and services.[176]

Cooperation, within the community and outside of it, is throughout the directive referred to as a very important objective. Cooperation at the international level is called indispensable and in it is emphasised that the contribution of the EU community and its member states under international agreements should be enhanced.[177] Any obligations under UNCLOS and the CBD Convention should be taken into full account when applying the directive. General principles such as the no harm principle, the precautionary principle and the polluter pays principle are asserted.[178]

The main purpose of the directive is to achieve good environmental status in the marine environment by the year 2020 latest.[179] Good environmental status is defined as "the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive within their intrinsic conditions, and the use of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations."[180] To achieve good environmental status measures should be taken to prevent and reduce inputs in the marine environment with a view of phasing out pollution and this should be done to ensure that there are no significant impacts on or risks to marine biodiversity, marine ecosystems and human health.[181] In determining good environmental status member states shall take into account pressures and impacts of human activities,[182] including biological disturbance such as the introduction of microbial pathogens and the introduction of non-indigenous species.[183] Pollution is by the directive defined as:

> the direct or indirect introduction into the marine environment, as a result of human activity, of substances or energy, including human-induced marine underwater noise, which results or is likely to result in deleterious effects such as harm to living resources and marine ecosystems, including loss of biodiversity, hazards to human health,

[174] See *supra* note 167, art. 4 (1).
[175] *ibid*, art. 5.
[176] *ibid*, art. 1 (3).
[177] *ibid*, preamble (16).
[178] *ibid*, preamble (17) & (27).
[179] *ibid*, art.1 (1).
[180] *ibid*, art. 3 (5).
[181] *ibid*, articles 1 (2) (a) & 1 (2) (b).
[182] *ibid*, art. 9 (1).
[183] *ibid*, annex 3.

> the hindering of marine activities, including fishing, tourism and recreation and other legitimate uses of the sea, impairment of the quality for use of sea water and reduction of amenities or, in general, impairment of the sustainable use of marine goods and services.[184]

Non-native species are by the community recognized as a major threat to European biodiversity and member states are required to include invasive species in the description of good environmental status.[185] One of the qualitative descriptors that shall be used for determining good environmental status is that non-indigenous species introduced by human activities should be at levels that do not adversely alter the ecosystems.[186]

4.2.2 The Marine Equipment Directive

The purpose of the Council Directive 96/98/EC of 20 December 1996 on Marine Equipment (Marine Equipment Directive) is to enhance safety at sea and the prevention of marine pollution through the uniform application of the relevant international instruments relating to equipment to be placed on board ships for which safety certificates are issued by or in behalf of member states pursuant to international conventions.[187] It is also the aim of the directive to ensure free movement of such equipment within the community. Equipment is defined as items that must be placed on board a ship for use in order to comply with international instruments.[188] International instruments are defined as including relevant international conventions, relevant resolutions and circulars of the IMO. When the BWM Convention enters into force the Marine Equipment Directive will apply to on-board ballast water treatment system. Such systems will increasingly become required when ballast water exchange has been phased out and replaced by the D-2 standard. As the directive does not currently address ballast water treatment systems it will have to be amended to reflect these developments.

4.2.3 The Biocides Directive

Directive 98/8/EC of the European Parliament and of the Council of 16 February 1998 concerning the placing of biocidal products on the market (The Biocides Directive) is the main body of law regulating the sale and use of chemical substances on the common market and within the territory of member states. Biocidal products are defined as active "substances and preparations containing one or more active substances, put up in the form which they are supplied to the user, intended to destroy, deter, render

[184] See *supra* note 167, art. 3 (8).
[185] See s*upra* note 59, p. 7.
[186] See *supra* note 167, annex 1 (2).
[187] Council Directive 96/98/EC of 20 December 1996 on marine equipment, Official Journal of the European Union, L 46/25, 17.2.1997, art. 1.
[188] *ibid*, art. 1 (b).

harmless, prevent the action of, or otherwise exert a controlling effect on any harmful organisms by chemical or biological means."[189] Harmful organisms are defined as any organism "which has an unwanted presence or a detrimental effect for humans, their activities or the products they use or produce, or for animals or for the environment."[190] Substances covered by the directive must be authorized in accordance with it if the product containing the substances is to be placed on the market and used in the territory of the member states.[191]

The Biocides Directive includes a comprehensive authorisation regime for biocidal products. When compared with the BWM Convention authorisation regime for ballast water management systems that make use of one or more active substances, it is apparent that the two instruments overlap. That conflict between regional instruments for the responsible use of chemical products and the BWM Convention could occur was accurately anticipated by the Netherlands at the 49th BWM Convention MEPC.[192] To avoid conflict the directive must be amended or replaced. The directive is currently up for revision and a new regulation that will repeal and replace the directive has been proposed. The European Council will most likely accept the proposal, which will combine the authorisation regime of the convention with the requirements of the directive. According to the proposed regulation the BWM Convention "provides for an effective assessment of the risks posed by ballast water management systems".[193] The solution is that the final approval by the IMO should be considered equivalent to the product authorisation required under EU law. Hence biocidal products used for ballast water treatment in IMO approved systems will be regarded as authorised under EU law. The directive will apply to these products, which means that the same cancellation, review and amendment procedures are required.[194] In accordance with the requirements of the directive, the European Commission shall be notified by the authorisation holders about new data on adverse effects of the substances or products on the environment or information indicating that the product is not sufficiently effective.[195] The authorisation holders must also keep records of biocidal products that they have placed on the market for ten years after placing them on the market.[196]

[189] Directive 98/8/EC of the European Parliament and of the Council of February 1998 concerning the placing of biocidal products on the market, Official Journal of the European Union, L 123/1, 24.4.1998, art. 1 (a).
[190] *ibid*, art. 1 (f).
[191] See *supra* note 189, art. 3 (1).
[192] See *supra* note 149, p. 1.
[193] 5032/2/11 REV 2, Position of the Council at first reading with a view to the adoption of a regulation of the European Parliament and of the Council concerning the making available on the market and use of biocidal products, 21 June 2011, p. 9 preamble (23).
[194] *ibid*, art. 2 (7).
[195] *ibid*, art. 46.
[196] *ibid*, art. 67.

4.2.4 The Port State Control Directive

In May 2009 the Committee of the Paris Memorandum of Understanding (Paris MOU) adopted a new inspection regime and following this the Directive 2009/16/EC of the European Parliament and the Council on port state control (Port State Control Directive), adopted in April 2009, entered into force in June 2009. The directive and the Paris MOU are closely related and the purpose of the directive is, *inter alia*, to establish common criteria for control of ships by the port state and harmonising procedures on inspection and detention, building upon expertise and experience under the Paris MOU.[197] The main objective of the directive is to drastically reduce substandard shipping in the waters of member states by increasing compliance with international and relevant EU legislation on maritime safety, maritime security, protection of the marine environment and on-board living and working conditions of ships of all flags.[198]

To be in compliance with the Port State Control Directive EU member states are obliged to establish and maintain competent authorities for the inspection of ships in their ports.[199] If during an inspection, carried out under the directive, deficiencies that are clearly hazardous to safety, health or the environment are discovered the competent authority of the port state must ensure that the ship is detained until the hazard is removed or it has been established that the ship can proceed to sea without risk to the safety and health of passengers or crew, or risk to other ships, or without there being an unreasonable threat of harm to the marine environment.[200]

Inspection of ships under the BWM Convention can be carried out in accordance with article 9, 10, 11 and 12 of the convention. It would be beneficial if the directive were amended so that it becomes clear how the convention and the directive should be applied in the situation of an overlap.

4.2.5 The Port Waste Reception Facilities Directive

Council Directive 2009/59/EC on port reception facilities for ship-generated waste and cargo residues (Port Waste Reception Facilities Directive) is a directive mainly aimed at ensuring reception facilities for ship-generated waste, meaning all waste that fall under the scope of the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78). MARPOL 73/78 does not cover ballast water. However, it is stated that ship-generated waste and cargo residues as defined in article 1 (a) of the Council Directive 75/442/EEC of 15 July 1975 on waste should be included

[197] Directive 2009/16/EC of the European Parliament and of the Council of 23 April 2009 on port state control, Official Journal of the European Union, L 131/57, 28.5.2009, art. 1 (b).
[198] See *supra* note 197, art. 1 (a).
[199] *ibid*, art. 4 (2).
[200] *ibid*, art. 19 (2).

under the scope of the Port Waste Reception Facilities Directive.[201] This means that "waste" shall include any substance or objects set out in an annex to the directive, which the holder discards or intends or is required to discard.[202] In the annex provision Q16 states: "Any materials, substances or products which are not contained in the above categories."[203] This is an open-ended provision that could include ballast water and sediments. If ballast water is included under the directive member states must ensure the availability of port reception facilities adequate to meet the needs of the ships the normally uses the port.[204]

4.2.6 The Habitats Directive

Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) was adopted in 1992 as a response to the Bern Convention. The aim of the directive is to contribute towards ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora in the European territory.[205] According to the directive member states must ensure that the deliberate introduction if any species which is not native to their territory is regulated so as not to prejudice natural habitats.[206] The introduction of non-native species through ballast water is accidental rather than intentional and this provision is therefore not of relevance for ballast water discharge. The Habitats directive requires that special areas of conservation be designated to protect the important natural habitat type of open seas and tidal areas. [207] This requirement could conflict with, or affect, the ballast water exchange requirements of the BWM Convention.

4.3 Regional Seas Conventions

The United Nations Environment Programme (UNEP) launched the Regional Seas Programme in 1974. The aim was to address the degradation of the world's oceans and coastal areas through the sustainable management and use of the marine and coastal environment. [208] To achieve this goal regional programmes have been established aimed at engaging neighbouring countries in protecting their shared marine environment. The programmes

[201] Directive 2000/59/EC of the European Parliament and of the Council of November 2000 on port reception facilities for ship-generated waste and cargo residues, Official Journal of the European Union, L 332/81, 28.12.2000, art. 2.
[202] Council Directive 75/442/EEC of 15 July 1975 on waste, Official Journal of the European Union, L 194/39, 25.7.1975, art. 1 (a).
[203] *ibid*, annex 1 Q 16.
[204] See *supra* note 202, art. 4 (1).
[205] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, Official Journal of the European Union, L 206/7, 22.7.1992, art. 2 (1).
[206] *ibid*, art. 22 (b).
[207] *ibid*, annex 1, 1 (11).
[208] http://www.unep.org/regionalseas/about/default.asp (2012-04-02, 9:51).

are based on an action plans and are all similar in their approaches. However, the content of each programme is tailored by a local government and it institutions to suit the particular environmental challenges existing in a region. Thirteen Regional Seas programmes have been established but not all are directly administered by UNEP. Four of the Regional Seas programmes (the Mediterranean, the Black Sea, the Baltic Sea and the North-East Atlantic) concern, at least partly, European waters. Of these only the Mediterranean programme is administered by UNEP. The Black Sea programme is partly managed by UNEP and the Baltic and North-East Atlantic programmes are independent, meaning that they are not established under the auspices of UNEP. These programmes are nonetheless welcome to participate in global Regional Seas meetings for sharing experiences and for exchanging advice and support.

4.3.1 The Mediterranean Sea

The most important legal document for the protection of the Mediterranean marine environment is the Barcelona Convention. Under this convention the contracting parties shall take all measures in conformity with international law to prevent, abate and combat pollution of the Mediterranean Sea area caused by discharges from ships.[209] Parties shall also ensure effective implementation of the rules that are generally recognized at the international level relating to control of this type of pollution. Pollution is by the convention defined as the introduction by man, directly or indirectly, of substances or energy into the marine environment resulting in such deleterious effects as, *inter alia*, harm to living resources and hazard to human health.[210] The Barcelona Convention has been amended by the adoption of several protocols. The Protocol concerning Specially Protected Areas and Biological Diversity was adopted in 1995. Here it is stated that parties shall take all appropriate measures to regulate the intentional or accidental introduction of non-indigenous species to the wild.[211]

The UNEP action plan recalls the priority given by the Barcelona Convention to the preservation of biodiversity and recognizes that shipping, because of ballast water, sediments and hull fouling, is a main vector of species introduction to the Mediterranean Sea area.[212] One of the main objectives of the action plan is to strengthen the capacity of the Mediterranean countries to deal with the issue of non-indigenous species introduction.[213] Parties are requested to as quickly as possible enact national legislation for controlling the introduction of marine species and are strongly recommended to take the necessary steps to express in their national laws the provisions of the pertinent international treaties and

[209] Convention for the Protection of the Mediterranean Sea against Pollution, 1976, art. 6.
[210] *ibid*, art. 2 (a).
[211] Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean, Official Journal of the European Union L 322/3, 14 December 1999, art. 13.
[212] UNEP/WG.2/5, Mediterranean Action Plan, 1975, pp. 6-7.
[213] *ibid*, section 12.

guidelines on the subject.[214] It is also strongly recommended that a regional project is developed to strengthen the capacities of the Mediterranean countries to reduce the transfer of aquatic organisms via the ballast water of ships and ballast tank sediments.[215] For elaborating and implementing this regional project close work with the IMO is concluded as necessary. Following this reasoning a five year long (2008-2012) GloBallast Partnership project was started, specifically aimed at aiding and assisting the vulnerable, developing states in implementing sustainable mechanisms for the management and control of ballast water and sediments and thereby minimising the adverse impacts of aquatic invasive species transferred by ships.[216]

4.3.2 The Black Sea

The Black Sea is because of its geographical features and relative isolation (its body of water is only connected to the Sea of Azov and the Sea of Marmara) particularly sensitive to the introduction of non-native species. In 1992 the Bucharest Convention was adopted with a view to achieve progress in the protection of the marine environment of the Black Sea and in the conservation of its living resources. The convention requires its parties to take all necessary measures for preventing, reducing and controlling pollution.[217] Pollution is, by the same definition as found in the Barcelona Convention, stated as the introduction by man of substances into the marine environment.[218] Ballast water is not mentioned in the convention but regardless of this the Commission on the Protection of the Black Sea against pollution has given high priority to promoting cooperation in the Black Sea area in line with the principles and recommendations of the BWM Convention.[219]

4.3.3 The Baltic Sea

The Baltic Sea is protected from pollution under the 1992 Helsinki Convention by the Helsinki Commission (HELCOM). The convention entered into force in January 2000 and thus replaced the first Helsinki Convention of 1974. HELCOM acts as the governing body for the convention and brings together the contracting parties Denmark, Estonia, European Community, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden. The Helsinki Convention aims at preventing and eliminating pollution in order to promote the ecological restoration of the Baltic Sea

[214] See *supra* note 212, section 17.
[215] *ibid*, section 23.
[216] http://www.rac-spa.org/aliens (2012-04-03, 12:06).
[217] Convention on the Protection of the Black Sea Against Pollution, 1992, art. 5 (2).
[218] *ibid*, art. 2 (1).
[219] Strategic Action Plan for the Rehabilitation and Protection of the Black Sea, Istanbul, 30-31 October 1996.

area and for preserving the ecological balance.[220] The precautionary principle shall be applied to measures taken under the convention and parties shall promote the use of best environmental practice and best available technology.[221]

There is no mention of ballast water in the Helsinki Convention but nonetheless HELCOM has taken an active role in promoting the adoption and implementation of the BWM Convention. Part of the HELCOM "*Baltic Sea Action Plan"*, an ambitious plan of action that has been formulated by the commission to restore the good ecological status of the Baltic environment by 2021, is the "*Road map towards harmonised implementation and ratification of the 2004 International Convention for the Control and Management of Ship's Ballast Water and Sediments"*. By following the roadmap the HELCOM parties have agreed to ratify the convention in all cases no later than 2013.[222] Other significant measures included under the roadmap is agreeing on target species, compiling data on the invasive species already present in the Baltic Sea area and providing ballast water reception facilities in the ports of the contracting states.[223]

In addition to the road map HELCOM has taken a joint ballast water management initiative together with the Commission for the Convention for the protection of the Marine Environment of the North-East Atlantic (OSPAR). While anticipating the entry into force of the BWM Convention the two commissions have adopted the *General Guidance on Voluntary Interim Application of the D1 Ballast Water Exchange Standard by vessels leaving the Baltic Sea and transiting through the North East Atlantic to other destinations*. These are voluntary guidelines by which, and from January 2010, the parties of the Helsinki convention and OSPAR can choose to perform ballast water management by ballast water exchange.[224] The guidelines are applicable to ships covered by article 3 of the BWM Convention and should not be regarded as a replacement for the requirements of the convention but only as providing an interim regional ballast water management strategy for the Baltic Sea and the North-East Atlantic.[225] Once a ship is able to perform according to the BWM Convention D-2 standard or when the convention has entered into force and the D-2 standard is applicable the guidelines will no longer apply.[226] The cooperation between HELCOM and OSPAR is an example of such regional measures as envisioned and encouraged by the BWM Convention.[227] Coherent ballast water management measures are of outmost importance to

[220] Convention on the Protection of the Marine Environment of the Baltic Sea Area, 1992, art. 3 (1).
[221] *ibid*, articles 3 (2) & 3 (3).
[222] HELCOM Baltic Sea Action Plan, 15 November 2007.
[223] *ibid*.
[224] General Guidance on the Voluntary Interim Application of the D1 Ballast Water Exchange Standard by vessels leaving the Baltic Sea and transiting through the North East Atlantic to other destinations, 2008, section 1.
[225] i*bid*.
[226] *ibid*.
[227] See *supra* note 95, art.13 (3).

control the spread of invasive non-indigenous aquatic specie and the commissions clearly, and in a commendable way, follow the path laid down by the convention in strengthening and harmonising regional efforts. It is however questionable how efficient such efforts are when only relying on voluntary measures.

4.3.4 The North-East Atlantic

The OSPAR Convention was opened for signature in 1992 and entered into force in March 1998, thus replacing the Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft (Oslo Convention) and the 1974 Convention for the Prevention of Marine Pollution from Land-Based Sources (Paris Convention). The convention has been signed and ratified by Belgium, Denmark, the European Community, Finland, France, Germany, Iceland, Ireland, the Netherlands, Norway, Portugal, Spain, Sweden, the United Kingdom of Great Britain and Northern Ireland, Luxembourg and Switzerland.[228] OSPAR is much like the other regional conventions focused on pollution prevention and founded on the precautionary principle and other international environmental law principles.[229] The parties to the convention shall take the necessary steps and measures to prevent and eliminate pollution and to protect the maritime area against adverse effects of human activities in order to, *inter alia*, conserve marine ecosystems.[230]

There is no mention of ballast water or ballast water management in the convention but as it has been generally recognised that AIS threaten biological diversity and marine ecosystems such measures could still be said to be included under the scope of the convention. The marine area to which OSPAR is applicable contains some very important shipping routes with heavy cargo ship traffic and the OSPAR commission has identified the introduction of alien invasive species via ballast water as a concern that needs to be addressed.[231] As previously discussed, the OSPAR commission and HELCOM have jointly taken ballast water management measures by promoting a voluntary ballast water exchange standard.

[228] http://www.ospar.org/content/content.asp?menu=01481200000000_000000_000000 (2012-04-03, 12:30).
[229] Convention for the Protection of the Marine Environment of the North-East Atlantic, 1992, art. 2.
[230] *ibid*, art. 2 (1) (a).
[231] http://www.ospar.org/content/content.asp?menu=00710302220000_000000_000000 (2012-04-03, 13:28).

4.4 Towards an EU Strategy on Invasive Alien Species

The rapid loss of biodiversity in Europe caused by AIS, and the annual cost of millions of EUR for controlling them, has not gone unnoticed. In 2008 the European Commission presented policy options for the proposed EU strategy on invasive species. The commission concluded that a comprehensive, dedicated EU legal instrument would be the most effective measure and that this solution would also provide the greatest legal clarity.[232] Currently the commission is preparing such a legal instrument, which is due for adoption in 2012.[233] A common approach on ballast water management is likely to have been included under this instrument. This approach should preferably be based on mandatory measures and be consistent with, or more stringent than, the BWM Convention regime. It is undesirable that the common policy relies on voluntary measures or any measures based on ballast water exchange.

4.5 Pertinent Observations

The EU has not yet developed a common ballast water policy and the community's involvement in ballast water management has so far been limited. There is currently no comprehensive European ballast water management regime and the efforts that have been made are for the most part scattered. The measures that have been taken are to the large extent aimed at preparing for the entry into force of the BWM Convention. A handful of community directives will be affected by the convention and a few possible conflicts must be redressed to ensure coherency between EU law and the convention. Steps have been taken towards this end but there still remain ambiguities that may cause problems when the convention enters into force.

The most important directive for the protection of the marine environment is the Marine Strategy Directive. The overarching aim of the directive is to achieve good environmental status in the marine environment by 2020 latest. One of the qualitative descriptors that shall be used for determining if good environmental status has been achieved is that non-indigenous species introduced by human activities should be at levels that do not adversely alter ecosystems.[234] In addition to this biological disturbances caused by human activity, such as the introduction of microbial pathogens and of non-indigenous species, must also be considered.[235] It is apparent that the EU will have to implement ballast water management strategies in order to achieve good environmental status. The Marine Strategy directive has a

[232] See *supra* note 138.
[233] http://ec.europa.eu/environment/nature/invasivealien/index_en.htm (2012-05-16 18:30).
[234] See *supra* note 167, annex 1 (2).
[235] *ibid*, annex 3.

clear focus on the importance of coherency and a common standard on ballast water would help control the spread of non-indigenous species and preserve marine ecosystems. Regulations for the control and management of ballast water should not be voluntary, as this will not help achieve good environmental status. The BWM Convention may be useful as a tool for achieving good environmental status if the convention is adopted by all EU member states, but in any case the EU approach on ballast water should be in line with the convention regime.

Compliance with the D-2 standard of the BWM Convention requires ballast water treatment systems and to face this development the Marine Equipment Directive and the Biocides Directive should be amended. The Marine Equipment Directive does currently not include onboard ballast water treatment systems and must for this reason be amended. Chemical or biocidal treatment of ballast water is one of the options used to treat ballast water onboard and the Biocides Directive must therefore be amended or replaced to avoid a conflict of law between the directive's product authorisation regime and the treatment system authorisation procedure of the BWM Convention. A solution to this problem seems to be on its way as a new directive has been proposed. In accordance with the new directive the approval of ballast water management systems under the BWM Convention will be considered equivalent to the product authorisation required under EU law. However, cancellation, review and amendment procedures will be the same for IMO approved treatment systems as for EU approved biocidal products and it is not unconceivable that conflicts may arise between the two instruments of law after the final approval. Can the EU revoke approval given by the IMO and how will this affect the status of the convention? Clarification on this issue would be desirable.

Another vagueness that preferably should be rectified before the BWM Convention enters into force is how port state control according to the BWM Convention is related to such measures, pursuant to the Port State Control Directive and in regard of the detention of ships. In accordance with the Port State Control Directive EU states are obliged to establish and maintain competent authorities for the inspection of ships in their ports.[236] If during inspection deficiencies are found that are hazardous to the environment the port state shall detain the ship until the treat has been removed. According to articles 9 and 10 of the BWM Convention port states are authorised to carry out ballast water inspections on ships in their ports or offshore terminals and take measures to prevent or prohibit a ship from de-ballasting if the results indicate that the release of ballast water may cause harm to the environment. These regulations may overlap, although it is unclear if the results of an inspection pursuant to the BWM Convention constitute grounds for detaining a ship in accordance with the directive. For the sake of clarity it would be appropriate to comment on this issue in the directive.

[236] See *supra* note 197, art. 4 (2).

The Port Waste Reception Facilities Directive should also preferably be amended so to contain an elucidating provision on whether or not the directive is applicable to ballast water and sediments. It should be clearly stated in the directive if ballast water and/or sediments fall within the scope of its waste definition.

EU is party to the Bern Convention and the community is hence under an obligation to "strictly control" the introduction of non-native species. In regard of ballast water this has so far only resulted in a recommendation from the Bern Convention Standing Committee that the parties should rapidly adopt the BWM Convention. However, the Bern Convention's approach to environmental protection and the principles that it was founded on could inspire the EU ballast water management strategy. The convention is based on precautionary considerations and emphasises cooperation to achieve protection for the environment. These are of course essential components of international environmental law but the most interesting aspect is the possibility under the convention regime to extend its regional scope of application. The Bern Convention is a European instrument of law but permits the accession of states outside the European continent by invitation of the Committee of Ministers of the Council of Europe.[237] This solution allows the instrument to address shared environmental problems, regardless of the regional limits for application originally had in mind. Most environmental problems do not respect borders and this is perhaps particularly true in regard to aquatic invasive species. It would be very advantageous if the EU decides to develop a common ballast water management policy with such and encompassing approach.

[237] See *supra* note 162, art. 20 (1).

5 The Swedish Approach

Annually approximately 46 million tonnes of ballast water is released in Swedish ports.[238] Located within Swedish jurisdiction are sensitive marine areas such as the Baltic. The Baltic is a brackish, semi-enclosed sea with relatively few indigenous species. These factors combined make the area particularly sensitive to the introduction of non-native species. Considering that the Baltic is also an important area for shipping, in fact one of the most intensely trafficked shipping areas in the world, there is reason for concern.[239] Most of the ballast water that is released in Swedish waters has been transported from another country and therefore the BWM Convention will be applicable. The convention has been ratified by Sweden but there are no Swedish regulations in force on ballast water management.

In the following chapter the Swedish approach to ballast water management is presented and discussed. The coming Swedish ballast water law and the laws affected by it is described and analysed. The Swedish Transport Agency (Transportstyrelsen), which is the Swedish government agency that is mainly responsible for handling ballast water management related issues, is given a cursory presentation. The Swedish-developed ballast water management system Pureballast is also briefly introduced.

5.1 Sweden & the BWM Convention

Sweden is a dualistic country and this means that treaties ratified by Sweden must be incorporated or transformed into Swedish legislation. Only when incorporated or transformed obligations under international treaties will take effect in Sweden. The Swedish law making process is in most cases initiated by a legislative proposal, including a draft bill, made by the Government (Regeringen) and laid before the Swedish Parliament (Riksdagen). The Swedish Parliament is responsible for approving new legislation. If legislation passes through the Parliament it should then be referred back to the Government to become formally promulgated. Following the ratification of the BWM Convention a new Swedish law that transforms the obligations under the convention regime into Swedish regulations has been drafted and has subsequently successfully passed through the Parliament. As it is still unclear when the BWM Convention will enter into force the Parliament has given the Government the mandate to decide when the Swedish ballast water law will come into force.[240]

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[238] Hoffrén, *Pilot study on annual ballast water discharge and uptake in Sweden,* 2006, p.11.
[239] Maritime Transport in the Baltic Sea, Draft HELCOM Thematic Assessment in 2006, 7 March 2006, p. 1.
[240] Regeringens proposition 2008/09:229, Anslutning till och genomförande av barlastvattenkonventionen, p. 1.

In 2009 when Sweden deposited the instrument of accession for the BWM Convention to the IMO the following reservation was made:

> Due to geographical, hydrographical and hydrological conditions, Sweden cannot fully comply with the requirements regarding Ballast Water exchange, and will therefore not fully comply with the requirements of the said Convention until the year 2017. In addition, regulation B-3.3 will not be applied until the second yearly survey of ships, but at the latest by the end of December 2011.[241]

The first part of the reservation was made due to the limited water depth that for the most part is less than 200 metres in the relevant marine areas and hence not adequate for complying with the requirements of the convention in regard of ballast water exchange.[242] Sweden expects to be in full compliance with the convention when ballast water exchange according to the D-1 standard has been completely phased out. The second part of the reservation was made because of the limited number of approved treatment systems available at that time, which rendered it hard for ships built in, or contracted to be built during 2009 to comply with the B-3.3 standard.[243]

The geographical limitations in regard of water depth was discussed during the considerations preceding the Swedish ballast water law and specially designated ballast water exchange zones in accordance with regulation B-4.2 of the convention was examined as an alternative. This option was, partly based on the recommendations of amongst others the Swedish Meteorological and Hydrological Institute (SMHI), rejected on several grounds that included the risk of spreading harmful aquatic species from the areas possibly suitable for designation to protected marine areas and sensitive coastal areas and the risk of spreading blooming algae. [244] It was also concluded that some of the areas that could be considered suitable for being designated as exchanges zones are located too far away from main shipping routes. Requiring and, perhaps, providing for ballast water reception and treatment facilities in port was also discussed as a possible solution. This alternative was rejected as such infrastructure would be costly, may cause commercial disadvantages for ports without facilities and would be of limited use once the D-2 standard has become applicable at which point onboard treatment systems should have become standard.[245]

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[241] BWM.1/Circ.10 Ref. B1/K/1.03, International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004, Accession by Sweden, 30 November 2009.
[242] See *supra* note 240, p. 28.
[243] *ibid*, p. 31.
[244] *ibid*, p. 29.
[245] *ibid*, pp. 31-32.

5.2 Barlastvattenlag SFS 2009:1165

The Swedish ballast water law (Barlastvattenlag) was issued in November 2009. The purpose of the law is to transform the obligations under the BWM Convention into Swedish law and it is therefore to a large extent drafted to closely resemble the convention. As an example of this the aim of the law is stated as to prevent, minimize and eliminate the spread of aquatic organisms and pathogens that may cause harm to the environment, human health, property and resources.[246] If compared with the aim as stated in the BWM Convention a minor amendment has been made, as the Swedish law does not refer to harmful aquatic species but to aquatic species that may cause harm. This alteration was made in order to avoid the misinterpretation that inherently harmful aquatic species are the matter of concern.[247]

The law applies to Swedish ships and foreign ships sailing within Swedish sea territory or EEZ with the same exemptions as listed in article 3 of the BWM Convention.[248] According to provisions of the law, ballast water shall be treated either on board with an approved treatment system, exchanged, deposited in a reception facility or be managed by any other approved method before it is released.[249] The Swedish Government appoints the appropriate authority for approval of ballast water treatment systems and methods.[250] The Government may also, in accordance with the BWM Convention, decide on requirements in regard of providing sediment reception facilities for where cleaning and repair of ballast tanks occur.[251] Ballast water management plan and ballast water record book is required under the Swedish law, closely following the requirements of the BWM Convention.[252] The Government, or its appointed agency, may decide on certificates and inspections of Swedish vessels.[253] Foreign ships can only be inspected in accordance with the Swedish ballast water law if they are in a Swedish port or offshore terminal and the inspection must be limited to control of certificate, inspection of the ballast water record book and sampling of ballast water.[254]

Chapter 7 and 8 of the Swedish ballast water law contains sanctions for violations. A civil law fine, based on strict liability, may be issued to the ship owner in the event of unauthorised release of ballast water.[255] The sum of the fine is calculated in relation the gross tonnage of the ship but the fine may be reduced or remitted if found to be unreasonable.[256] The civil law

[246] SFS 2009:1165, Barlastvattenlag, chapter 1 § 1 (1).
[247] See *supra* note 240, p. 37.
[248] See *supra* note 246, chaper 1 § 3.
[249] *ibid*, chapter 2 § 1.
[250] *ibid*, chaper 2 § 2.
[251] *ibid*, chapter 3 § 1.
[252] *ibid*, chapter 4 §§ 1 & 2.
[253] *ibid*, chaper 5 §§ 2 & 3.
[254] *ibid*, chapter 5 § 7.
[255] See *supra* note 240, p. 58.
[256] See *supra* note 246, chapter 7 §§ 3 & 4.

fine is an administrative sanction but may be combined with criminal sanctions for the person whom, with intent or criminal negligence, releases untreated ballast water. The punishment for such an offence varies from fines to a maximum of 2 years imprisonment, depending on the severity of the violation.[257] The pairing of a civil law fine based on strict liability for the ship owner and the possibility to, under some circumstances, impose criminal sanctions against the person responsible for the release of untreated ballast water is a solution that combines the efficiency of civil law fines with the discouraging effect of criminal sanctions. It is a very reasonable solution that well balances these difficult considerations. The Swedish sanctions are in accordance with article 8 of the BWM Convention. Article 8 (3) states that sanctions provided in law shall be adequate in severity to discourage violations. The maximum penalty of 2 years imprisonment should be regarded as severe enough to discourage violations and the severity is not in disparity with the seriousness of the crime when considering that a violation can cause irrevocable harm to marine ecosystems.

The Swedish ballast water law contains several references to additional regulations that in accordance with the law are to be developed by appointed government agencies.[258] It is emphasised that such regulations must not conflict with any, for Sweden binding, corresponding international regulations.[259] Transportstyrelsen is currently working on ballast water management regulations and the Ministry of Enterprise, Energy and Communications (Näringsdepartementet) is developing a set of technical regulations.[260] These regulations will hopefully be approved and ready for application when the BWM Convention and the Swedish ballast water law come into force.

5.3 Other Relevant Regulations

When the Swedish ballast water law enters into force a handful of other Swedish laws must have been amended to ensure consistency. With this aim in mind amendments have been proposed to Miljöbalken (SFS 1998:808), Fartygssäkerhetslagen (SFS 2003:364) and Lag om Sveriges ekonomiska zon (SFS 1992:1140).

The Swedish environmental code Miljöbalken should, as have been proposed by the Swedish Government, be amended by adding a new provision in order to clarify that ballast water is handled by a separate law and that this issue is not included under the scope of the provisions found in Miljöbalken concerning pollution from ships.[261] Fartygsäkerhetslagen regulates ship safety and the Swedish Government has proposed that this

[257] See *supra* note 246, chapter 8 § 1.
[258] See *e.g. supra* note 246, chapter 1 § 4 & chapter 2 § 1.
[259] *ibid,* chapter 1 § 5.
[260] As informed through email correspodence with Henrik Ramstedt, Transportstyrelsen.
[261] See *supra* note 240, p. 18.

law is amended so to require that the captain must have such adequate knowledge of the ship to be able to prevent any unlawful release of ballast water and sediments.[262] Lag om Sveriges ekonomiska zon regulates the Swedish EEZ and to this law an amendment has been proposed that indicates that additional regulations on the protection of the marine environment can be found in the ballast water law.[263]

Sweden is party to HELCOM and to OPSAR. HELCOM and OSPAR provide an important framework for cooperation with the neighbouring states that can ensure harmonised implementation of the convention.

5.4 Transportstyrelsen

Transportstyrelsen is the Swedish government agency that works with transport by rail, road, air and sea in Sweden. Transportstyrelsen mission is to assure the accessibility and quality of transport, and for this purpose taking into account the environmental aspects. Transportstyrelsen is also the government agency responsible for matters in regard of ballast water management. Ballast water is in part handled by other Swedish government agencies such as Länsstyrelsen and Havs- och vattenmyndigheten but they have informative roles and are appointed to work strategically with invasive species.

Transportstyrelsen is currently, as mentioned above, working on developing ballast water management regulations. The agency is also actively cooperating with the IMO on issues relating to ballast water as well as working together with HELCOM and the OSPAR states in order to ensure harmonised implementation of the BWM Convention.[264]

5.5 Pureballast

Sweden has the advantage of technical know-how and resources, which is significant for the ability to implement and comply with the BWM Convention D-2 standard. In 2007 the first on board ballast water treatment system to obtain IMO's Active Substance Final Approval was Pureballast, a system developed by two Swedish companies.

Pureballast was developed by Wallenius Water and Alfa Laval and is a chemical-free treatment system for ballast water. The system uses filters and Advanced Oxidation Technology (AOT) to ensure that the ballast water when released contains a minimum of living organisms.[265] Firstly the water

[262] See *supra* note 240, p. 19.
[263] *ibid*, p. 20.
[264] As informed through email correspodence with Henrik Ramstedt, Transportstyrelsen.
[265] http://www.alfalaval.com/solution-finder/products/pureballast/pages/howitworks.aspx (2012-04-18, 17:31).

is passed through filters when taken aboard into the ballast water tanks. It is secondly treated with AOT, which destroys the cell membranes of any organisms present and thus killing them. Thirdly the ballast water is treated a second time before the ship de-ballasts, ensuring that any growth that may have occurred in the tanks is eliminated. The water is finally released through pipes that bypass the filter in order to avoid contamination. The Pureballast system is marketed as a convenient, space saving and chemical-free alternative that is low in maintenance costs and that is easy to use. The system has been granted type approval certificate by Det Norske Veritas after land based and shipboard tests as well as environmental testing in accordance with IMO Resolution MEPC.174 (58) and active substance approval testing in accordance with IMO Resolution MEPC. 169 (57).[266]

5.6 Pertinent Observations

Swedish waters contain important international shipping routes but also sensitive marine ecosystems, in particular the very susceptible marine environment of the Baltic Sea. It is essential to protect these marine areas from the risk of introducing aquatic invasive species and ballast water regulations are therefore much needed. Despite this there are currently no Swedish ballast water regulations in force.

Sweden has ratified the BWM Convention and preparations have been made to transform the convention into Swedish law. The Swedish ballast water law will enter into force following the BWM Convention. The Swedish law has been drafted to ensure that Sweden, after 2016, will be in compliance with the requirements of the convention. However, Sweden does not expect full compliance until ballast water exchange has been phased out as required method under the convention regime, due to the geographical, hydrological and hydrographical features of Swedish waters. This means that even after the BWM Convention has entered into force there will be a significant number of ships that may continue to release ballast water that has neither been exchanged nor treated. Debatable as this may seem better options are lacking. Ballast water exchange in accordance with the convention cannot be performed, as the water depth and distance to shore in those areas most visited by commercial ships are limited. Ballast water exchange zones is not a reasonable alternative as there are no marine areas that would be suitable both in terms of being close to shipping routes and in providing a reduced risk of transferring harmful aquatic organisms to sensitive marine environments. Land based reception facilities have been rejected by the Swedish government as they would be costly to construct and of limited use when compliance with the D-2 standard is required for all ships to which the convention applies. Sweden's reservation to the BWM Convention is, considering the preconditions, reasonable. Nevertheless it is still unfortunate that Swedish waters will continue to be subjected to vast amounts of untreated ballast water until 2016. There are already potentially invasive

[266] Det Norske Veritas, Type Approval Certificate No. P-13734, 2011.

species present in these waters and it can only be hoped that a large-scale invasion will not occur during the years remaining until then.

The Swedish ballast water law is adequate and true to meaning and intention of the BWM Convention. The sanction system under the Swedish law is satisfactory and the chosen solution of combining fines based on strict liability with criminal sanctions based on culpability balances the need for efficiency with the discouraging effect of criminal sanctions. The fine is calculated based on the gross tonnage of the ship. When the draft bill for the Swedish ballast water law was referred to advisory bodies for assessment one opinion suggested that the fines are too inexpensive to act as a strong incentive for ship owners to ensure compliance with the law. If this should turn out to be the case adjustments in the law could easily be done and it should therefore not be considered as a problem of significance.

Sweden cooperates through its government agency Transportstyrelsen with the other OSPAR and HELCOM countries for ensuring coordinated implementation of the BWM Convention. The value of regional cooperation and joint efforts should not be underestimated and could greatly benefit Sweden in regard of controlling the spread of AIS. Sweden is also fortunate to have technical resources readily available, evident from the success of the Pureballast ballast water treatment system. Considering these premises Sweden is well equipped for being able to tackle the ballast water problem. Sweden is also a EU member state and when the union decides on a common policy on ballast water Sweden will benefit from being part of a larger regional, political and economical context. Sweden, on its own, is a nation too small to be able to impose ballast water regulations that would conflict with trade interests or that would be efficient in achieving protection for the marine environment.

6 Discussion

Several instruments of international law directly or indirectly address invasive species and under customary international law states are required to use their best endeavours to avoid transboundary environmental harm. Unfortunately ballast water management regulations have been developed at a slow pace and only nudged along by a few spectacular invasions. Adding to the problem the regulations that are in force are mostly voluntary. This is despite that states, in accordance with UNCLOS, must take the measures that are necessary to prevent, reduce and control intentional or accidental introduction of new and alien species that may cause harmful changes to their new environment and that these measures, in accordance with the precautionary principle, must be precautionary and anticipatory in ambit. This is often the case with the international response to environmental concerns and can *e.g.* be compared with the establishment of MARPOL 73/78 in response to the Torrey Canyon oil spill. The ballast water problem demonstrates how environmental issues of great concern can be apparent and well known but still not quickly and decisively responded to at the international level. Although it conceivably is easier to legislate on the regional or on the national level, as there are fewer parties concerned, this problem is also recognisable at these levels.

Pollution that takes place, or has its effects, outside of the national boundaries of one state must be addressed at the international level and coherent measures must be implemented globally or throughout the affected region in order to secure results. Bio pollution such as the unintentional transfer of species is especially challenging, as the effects can be very hard to predict. Many of the voluntary ballast water management instruments that are currently being used include, or rely on, risk assessment measures that may reduce risk, but may just as well prove to be meaningless. Ballast water exchange, which is the most commonly implemented ballast water management measure, is also insufficiently serving its purpose. Exchanging ballast water on the open seas does not in any way ensure that species are not transferred and may also be dangerous to ship and crew. Ballast water exchange is a requirement under the much-anticipated BWM Convention but this is not as problematic as it may appear, as the phasing out of this method is an important part of the convention regime. After 2016 ships to which the convention apply will no longer be using ballast water exchange.

The BWM Convention is an important step forward as it is the first instrument that seeks an internationally coherent regime to minimize the risk of introducing species with the release of ballast water and sediments. The convention is expected to enter into force by the end of 2013. The convention will then apply to at least 35 % of the gross tonnage of the world's merchant shipping fleet. This is a significant share of the ship borne world trade transport and it will make the ability for ships to perform in

compliance with the convention of great importance for those engaged in international commerce. By the end of 2016 this will mean being able to manage ballast water in accordance with the D-2 standard. In order to be in compliance with this standard ballast water treatment systems must be installed. The availability of such systems, which have obtained final approval by the IMO, is now good. However, the disparity amongst states in regard of economic resources can make it very difficult for some states to successfully implement the convention. The Globallast projects have for several years engaged in assisting less-industrialised nations with preparing for the convention and tackling the ballast water problem. These projects will soon come to an end and although they have been successful the challenges for the developing states remain. Hopefully the Globallast projects have paved the way for those states that have received assistance and more projects will follow if considered necessary by the IMO. It is essential that technology, knowledge and resources are spread and shared amongst states if the convention shall accomplish becoming the strong governing international instrument of ballast water management that is anticipated.

There are several reasons why it is of importance that coherent measures are taken globally in regard of controlling the spread of AIS and other harmful organisms via ballast water. The most obvious reason is that is not efficient to regulate just within the limits of a single state, considering that mobility is an inherent characteristic of the problem. Aquatic organisms can spread over large areas once they have been transported over the natural barriers that normally would keep them from establishing themselves in distant areas with, otherwise, suitable living conditions. It will have no effect if one state sharing a marine region imposes regulations if the neighbouring states do not. Another problem to take into consideration is that international trade would suffer for those states imposing regulations if there are other states without regulations and situated in the same area. To avoid this problem regionally coherent measures are crucial and it is discouraging that the EU has not yet acted resolutely on the ballast water issue. It is particularly problematic as the BWM Convention will soon enter into force and as the convention has been adopted by several of the EU member states.

On EU level only a few and scattered efforts have so far been made in regard of ballast water. These efforts include encouraging the member states to adopt the convention and taking measures, such as working on replacing the current Biocides Directive to avoid conflict between the directive and the convention, for facilitating the implementation of the convention. The EU has also cooperated with the UNEP Regional Seas Programmes for the Baltic, the North-East Atlantic, the Mediterranean and the Black Sea and within theses collaborations partaken in interim measures such as voluntary ballast water exchange standards. It is surprising that no common ballast water policy has yet been adopted, especially as the EU, according to the Marine Strategy Framework Directive, shall strive towards coordinated, consistent and integrated actions in regard of marine environmental issues. It is the goal of the directive, and hence of the EU marine environment

policy that good environmental status shall have been achieved in the marine environment by 2020 the latest, meaning clean, productive oceans with maintained biodiversity. The spread of non-native species have been identified as a threat to biodiversity and keeping such species, introduced by human activities, at a level low enough to not adversely change the environment has been selected as one of the qualitative descriptors that shall be used for determining good environmental status. It seems that a common policy on ballast water management is necessary if these goals are to be achieved and clearly a community approach towards regulating ballast water is overdue.

The lack of EU regulations on ballast water is also questionable when considering the precautionary principle. The EU is required, under the Treaty on the Functioning of the European Union, to base its environmental policies on this principle and on the principle that preventive action should be taken.[267] The ballast water problem is not unknown to the decision makers of the union but still no purposeful action has been taken. As have been proposed and is currently being developed, a comprehensive and dedicated EU legal instrument would be the most appropriate EU strategy on invasive species.[268] This instrument should include a common approach on ballast water with mandatory measures to be taken by all member states. The EU should be better equipped than most regional organisations, or than is possible in the global context, to handle problems arising from the differences in resources amongst its member states. The union is built on far reaching cooperation and several very complex common policies have been developed and successfully implemented. As an example the Common Fisheries Policy (CFP) could be mentioned. Even though that particular policy has received heavy criticism for causing unsustainable fishing practices, the comparison is still interesting. A regional organisation such as the EU, with the mandate to take political decisions for all of its member states, has great potential for enforcing comprehensive environmental measures. Taking such measures in regard of ballast water would be hugely beneficial for the region, as clean and productive oceans can greatly influence the economy of the European states and the health of the European people. The European waters are already under much pressure from pollution, overfishing and introductions of invasive species that have already occurred and the continued release of untreated ballast water may be the straw that breaks the camel's back if the problem is not properly addressed. It should be remember that, unlike overfishing, there is no simple cure for AIS once they have been established. There is hope in the fact that the EU has shown itself as capable of setting up advanced legal schemes in regard of *e.g.* commerce and agriculture. The union should also be able to develop and enforce stringent environmental regulations and thus setting an example for the rest of the world to follow.

[267] Consolidated Version of the Treaty on the Functioning of the European Union, Official Journal of the European Union C 115/45, 2008, art.191 (2).
[268] See *supra* note 158, p. 9.

In a similar situation, Sweden has no ballast water regulations that are currently effective. Important and heavily trafficked shipping routes go through Swedish waters and the need for such regulations is apparent. Daily ships sailing from international ports of origin release large quantities of ballast water into sensitive marine areas such as the Baltic Sea. The Baltic Sea is particularly sensitive to species introductions as it is a semi-enclosed sea with brackish water. The Swedish response to the ballast water problem has so far been to adopt the BWM Convention and to prepare for its entry into force by adopting legislation that transforms the convention into Swedish law. Sweden also cooperates with OSPAR and HELCOM on the issue. These measures and efforts are commendable but may seem as the bare minimum when considering the extent of the problem and the consequences that it may cause. However, what should be kept in mind is that Sweden is a EU member state. That no ballast water management regulations have been developed or adopted before the BWM Convention was concluded most likely stems from this fact. The Swedish state has surely been hesitant to regulate while anticipating that the EU will decide on common measures.

Sweden is a small nation and imposing ballast water management regulations that are not the result of an international and coherent approach could be very disadvantageous. The European Commission has strongly recommended the adoption of the BWM Convention and the Swedish accession is in line with this recommendation. It is very unlikely that Sweden will take any additional measures without the approval of the union. Hopefully the seriousness of the problem will not be ignored on EU level and the importance of consistent measures will not be left without priority.

Sweden will not fully comply with the BWM Convention until after 2016 when ballast water exchange has been phased out, as the geographical features of Sweden make ballast water exchange in accordance with the convention regime unsuitable. The Swedish accession to the BWM Convention was for this reason made with a reservation. This reservation is not incompatible with the object and purpose of the convention and it has rightfully been accepted. However, as no other regulations exist the current situation implies that many ships will not have to take any ballast water management measures in Swedish waters until 2016. This is troublesome but, considering the lack of suitable alternatives, perhaps unavoidable.

7 Conclusions

The spread of invasive aquatic species into new environments by shipping has been identified as one of the four greatest threats to the world's oceans and unmanaged ballast water as a main vector for such introductions. The current patchwork of scattered international, regional and national regulations and suggested measures is not adequate for successfully combating the problem. Nonetheless, there is potential for remedy when the BWM Convention enters into force.

The BWM Convention is the first international legal instrument that in a comprehensive manner addresses the ballast water issue. The convention, expected to enter into force before the end of 2013, is an important step forward and it will greatly help controlling the spread of harmful aquatic organisms and pathogens via ballast water and sediments. However, international cooperation and measures to compensate for the disparity amongst states in terms of economic resources and technical knowledge are essential in order to ensure the success of the convention.

The EU has not yet acted decisively on the ballast water issue but preparations have been made for the entry into force of the BWM Convention, which the member states have been encouraged to adopt. A few conflicting areas between EU law and the BWM Convention still remain but these problems are expected to have been solved before the convention comes into effect.

More problematic is the fact that no common EU policy on ballast water has been adopted. This gives cause for concern, particularly as the BWM convention will apply to some of the EU member states but not to others. Consistent action is of utmost importance to ensure effectiveness and that trade within the union is not adversely affected. Coherent and mandatory measures are necessary to help achieve god environmental status in the marine environment, which is the aim of the Marine Strategy Directive. A common policy based on such measures would also be in compliance with the precautionary principle, which is required under the Treaty on the Functioning of the European Union. For the above reasons the EU legal instrument for invasive species that is currently being developed should include a common policy on ballast water management. This policy should be based on requirements that are equivalent to, or more stringent than, those of the BWM Convention.

Sweden has adopted the BWM Convention and developed legislation that accurately has transformed the substance of the convention into Swedish law. These measures, including Sweden's reservation to the convention, are reasonable and adequate while awaiting further action to be taken by the EU.

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