Part IV

GLOBAL MARITIME TRANSPORT: CHALLENGES AND RESPONSES

16

Mare Liberum or *Mare Restrictum*? Challenges for the Maritime Industry

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Shipping has long been an important driver of global trade. The maritime industry is responsible for almost all bulk transport between continents, as well as bringing many consumer goods from production facility to the public.

However, ships also have a considerable environmental impact. Pollution of the oceans with oil, cargo residues and garbage leaves traces in the marine environment. Air emissions caused by the combustion of heavy fuel oil lead to high values of sulphur oxides, nitrogen oxides and particulate matter.

In order to address these problems and to improve the environmental performance of shipping, several legislative regimes have been established, notably the UN Convention on the Law of the Sea. Additionally, the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL), under the auspices of the International Maritime Organization (IMO), aims to set standards for the environmental impact of ships.

The global regimes do not in themselves offer sufficient guarantees for safeguarding the oceans from ship-source pollution. Therefore, regional and national instruments have been established, like the 1990 Oil Pollution Act in the USA and the *Erika* packages in the EU, which entered into force after the *Erika* spill which occurred in 1999.

However, all these and other legislative measures have not been able to eradicate the negative effects of international maritime trade. Major reasons include the lack of enforcement on the high seas, and the weak link between ownership of a vessel and its flag state. Effective solutions will require a multi-instrument approach, where legislation is complemented with market-based instruments, innovation strategies and communication and awareness campaigns.

THE MARITIME SECTOR IN A GLOBAL MARKET

Currently, maritime transport handles around 90 per cent of all world trade.[1] The total number of merchant ships registered worldwide is 50,054 (as of 31 October 2010).[2] These ships vary in size between 400 gross tonnes (GT) up to the giant oil tankers and bulk carriers of 500,000 GT, and container ships carrying up to 12,000 TEU.[3] The combined size of the world merchant fleet was estimated at 1.276 billion deadweight tons in 2010, and the total throughput of containers in ports had reached 456 million TEU in 2009.[4] Apart from merchant ships > 400 GT, tens of thousands of other ships ply the oceans: fishing boats ranging in size between a few meters and more than 100 meters in length; working vessels like dredgers and tug boats, and government ships such as coast guard patrol vessels and naval ships.

With the world economy expanding and demand for goods increasing, transportation has also grown. For bulk transport, like ore, coal, oil and cereals, there is no real alternative to maritime transportation, but also consumer goods are mostly carried across the oceans. The growth in shipping has not only changed the ships but has brought considerable changes to port areas. In many cases, port development is taking place in areas with high natural values, like a delta or other wetland site. This chapter will not go into detail on this aspect, but focuses on the environmental aspects of shipping as such.

The maritime industry involves a wide variety of players. Foremost are the ship-owners, represented by organisations like the International Chamber of Shipping (ICS), the Baltic and International Maritime Council (BIMCO) and the International Association of Independent Tanker Owners (INTER TANKO). Also other stakeholders, such as cargo owners, charter parties, classification societies and port authorities, play a role in influencing maritime policy.

Up till August 2008, freight rates were very high, and it was predicted that old ships would remain in service longer than planned. This could have detrimental effects on maritime safety and the environment, because the low costs of repairs following a detention would not outweigh the high profits of carrying cargo; detention is often considered a calculated economic risk. Today, however, with the economy falling and oil prices in steep decline, the maritime industry is undergoing major challenges.

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[1] *UN Atlas of the Oceans*, at <www.oceansatlas.org>.

[2] See <www.marisec.org/shippingfacts/worldtrade/number-of-ships.php>.

[3] TEU means 'twenty foot equivalent unit'. Containers come in various sizes; TEU is used as a standard unit.

[4] UNCTAD, *Review of Maritime Transport 2010*; see further at <http://r0.unctad.org/ttl/>.

One instrument for measuring the economic state of maritime trade is the Baltic Dry Index, which assesses the price of transportation of bulk goods such as coal, ore and cereals across the oceans on 26 major sea routes. In 2002 the BDI was around 1000; then it climbed to more than 10,000 points by summer 2008, after which a very steep descent followed. As of November 2008 the BDI was back to the 2002 value.[5]

Freight costs have fallen in the past, resulting in the laying up of a substantial part of the world tonnage. Ship-owners may choose to take ships out of service and continue operations with a reduced fleet. In the late 1970s, some newly built ships were never put into service after launching, because the demand for ocean transport was very low.

Most ships are registered under non-EU flags, many referred to as 'open registers' or 'flags of convenience'. These states are less strict in registration of ships, making it easier and cheaper for ship-owners to register.

Flag states do not necessarily have links with the seas; for example, landlocked Mongolia had around 60 ships in its register in 2010. Panama is by far the largest flag state, with 6,379 registered ships, of which some 5,244 are not owned by Panamanian companies in 2010.[6] Between flag-states there are substantial differences in the control of ships.

The European Union utilises a black list of flag states notorious for not controlling the ships flying their flag. Also the maritime industry uses lists to identify flag states whose performance is below standard. The Shipping Industry Flag State Performance Table produced by Marisec lists 14 countries with 12 or more negative performance indicators: Albania, Bolivia, Cambodia, Costa Rica, Democratic People's Republic of Korea, Democratic Republic of the Congo, Honduras, Kenya, Madagascar, Mongolia, Sao Tome and Principe, Suriname, Syrian Arab Republic and Thailand.[7]

IMPACT OF SHIPPING

International maritime trade is responsible for many effects on the surroundings. Pollution of the marine environment is one issue, but also pollution of the air and land areas frequently occurs as a result of shipping. Most of the harmful emissions originate from the daily release of various substances. Intentional and unintentional discharges of oil, chemical cargo residues, garbage and cleaning agents, anti-fouling paint, exhaust and other air emis-

[5] See <www.investmenttools.com/futures/bdi_baltic_dry_index.htm>.

[6] *CIA World Fact Book*, at <www.cia.gov/library/publications/the-world-factbook/geos/pm.html>.

[7] See <www.marisec.org>.

sions and non-indigenous species from ballast water have an ongoing adverse impact on life in the world's seas and oceans.

With the increase in traffic, risk minimisation will be an important task for port, coastal and flag states. Twenty-seven states in the North Atlantic region have signed the Paris Memorandum of Understanding (Paris MOU) and agreed to control visiting ships in their ports. If a ship is shown to have certain deficiencies, it will have to be detained. The number of detentions had an upward trend, and has risen, for instance, from 944 in 2005 to 1,174 in 2006; however, since 2007 the trend has been a decrease in detention percentage.[8]

In many countries, pollution is no longer accepted as an unavoidable side-effect of maritime activities. An example is the detention of the officers of the tanker *Hebei Spirit* in Korea. This ill-fated ship was rammed by a runaway barge in the port of Taean (South Korea) while at anchor. The impact caused a hole in the hull, leading to a large oil spill. In this case there was nothing the crew of the tanker could have done, but the authorities decided to arrest the officers anyway.[9]

OIL POLLUTION

During the 1990s the European seas suffered from several disasters involving tankers: *Braer* (Shetland, 1992, 85,000 tonnes of oil); *Sea Empress* (Bristol Bay,1996, 72,000 t.); *Erika* (Brittany, 1999, 20,000 t.); *Volgoneft 248* (1999, Sea of Marmara, 5,000 t.) and *Prestige* (Galicia, 2001, 63,000 t.). These major accidents form only the tip of the shipping pollution iceberg.

According to REMPEC, each year:

> 70 to 80,000 tons of hydrocarbons are rejected into the Mediterranean because of maritime transport activities. Contrary to a generally accepted idea, these rejections are not the result of oil tanker operations only, but all ships and vessels contribute to it because of their daily operations, of their mode of propulsion and of the fuel employed, which produce residues.[10]

In some areas, information on spills has been collected and analysed thoroughly. In the Baltic Sea for several years now, data have been collected on spills and made available on maps to the public.[11] In the North Sea, each year

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[8] See Paris MOU, Annual Report 2009, at <www.parismou.org>.

[9] Lloyds List, 19 June 2008; *Hebei Spirit* master faces three-year jail term.

[10] See <www.rempec.org>.

[11] See <www.helcom.fi/gis/helcom_atlas/en_GB/atlas>. See also K. Tahvonen, 'Monitoring Oil Pollution from Ships : Experiences from the Northern Baltic Practice', in D. Vidas (ed.), *Law, Technology and Science for Oceans in Globalisation* (Leiden: Martinus Nijhoff, 2010), pp. 231–244.

between 300 and 400 oil spills are detected and reported by ships and patrol planes.[12] Most of these spills are thought to originate from shipping: either illegal discharges of slops, which is waste oil from engine rooms, or bilge water contaminated with oil.

Emissions to Air

One negative effect of the growth of maritime transport currently high on the international agenda is the increase in emissions to air. While many land-based sources are cutting down their emissions, the world fleet, due to its growth and the lack of limiting regulations, keeps emitting more sulphur oxide (SOx), nitrogen oxide (NOx), particulate matter (PM) and CO_2.

Most merchant vessels use High-density Fuel Oil (HFO) for propulsion, a mix of refinery residue and 'blending products' added to bring the fuel to the right specifications. SO_x emissions are directly related to the sulphur content in fuel. The current maximum value for sulphur in marine fuel is 4.5 per cent, and the actual average value lies around 2.7 per cent, which clearly shows that shipping is one of the largest contributors of acid deposition. For example, road diesel in the EU has a maximum sulphur content of 10 ppm, which is 45,000 times lower than the maximum value for HFO.

The total fuel consumption of worldwide shipping is estimated at 369 million tonnes in 2007, and expected to rise to 486 million tonnes by 2020.[13] The associated CO_2 emissions from shipping are estimated at 1,121 million tonnes in 2007.[14] Without corrective action, by 2020 these emissions will rise to 1,478 million tonnes, due to increased bunker fuel consumption, according to the IMO. To view this in perspective, the total emissions of shipping worldwide could be as much as 5 per cent of total GHG emissions – exceeding that of airline industry, which is calculated at 2 to 3 per cent of the world total.[15] The impact on climate change caused by shipping is aggravated by the output of black carbon or soot, which heats up the atmosphere and, when deposited on ice sheets, leads to increased melting.

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[12] See <www.zeeinzicht.nl>.

[13] IMO doc. BLG 12/INF.10.

[14] IMO doc. BLG 12/INF 12.

[15] Comparing Fuel Consumption, CO_2 and Other Emissions from International Shipping and Aircraft: A Summary of Recent Research Findings by V. Eyring and J.J. Corbett, at <www.pa.op.dlr.de/SeaKLIM/Fuel_Emissions_International_Shipping.html>.

Marine Litter

Ships are a major source of marine litter in the oceans – partly because international regulations allow for certain types of waste to be discharged at sea, and partly because control and enforcement at sea are virtually impossible.

Marine litter, a generic term for waste at sea and on shorelines, is an underestimated problem, with high impact on marine life. The impact takes place on surface waters in coastal areas, on the seabed and in open oceans. Among the most visible effects is the entanglement of seabirds, marine mammals and amphibians, but ingestion is an important problem as well. An example of this is the ingestion of small floating objects by fulmars in the North Sea.[16] UNEP estimates show that more than one million birds and some hundred thousand marine mammals and sea turtles die each year throughout the world after either becoming entangled in or eating plastic materials dumped in the sea.[17]

Plastics pose a real problem: plastic objects float and thus can travel long distances, and they degrade very slowly. When they do break down, small particles are formed, often referred to as micro-plastics. These particles are then taken up by marine organisms such as zooplankton and end up in the food chain.[18] Apart from being a threat to the environment, marine litter also has a negative effect on local economies, for example by increasing the costs of beach cleaning.[19]

Invasive Species

When a merchant ship does not carry cargo, it needs to take on ballast in order to maintain stability and propulsion. In the old days, this used to be rocks or bricks; nowadays water is taken on board in special ballast tanks. Together with this water, various marine organisms – including bacteria, viruses and fish larvae – also travel across the oceans. In several cases, this has led to ecological and economic problems. Examples are the introduction of the zebra mussel in the Great Lakes of North America and the comb jelly in the Caspian and Black Seas. Apart from damage to receiving ecosystems, the introduction of invasive species has led to considerable economic losses,

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[16] J.A. Van Franeker and A. Meijboom, 'Fulmar Litter EcoQ Monitoring in the Netherlands 1982-2005 in relation to EU Directive 2000/59/EC on Port Reception Facilities', Report for the Netherlands Ministry of Transport, Public Works and Water Management, Wageningen IMARES Report No. C019/07, 2007.

[17] See <www.unep.org>.

[18] R.C. Thompson et al., 'Lost at Sea: Where is All the Plastic?', *Science*, Vol. 304, 2004, p. 838.

[19] See <www.adoptabeach.org.uk/pages/page.php?cust_id=35>.

with the collapse of fisheries and dramatic increase in maintenance costs of water-intake systems in power plants.[20]

Underwater Noise

Recently, several studies have been produced on the impact of underwater noise on marine life.[21] In particular a document submitted by the United States to the IMO provides useful information on noise generated by international shipping and its potential adverse impacts on marine life.[22] Since sound travels great distances under water, the impact is not limited to confined areas.

Most marine animals use sound for communicating with each other, locating prey and finding their way in the oceans. Specific noise produced by ships and offshore installation can have a range of effects on animals, including interference with biological functions. A report to the US Congress discussed 'masking sounds' caused by ships, which are on the same frequency band as that used by certain whales.[23] In extreme cases, like seismic survey and certain types of sonar, underwater noise can be literally deafening.

Ship Breaking

When a ship comes to the end of its working life, it will normally be scrapped. Currently, most ships are taken to scrapyards on beaches in South Asia, mainly India and Bangladesh, where conditions are very harsh – for both the marine environment and the workers employed. Relatively few ships are dismantled at European facilities, as in Turkey. Film footage of ships being broken up by impoverished workers in bare feet has made a considerable impact. In particular the cases of the tankers *Sandrien* and *Otapan* and the French naval ship *Clemenceau* brought this issue on the agenda. The *Otapan* was in the news in 2007, when the vessel was towed from the Netherlands to Turkey. Before arrival, the Turkish authorities found out that considerable amounts of asbestos and other hazardous substances remained in the ship; finally the *Otapan* was towed back to Rotterdam, where the toxic substances were removed.[24] Ship dismantling is not just a maritime issue; working conditions and the export of hazardous materials also play an important role.

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[20] On ballast water issues for, in particular, semi-enclosed seas, see Vidas and Markovčić Kostelac, chapter 21 in this book.
[21] On underwater noise pollution, see also discussion by Papanicolopulu, chapter 24 in this book.
[22] IMO doc. MEPC 57/INF. 4.
[23] US Marine Mammal Commission, Report to Congress, 2007.
[24] See <www2.vrom.nl/pagina.html?id=10525>.

For this reason, the Basel Convention, the International Labour Organisation and the IMO are involved.[25]

LEGAL STRATEGIES TO PROTECT THE OCEANS FROM IMPACTS BY SHIPPING

Outdated Foundations of the Law of the Sea: *Mare Liberum* and Flags of Convenience

Despite abundant research proving the ongoing and rapid depletion of the marine environment, the international community appears unable to achieve effective protection of the seas. The situation is one of a confusing array of jurisdictions and powers of flag, coastal and port states. International regulation of ship-source pollution has been very slow in creating solutions to the problem of a rapidly deteriorating marine environment.[26] And once an international regulation is established, it too often lacks a comprehensive, holistic approach capable of covering all relevant aspects of the problem. This inability to protect the marine environment from pollution by ships in a sufficiently rapid and effective way originates mainly in two fundamental elements of the international law of the sea: *mare liberum*, freedom of the seas, including freedom of navigation, which is, as the longstanding foundation of the law of the sea, codified in the United Nations Convention on the Law of the Sea (LOS Convention); and the concept of 'open registers', which enables a ship-owner to choose the nationality of his ship through registration in a country of preference, the so-called 'flag state'.

Mare Liberum

The Dutch jurist Hugo Grotius (de Groot) formulated the principle of *Mare Liberum* in the early 17th century to pave the way for Dutch merchants on their sea-raids in the Far East. Upon being approached in 1604, on behalf of the United Dutch East India Company (VOC: *Vereenigde Oostindische Compagnie*), Grotius wrote *De Jure Praedae* regarding the legal grounds for the seizure of foreign vessels by Dutch privateers. Chapter twelve of this study, published independently as *Mare Liberum*, challenged the dominant position of Portugal and Spain on the high seas, whose self-appointed *dominion* was obstructing the merchant navy of the VOC from free passage to the East Indies. Grotius considered the right of free passage a necessary

[25] On the increasing need for such interactions, see Jacobsson, chapter 4 in this book.

[26] As to the role of IMO, see discussion by Sainlos, chapter 19 in this book.

precondition for international trade. Therefore, he reasoned, no country should be allowed to control the high seas. Even today, *mare liberum* – freedom of the seas – remains one of the leading principles of the international law of the sea.[27]

Open Registers

Not ownership, management, nationality of the crew, or the ship's operational base, but flag-state registration is the legal link between the state of nationality and the ship. The flag state is responsible for regulating safety at sea, the manning of the vessels and the competence of the crews, and for setting standards of construction, design, equipment and seaworthiness. It is also the flag state that is responsible for taking measures to prevent pollution. And only the flag state has jurisdiction to enforce regulations applicable to ships on the high seas. As noted, states with 'open registers' are the most popular flag states, often referred to as 'flags of convenience' (FOC). By far the largest flag state is Panama, with almost 6,400 ships flying its flag in 2010. The five or six largest flag states are in control of more than half of the world's tonnage. This is an important reason for the slow progress in setting stronger international regulation of pollution and establishing the necessary enforcement of these rules. Although the vote in adoption of international agreements is democratic – one state, one vote – an agreement will enter into force only after the number of ratifying states represents a sufficient shipping tonnage. Because of this system, the open registers actually can have the right of veto in, for example, the IMO. Open-registry states usually are not among the states with ambitious goals in the field of environmentally sound management of the ships in their registries. This *status quo* is maintained by the shipping companies, which determine the tonnage a flag state represents. The open registers are dominated by ship-owners of Japanese, US, Chinese, Chinese (Hong Kong), Norwegian, Greek and German nationality. These shipping companies can play an important role in accepting or preventing the entry into force of regulation that is essential for the protection of the marine environment.

[27] For a more comprehensive discussion see D. Vidas, 'Responsibility for the Seas', in Vidas (ed.), *Law, Technology and Science for Oceans in Globalisation*, pp. 3–40, especially at pp. 17–33.

Jurisdiction under the LOS Convention: Still a *Mare Liberum* Approach

The LOS Convention, adopted in 1982, is the first attempt to codify and develop a global framework for the rational exploitation and conservation of the sea's resources and the protection of the marine environment. Part of this comprehensive regulation of almost all aspects of the law of the sea was the inclusion of the principle of *mare liberum*, the freedom of the seas, in the LOS Convention. Also today, the system of jurisdiction as established in the LOS Convention prevails. The LOS Convention recognises the right of coastal states to control, by means of national legislation, navigation and pollution in their territorial seas. For example, a coastal state is free to set stricter standards for pollution discharge than those set by international conventions. However, the LOS Convention excludes from the coastal state's jurisdiction in the territorial sea the right to regulate construction, design, equipment and manning standards for ships, unless exercising international rules and standards.[28] Perhaps the most important limitation here is that the application of the pollution standards of the coastal state must not have the practical effect of denying ships 'innocent' passage. 'Innocent passage' is defined by the 1958 Geneva Convention on the Territorial Sea as passage which is not prejudicial to the peace, good order or security of the coastal state. This definition was further clarified in the Corfu Channel case:[29] as a result, only pollution which is 'wilful and serious' and contrary to the LOS Convention will deprive a vessel of the innocent character of passage. This excludes accidental pollution (which is evidently not wilful) and operational pollution (which is usually less serious in individual instances and sometimes justified by weather or distress) from being not 'innocent'. A consequence is that a coastal state cannot close its territorial sea to foreign vessels in innocent passage, even in case of a significant environmental risk.[30] The sole option left to the coastal state is to take precautionary measures to minimise the risk, such as restricting passage to specific sea-lanes or requiring ships to carry documentation.[31]

Coastal-state jurisdiction in the economic exclusive zone (EEZ) is even less extensive. The LOS Convention extended to the EEZ the jurisdiction of coastal states with respect to the protection and preservation of the marine environment. However, the LOS Convention reserves in the EEZ for all states the high-seas freedom of navigation, leaving the coastal state only the

[28] LOS Convention, Arts. 21(2) and 211(4). See also discussion by Ringbom, chapter 20 in this book.
[29] Corfu Channel case, *ICJ Reports 1949*.
[30] Art. 24(1) of the LOS Convention.
[31] Ibid., Arts. 22(2) and 23.

jurisdiction to enforce the application of international regulation that is already in place.[32] An addition to the jurisdiction of coastal states in the EEZ is the jurisdiction that the LOS Convention provides to port states to investigate and prosecute discharge violations wherever they have taken place.[33] This power applies to both the high sea and to coastal zones in the own and another state – in the latter case, however, only in response to a request from the state concerned. In practice, this latter form of exercising jurisdiction has rarely been applied by port states.

A case in point is the situation that arose when the single-hull tanker *Prestige* went down off the Galician coast in November 2002. The *Prestige* was carrying heavy fuel oil, and the pollution caused major damage to the Spanish and French coastal ecosystems. Subsequently Spain and France both proposed to exclude old single-hull oil tankers from their EEZs. Further, from 1 January 2003, Spain closed its harbours to single-hull oil tankers carrying bitumen, fuel oil and crude oil. These unilateral measures gave rise to a barrage of criticism, invoking inconsistency to the international law of the sea, as being contrary to the principle of the freedom of the seas.

Nevertheless, the LOS Convention, and especially its Articles 192 to 195 on the marine environment, is the result of a process of international law-making which has effected several fundamental changes in the international law of the sea. An essential development is that pollution of the seas is no longer an implicit freedom of the seas. The protection provided by the LOS Convention extends not only to states and their marine environment, but in principle to the marine environment as a whole, including the high seas, and there is the legal obligation to protect this environment. The 'environment' for this purpose includes 'rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life'.[34] The LOS Convention also provides concrete indications for states which, in order to prevent environmental pollution, are willing to take measures that conflict with the principle of *mare liberum*. However, Articles 192 to 195 of the LOS Convention require states to take a joint approach in measures aimed at the prevention of the pollution and the protection of the marine environment.

MARPOL

The emergence of a more strongly expressed obligation to protect the marine environment is evidenced not only by Articles 192 to 195 of the LOS Con-

[32] See ibid., especially Arts. 56(2), 58, 208, 210 and 211(5) and (6).
[33] Ibid., Art. 218.
[34] Ibid., Art. 194(5).

vention, but also by other multilateral agreements and regional treaties negotiated progressively since the first attempt at international regulation of oil pollution from tankers, the London Convention of 1954.[35] That convention primarily addressed pollution resulting from routine tanker operations and from the discharge of oily wastes from machinery spaces – at that time regarded as the major causes of pollution from ships.

A central contribution to international maritime law is MARPOL. This convention is internationally the most important basis for protecting the marine environment from ship pollution. It is not confined to oil pollution, and regulates other types of ship-based pollution as well. The main focus of MARPOL is on powers of enforcement and inspection, and, in close interaction with the LOS Convention, further concerns the issue of jurisdiction. To ensure that its ships comply with the technical standards set by MARPOL, a flag state has two main responsibilities. It must inspect the ships at periodic intervals, and it must issue an 'international oil pollution prevention certificate'. Such a certificate provides direct evidence that the ship complies with the requirements of MARPOL. The Convention also provides a form of port-state control, although states may enforce international regulations against a ship only if it enters a port voluntarily. Ships required to hold a certificate are additionally subject to inspection by any party in whose port they happen to be. Importantly, although under MARPOL flag states have primarily the jurisdiction of regulation and prosecution, coastal states and port states are entitled to regulate pollution within their own internal waters, territorial sea and EEZ. Nevertheless, in the EEZ, jurisdiction of coastal and port states is restricted by the high-seas freedom of navigation, and in the territorial sea by innocent passage.

The Annexes to MARPOL

Annexes to MARPOL, subsequently adopted by the IMO, and in particular its Marine Environment Protection Committee (MEPC), contain more detailed anti-pollution regulations. When MARPOL entered into force on 2 October 1983, all parties have automatically been bound by Annexes I (oil) and II (noxious liquid substances). However, the other Annexes are optional, and participation is less widespread.

In MARPOL Annexes I, II and V (the latter regards garbage from ships), certain areas are defined as 'Special Areas', in which, for technical reasons relating to their oceanographic and ecological condition and to their sea

[35] International Convention for the Prevention of Pollution of the Sea by Oil, text in UNTS, Vol. 327, pp. 3ff. The Convention was amended in 1962, 1969 and 1971.

traffic, the adoption of special mandatory methods for the prevention of sea pollution is required. These Special Areas are provided with a higher level of protection than other areas of the sea.[36] The Special Areas under MARPOL should not be confused with 'Particularly Sensitive Sea Areas' (PSSAs). A PSSA is an area that needs special protection through action by the IMO because of its significance for recognised ecological or socio-economic or scientific reasons and which may be vulnerable to damage by international maritime activities.[37] The criteria for the identification of PSSAs and the criteria for the designation of Special Areas are not mutually exclusive. In many cases a PSSA may be identified within a Special Area and *vice versa*. When an area is approved as a PSSA, specific measures are used to control the maritime activities in that area.

The MARPOL Convention has its weaknesses, including not too ambitious provisions. The often huge delay in the entry into force of Annexes is another problem. This is due to the power that the flags of convenience states are able to exert within the IMO. When Annex VI entered into force in May 2005, the shipping companies that dominate the flag states' registries that control some 45 per cent of the shipping tonnage worldwide had managed to hinder its entry into force for eight years. And as more ships flag out to open registries, it is becoming even harder to meet the requirement that Annexes shall be adopted and amended subject to acceptance by at least two-thirds of parties constituting not less than 50 per cent of the gross tonnage of the world merchant fleet. Moreover, under MARPOL, parties are not bound by amendments they have not accepted.

On the other hand, it may be concluded that, to a certain extent, the regulatory system of MARPOL functions reasonably well under IMO supervision; the IMO appears to incorporate and respond to new developments. Further, the IMO has proven, by means of the extended jurisdiction to port states and coastal states, that it has made a start in dealing with the practical problems of the crucial aspect of effective regulation of sea-related activities, which is enforcement. Nevertheless, it has a weak supervisory role, as it lacks processes for dealing effectively with non-compliance of parties. Implementation and compliance-control are still left to the parties and to port states.

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[36] On Special Areas see also Sainlos, chapter 19, and Ringbom, chapter 20 in this book.

[37] Guidelines on designating a PSSA are contained in IMO Assembly Resolution A.982(24), 'Revised Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas', adopted in December 2005. See further Sainlos, chapter 19 in this book.

Marine Litter under Annex V: The European Answer

Under Annex V the discharge of plastics anywhere into the sea is prohibited, and the disposal of other garbage into coastal waters and Special Areas is restricted. However, it soon became clear that, under the jurisdiction regime, enforcement could be effectively established only via the ports. To extend port-state control, a new Regulation 8 to the Annex V was adopted in 1994 and entered into force in 1996. It enables port-state control officers to inspect a foreign-flagged vessel 'where there are clear grounds for believing that the master or crew are not familiar with essential shipboard procedures relating to the prevention of pollution by garbage'. Regulation 9, which was adopted in 1995 and entered into force for new ships from July 1997 (and from July 1998 for ships built before July 1997), makes it compulsory for bigger ships to provide a Garbage Record Book in which they must record all disposal and incineration operations.[38] As this system would not work otherwise, MARPOL also obliges parties to provide port reception facilities for wastes generated during the normal operation of ships. However, because implementation and compliance control is left to the parties themselves, Annex V has not as yet resulted in a sufficient reduction of ship-generated waste. The MEPC is currently working on a comprehensive review of Annex V, aimed at enhancing its effectiveness.

With its Directive on port reception facilities for ship-generated waste and cargo residues,[39] the EU sought to tackle the problem of compliance under MARPOL Annex V. The Directive entered into force in 2000 and, with a deadline of implementation by member states set in December 2002, applies to all ships and all EU member-state ports. The Directive makes the provision of port collection facilities compulsory. Before entering an EU port, ships are required to provide information on the date and the last port in which ship-generated waste was delivered, and the quantity of waste remaining on board.[40] Ships are required to deliver their ship-generated waste before leaving a port of an EU member state, unless the master can prove that his ship has adequate storage capacity. Further, ships can be inspected; and ships that do not deliver their waste without providing a valid reason for exemption are not allowed to leave the port until the waste has been delivered.

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[38] All ships of 400 gross tonnage and above and every ship certified to carry 15 persons or more, and every fixed or floating platform engaged in exploration and exploitation of the seabed; see <www.imo.org>.

[39] Directive 2000/59/EC of the European Parliament and of the Council of 27 November 2000 on port reception facilities for ship-generated waste and cargo residue, OJ L 332, of 28 December 2000, amended by Directive 2002/84/EC, OJ L 324, of 29 November 2002.

[40] Other than fishing boats and recreational craft authorised to carry no more than 12 passengers.

Essential, but a bottleneck as well for successful implementation of the Directive, is the obligation for ports to establish cost-recovery systems to encourage the delivery of waste on land and discourage dumping at sea. All ships calling at a port of an EU member state, whether they use the facilities or not, will bear a significant part of the costs. Where it is proven that a ship has put to sea without having delivered its waste and without benefiting from an exemption, the next port of call is alerted, where the ship will be detained and inspected. Unfortunately, in practice the EU input has not made a real difference in comparison to the effect that Annex V has had. Reasons include poor reception facilities in many ports, non-compliance by ships when there are good facilities, but also a lack of harmonisation in an international context, with the consequence of confusion because different ports have their own waste-handling systems.[41]

Standards for Emissions to Air and EU Initiatives

The new Annex VI of MARPOL was adopted in 1997, and entered into force in May 2005. Annex VI sets limits on emissions of sulphur oxide and nitrogen oxide from ship exhausts and prohibits deliberate emissions of ozone-depleting substances. The Annex sets a global cap of 4.5 per cent m/m on the sulphur content of fuel oil and calls on the IMO to monitor the worldwide average sulphur content of fuel. As with the provisions regarding special areas in the Annexes I, II and V, Annex VI contains provisions allowing for special SOx Emission Control Areas (SECAs) to be established with more stringent controls on sulphur emissions. In these areas, the sulphur content of fuel oil used on-board ships must not exceed 1.5 per cent m/m. Alternatively, ships must fit an exhaust-gas cleaning system or use other relevant technological methods to limit SOx emissions. The SECA of the Baltic Sea area and the North Sea area took effect in May 2006 and November 2007 respectively.

In 2008 the IMO revised Annex VI with regard to SOx, NOx and Particulate Matter, to take account of current technology and the need for further reductions in emissions from ships. The main changes are a progressive reduction in SOx emissions from ships, with the global sulphur cap reduced initially to 3.50 per cent, effective from 1 January 2012 and then progressively to 0.50 per cent, effective from 1 January 2020, subject to a feasibility review to be completed no later than 2018. The limits applicable in SECAs were reduced to 1.00 per cent, beginning as of 1 July 2010 and being further

[41] See the recommendation submitted by Friends of the Earth International preparing the 57th session of the MEPC on 28 January 2008, IMO doc. MEPC/57/8/XX.

reduced to 0.10 per cent, effective from 1 January 2015. Progressive reductions in NOx emissions from marine engines were also agreed, with the most stringent controls on 'Tier III' engines, i.e., those installed on ships constructed on or after 1 January 2016, operating in Emission Control Areas. The revised Annex VI will allow for an Emission Control Area to be designated for SOx and particulate matter, or NOx, or all three types of emissions from ships. This Annex entered into force on 1 July 2010.

As in some other cases, the European Union decided that progress at the IMO level was too slow, justifying the need for regional action. Therefore marine fuels were incorporated in the European Sulphur Directive, adopted in 1999 to regulate sulphur emissions on land. In 2005, after several years of negotiation, this Directive was amended with regulations for marine bunker fuels.[42] The amended Directive is stricter than MARPOL in some respects, and contains a new element. Ships during their stay in port (alongside the quay) are permitted to make use of fuel oils with a maximum of 0.1 per cent m/m sulphur from 2010. In practice, this means that such ships shift to using marine gas oil. Thus, the EU enables a tighter schedule than that provided under IMO.

Global and Regional Conventions on Shipping: Some Issues

Several specific UN conventions on shipping were established mainly in the 1970s. Important among these is the 1974 International Convention for the Safety of Life at Sea (SOLAS), which aims at minimising the risk of maritime accidents by regulating standards of seaworthiness.[43] One of the SOLAS amendments, by some considered to be the most revolutionary change adopted by the IMO,[44] has made it mandatory for all oil and chemical tankers to comply with the 1994 IMO International Safety Management Code.[45] Flag states can certify ships only if the safety and environmental policies, instructions and procedures of the operator's company are in accordance with the Code. Another set of IMO regulations, the 1978 International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), amended in 1995, deals with requirements regarding ship crews, especially those working on tankers.

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[42] The original sulphur directive was Directive 1999/32/EC relating to the sulphur content of certain liquid fuels. The Directive was amended and renamed as Directive 2005/33/EC relating to a reduction in the sulphur content of certain liquid fuels, OJ L 191, of 22 July 2005.

[43] International Convention for the Safety of Life at Sea, text in UNTS, Vol. 1184, pp. 2ff.

[44] P. Birnie and A. Boyle, *International Law & the Environment*, 2nd edn (Oxford University Press, 2002), p. 361.

[45] Ch. IX of SOLAS, as amended in 1994.

In 1988 the IMO recognised the problem of invasive species in ships' ballast water, and in 2004 the Ballast Water Convention was adopted. Under that Convention, all ships are required to have a Ballast Water and Sediments Management Plan in place by 2011. Two options are open for such a plan: mid-ocean exchange, where ballast water is flushed out of the tanks and new water taken in, or a ballast water treatment system. In the latter system, particles (including organisms) are filtered out of the water, after which a disinfecting system is applied before the water is pumped into the ballast tanks.[46] However, the Convention still has quite a long way to go before its entry into force.[47]

There exist various regional treaties requiring states to control land-based sources of marine pollution, dumping and seabed operations. Regional treaties cover the North Sea and the North-East Atlantic,[48] the Baltic,[49] the Mediterranean[50] and the Black Sea.[51] Since Agenda 21 of the 1992 Rio Conference, an integrated and precautionary approach to protection of the marine and coastal environment is addressed in many of the regional sea agreements.

International and European Regulation of Shipbreaking

In 2001 the Dutch Minister of Environmental Affairs successfully applied the EC Regulation on the monitoring and control of transporting waste materials within, to and from the European Community (EVOA)[52] to the asbestos-containing scrap-ship *Sandrien.* EVOA is a European implementation of the Basel Convention which governs the transboundary movement of waste.[53] In particular the Basel Convention requires prior authorisation from

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[46] See <www.globallast.imo.org>.

[47] For further particulars on the Ballast Water Convention, see Vidas and Markovčić Kostelac, chapter 21 in this book.

[48] The 1992 Paris Convention for the Protection of the Marine Environment (OSPAR Convention).

[49] The 1992 Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area.

[50] The 1976 Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution.

[51] As to the Black Sea, the Baltic Sea, and the Mediterranean Sea, respectively, see further Oral, chapter 25, Corell, chapter 26, and Raftopoulos, chapter 27 in this book.

[52] Regulation (EEC) 259/93. Under Art. 11 of the Basel Convention, a regional agreement (like EVOA) which offers at least an equal level of environmental protection as the Basel Convention has priority over the latter. On 12 July 2007 a revised EVOA entered into force: Regulation (EC) 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste, OJ L 190, of 12 July 2006.

[53] The Basel Convention was signed in 1989 under the aegis of the United Nations Environmental Programme (UNEP) and to which the EU and its member states are parties. See

the country of destination before waste can be moved. An amendment to this Convention adopted in 1995 banned exports of hazardous waste from countries that are members of the Organisation for Economic Cooperation and Development (OECD) to non-OECD countries.[54] End-of-use ships destined for shipbreaking are considered as 'waste' under international law and under EU law on waste. They are also considered as 'hazardous waste' if they contain substantial quantities of hazardous substances or if they have not been properly emptied of their cargo of hazardous substances. The export of such vessels from the EU to a non-OECD country for shipbreaking is therefore prohibited. The *Sandrien* was due to undertake her final journey, from Amsterdam to the scrapyards on the beaches of Alang in India. The Dutch high administrative court ruled that the vessel was not allowed to proceed to India because it contained the dangerous substance asbestos.[55] Such vessels must be processed in an OECD country under environmentally sound conditions or decontaminated so that they no longer constitute hazardous waste.

The Ban Amendment is a requirement of the Ban Amendment decision III/1(1995) not to export toxic waste from developed to developing countries. All parties are to honor decisions even before the amendment legally enters into force internationally.[56] Further, the judicial decision taken in this case does not hide the fact that the illegal export of toxic scrap-ships to the beaches of Asia is still being tolerated on a large scale. On 12 March 2010, the European Commission adopted a Communication presenting an assessment of the link between the IMO Hong Kong Convention for the safe and environmentally sound recycling of ships, the Basel Convention and the EU waste shipment regulation. The Basel Convention, the International Labour Organisation and the IMO have negotiated a convention with respect to the safe recycling of ships. During tripartite meetings of these organisations in recent years, a draft convention has been discussed. The result is that parties to IMO adopted the International Convention for the Safe and Environmental Sound Recycling of Ships on 15 May 2009 at an IMO diplomatic conference held in Hong Kong.[57]

<http://europa.eu/scadplus/leg/en/lvb/l28192.htm >.

[54] Ban Amendment to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Geneva, 22 September 1995.

[55] 'Afdeling Bestuursrechtspraak Raad van State', 19 June 2002, 200105168/2. In this case the Dutch administrative court applied EVOA.

[56] The amendment is in force in 33 of the 41 countries to which it applies (OECD countries), and in all EU countries through the Waste Shipment Regulation. See also <www.basel.int/ratif/ban-alpha.htm>.

[57] See <www.imo.org/MediaCentre/PressBriefings/Pages/Major-ship-recycling-country-signs-the-Ship-Recycling-Convention.aspx>.

Liability for environmental damage resulting from oil spills

The LOS Convention provides in Article 235(1) that states are responsible for the fulfilment of their international obligations concerning the protection and preservation of the marine environment, and that they shall be liable in accordance with international law. Nevertheless, pollution from ships has generally not been the subject of claims between states, even in cases as serious as that involving the *Amoco Cadiz*.[58] They have instead been dealt with under national law, or civil liability and compensation schemes. According to the 'polluter pays' principle, the costs of dealing with pollution are not to be borne by the public authorities but by the polluter. Moreover, liability should not be limited to compensation for direct injury, but could include some part of the costs of maintaining a response capability and of restoring the environment to an acceptable state.

However, a significant extension of maritime liability on the international level that might be linked to the 'polluter pays' principle is the 1992 International Convention on Civil Liability for Oil Pollution Damage and the 1992 International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (the 1992 CLC and the 1992 Fund Convention).[59] The 1992 Fund Convention established a regime for compensation of victims of oil pollution when full compensation under the 1992 CLC cannot be provided. The International Oil Compensation Fund (IOPC) administers the regime of compensation provided by the 1992 Fund Convention.

The basis of the 1992 CLC is the principle of strict liability. Only a few exceptions are permitted.[60] As a result of this, the claimants save considerable costly litigation.[61] These two treaties reflect the limitations of the 'polluter pays' principle. The question of who is the polluter is hard to answer in an industry as complex as shipping. Should it be the operator of an oil or chemical tanker, the cargo owner, the ship-owner or the harbour pilot? It has

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[58] *Antonio Gramsci, Vistabella, Haven, Iliad, Sea Empress, Kuyungnam No1, Amoco Cadiz, Erika* and *Prestige*: these are all names of tankers that have caused oil spills of varying magnitude during the past three decades.

[59] The Convention on Civil Liability for Oil Pollution Damage and the Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage both entered into force in May 1996. The 1992 CLC and the 1992 Fund Convention are amendments to the 1969 International Convention on Civil Liability for Oil Pollution Damage and the 1971 International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage.

[60] Art. III (4) CLC: 'no liability for pollution damage shall attach to the shipowner if he proves that the damage: results from an act of war or natural disaster; was caused by sabotage by a third party, or was caused by the failure of the authorities to maintain navigational aids.'

[61] See I.C. White, *Oil Spill Compensation*, p. 4, available at ITOPF-website, <www.itopf. com>.

been more the result of a policy decision that the 1992 CLC directs the responsibility and the resulting liability towards the ship's owner, while contributions to the IOPC Fund originate not from states, but from a levy on oil importers, who are mainly the oil companies that own the cargoes of the vessels. Further, as long as insurance in the shipping industry is the main source of ship-owner liability funding, it is not realistic to expect full payment by the polluter of all the damage that has been caused. Therefore, all maritime liability treaties and the compensation from industry funds have a limited liability, where losses are prioritised, paid *pro rata,* or excluded. In the event of an oil spill that results in a total of all approved claims for pollution damage in excess of the total amount of compensation available under the 1992 CLC and Fund Convention, the compensation paid to each claimant will be reduced proportionately. Although the revised 1992 CLC and Fund Convention have a less limited liability than their predecessors, in case of a major catastrophic spill of the proportion of the *Exxon Valdez*, compensation will still be insufficient to cover the damages.

Unlike the previous regime 1969 CLC, the 1992 CLC definition of 'pollution damage' covers environmental damage. However, not all environmental loss is covered. The definition includes recovery for loss of profit resulting from impairment of the environment, such as loss of income suffered by fishermen or hotel owners. Pollution damage in the coastal state's EEZ is also included in the definition. However, if the pollution damage suffered concerns compensation for impairment of the environment other than loss of profit, compensation is limited to 'costs of reasonable measures of reinstatement actually undertaken or to be undertaken'. Thus, the liability regime still does not cover damage to the environment *per se*, damage that cannot be redressed or quantified in terms of property loss or loss of profits, or which the government involved does not want to reinstate, or which occurs on the high seas.[62] Such damages will not be recovered even in the case of a relatively minor oil spill.

Unfortunately, this regime of limited liability comes together with non-transparent relations of ownership with respect to oil tankers that provide all sorts of escape possibilities.[63] Therefore using such substandard tankers does not involve a significant risk for the cargo owner, ship's owner, the master or the P & I insurer (protection and indemnity association). As a consequence,

[62] See, e.g., P. Wetterstein, *Harm to the Environment: The Right to Compensation and the Assessment of Damages* (Oxford: Clarendon Press, 1997), for an overview of the different types of damages.

[63] See M. Gianni, *Real and Present Danger: Flag State Failure and Maritime Security and Safety* (published under the auspices of the International Transport Workers' Federation and World Wide Fund for Nature, June 2008), pp. 19–22.

the demand for old, often single-hull, tankers increases. Because of this system, the scarcity of (and therefore the 'demand' for) coral reefs and mangrove swamps and other ecosystems usually without direct market value is likely to rise as well. These ecosystems are irreplaceable, while it takes only a financial transaction to exchange a substandard tanker for a new one.

Regulation of Liability for Oil Spills in the USA

Such a major oil-importing country as the USA did not become a party to the 1992 CLC and Fund Convention because it considered the liability limits to be still too low. Triggered by the *Exxon Valdez* disaster in Alaska – the total clean-up costs were estimated at USD 2,5 billion – the US Oil Pollution Act of 1990 (OPA) introduced limits on liability that were much higher than those of the 1992 Protocols. OPA allows unlimited liability in situations such as gross negligence, wilful misconduct and violation of applicable federal regulations. More importantly, OPA permits full compensation for damage to the environment. Purely economic losses are covered to a great extent (economic losses unconnected with personal injury or property damage). Even the loss of 'image' of the damaged area can be compensated. Further, OPA recovers compensation for a wide range of environmental damage *per se*. In this it reflects the 'public trust doctrine' according to which private users must protect from harmful interference natural resources held in trust for the benefit of the public. The damage is measured by: 'a) the costs of restoring, rehabilitating or acquiring the equivalent of the damaged resources; b) the diminution in value of those natural resources pending restoration; plus c) the reasonable costs of assessing those damages'.[64] Restoration includes replacement or acquisition of the equivalent as well as restoration of the injured resource. In fact the OPA tries to assess the total amount of environmental damage in terms of dollars. As a result, the OPA regime extends liability further than the 1992 Conventions, where liability for impairment of the environment is limited to costs of reasonable measures of reinstatement. Another important difference is that the 1992 Conventions are not able to deal with compensation of irreparable environmental damage, while achieving the equivalent of the damaged natural resources is possible under OPA.

The Not so Slow EU Approach: *Erika* Packages

On 12 December 1999, a major disaster struck the coast of Europe. The tanker *Erika* sank off the French Atlantic coast, causing a spill of heavy fuel

[64] OPA Sec. 1006 (d) jo. Sec. 1002 (b) (2) (a).

oil and massive damage to the coastal and sea environment, as well to the local fishing and tourism industries. The European Commission acknowledged that action on maritime safety under IMO auspices had not been effective:

> Action by the IMO is severely handicapped by the absence of adequate control mechanisms governing the way the rules are applied throughout the world. As a result, IMO regulations are not applied everywhere with the same rigour. The evolution of maritime transport over the last few decades and, in particular, the emergence of 'flags of convenience' […], some of which fail to live up their obligations under the national conventions, is tending to aggravate this phenomenon.[65]

In response to the *Erika* disaster, the Commission proposed a first package of safety measures, 'Promoting safer seas'. This '*Erika* 1 package' came into force in July 2003 with measures aimed at improving existing state port-control measures,[66] strengthening the legislation as regards classification societies which conduct structural safety checks on ships on behalf of flag states, and developing a timetable to phase out the use of single-hull oil tankers worldwide.[67] A set of measures known as the *Erika* 2 package followed, with three new steps to improve safety.[68] The first measure involved the creation of a European Maritime Safety Agency (EMSA) to bolster the enforcement of safety rules.[69] Further, it was arranged to set up a Community maritime monitoring and information system for vessels in European waters.[70] The third objective of the package was to establish a supplementary

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[65] Commission communication of 21 March 2000 to Parliament and the Council on the safety of the seaborne trade, COM(20000) 142 final.

[66] Council Directive 95/21/EC of 19 June 1995 concerning the enforcement, in respect of shipping using Community ports and sailing in the waters under the jurisdiction of the Member States, of international standards for ship safety, pollution prevention and shipboard living and working conditions (port State control), OJ L 157, of 7 June 1995.

[67] Resulting in the Regulation (EC) No 417/2002 of the European Parliament and of the Council of 18 February 2002 on the accelerated phasing-in of double hull or equivalent design requirements for single hull oil tankers and repealing Council Regulation (EC) No 2978/94, OJ L 64 of, 7 March 2002.

[68] Commission Communication of 6 December 2000 to the Council and the Parliament on a second set of Community measures on maritime safety following the sinking of the oil tanker *Erica*, COM (2000) 802 final.

[69] Regulation (EC) No 1406/2002 of the European Parliament and of the Council of 27 June 2002 establishing a European Maritime Safety Agency, OJ L 208, of 5 August 2002, as amended by Regulation (EC) No 724/2004 of the European Parliament and of the Council, of 31 March 2004.

[70] Directive 2002/59/EC of the European Parliament and of the Council of 27 June 2002 establishing a Community vessel traffic monitoring and information system and repealing Directive 93/75/EEC, OJ L 208, of 5 August 2002.

fund covering liability and compensation for pollution damage to the victims of oil spills in European waters, designated COPE (Compensation for Oil Pollution in European Waters Fund), which will top up the CLC and the IOPC.[71]

Not long after the *Erika* disaster, the *Prestige,* another single-hull tanker carrying heavy fuel, went down off the Galician coast in 2002. The Commission managed to develop new safety measures swiftly. Single-hull oil tankers were banned from carrying heavy fuel oil in and out of European ports from October 2003, and the timetable for the withdrawal of such tankers by 2010 was accelerated. And in order to hit polluters with tougher sanctions, EC Directive 2005/35 on ship-source pollution and on the introduction of penalties for infringements was introduced.[72] This directive applies to all ships calling at European ports, regardless of flag. It includes criminal liability provisions for foreign-flag ships within the EEZ of an EU member state. It limits MARPOL defences, and prescribes criminal liability for discharges that are a result of 'serious negligence'.

In November 2005 the European Commission came with a subsequent set of proposals to further improve Europe's maritime safety regime.[73] This third package is based on a proactive approach rather than providing reactive responses to maritime accidents. The aim is to reinforce existing European maritime safety legislation and to transpose major international instruments into EU law. Therefore, the proposals target substandard ships, while making it easier for reputable owners and operators to go about their business. Four of the measures are aimed at reinforcing prevention of accidents and pollution by improving the quality of EU flags, reviewing legislation on port-state control and improving rules relating to classification societies. The rest of the *Erika* 3 package focuses on effective accident response – including the development of a harmonised EU framework for accident investigation, the introduction of compensation to passengers in the event of an accident, and

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[71] Proposal for a regulation of the European Parliament and of the Council on the establishment of a fund for the compensation of oil pollution damage in European waters and related measures, COM (2000) 802 final, OJ C 120 E, of 24 April 2001.

[72] Directive 2005/35/EC of the European Parliament and of the Council of 7 September 2005 on ship-source pollution and on the introduction of penalties for infringements, OJ L 255 of 30 September 2005. See also the Council Framework Decision 2005/667/JHA of 12 July 2005 to strengthen the criminal-law framework for the enforcement of the law against ship-source pollution, and the proposal for a Directive of the European Parliament and of the Council on the protection of the environment through criminal law, COM(2007) 51 final, OJ C 138, of 22 June 2007.

[73] Commission Communication of 23 November 2005 to the Council and the Parliament on a third package of legislative measures on maritime safety in the European Union, COM (2005) 585 final.

the introduction of a directive on ship-owners' civil liability coupled with a mandatory insurance scheme.[74] In short, it may be concluded that the EU managed to establish a comprehensive set of measures in a relatively short period. It is, however, unfortunate that it was not the result of an especially pro-active approach. As in the USA, where the major oil spill of the *Exxon Valdez* was needed to get the OPA 1990 in place, in Europe the disasters of the *Erika* and the *Prestige* proved necessary to create the requisite momentum.

The Response of a Local Court: The French Verdict in the *Erika* Oil Spill

In a ruling of 16 January 2008, by some considered a landmark decision, the Criminal Court of Paris condemned the world's fourth largest oil group, Total SA, to a fine of EUR 375,000, the maximum allowable penalty for maritime pollution, claiming 'ecological prejudice' caused by the sinking of the *Erika.*[75] This was the first time a French court recognised the existence of ecological damage 'resulting from an attack on the environment'. The ship itself illustrated the convoluted nature of international shipping: The cargo belonged to Total, while the ship itself was owned by Italians, crewed by Indians, was sailing under the Maltese flag and chartered by a shipping company registered in the Bahamas. Cargo owners that charter a ship are usually precluded from responsibility under international maritime law. However, the Court ruled that only Total's subsidiary, Total Transport, would be let off as the ship's legal charter. Total SA, on the other hand, was found guilty of recklessness in its vessel inspection and vetting procedures. This carelessness was found to have played a causal role in the sinking of the *Erika*. Further, the Italian maritime certification company RINA, which judges blamed for issuing a navigability certificate to the ship without undertaking the necessary checks under the pressure of commercial constraints, was also fined the maximum amount for a company, EUR 175,000. The four parties were also told to pay out nearly EUR 200 million in damages to some one hundred plaintiffs in the case, including the French state, the regions, and environmental pressure groups like Greenpeace, fisherman and hotel owners.

[74] For an overview see <http://eur-lex.europa.eu> and <http://europa.eu/scadplus/scad_en.htm>.

[75] French ruling (Tribunal de Grande Instance de Paris, 16 janvier 2008) available at <www.faroetgozlan.com/competences.htm>.

The Magic Pipe

A rubber hose or a specially fitted steel pipe, referred to as the 'magic pipe', is a clear example of the laborious way the international community handles the protection of the marine environment against ship-sourced pollution. Engine-room operations on board large ocean-going vessels generate great amounts of waste oil and oil-contaminated bilge waste. The magic pipe is an instrument that enables the vessel operator to bypass shipboard oily-water separators, and discharge oil sludge and oil contaminated waste directly overboard. MARPOL Annex I prohibits the discharge of waste containing more than 15 parts per million oil and without treatment by an oily-water separator and oil sensing equipment, and also requires that overboard discharges be recorded in an oil record book. However, 37 years after the original IMCO recommendation of 1971 on international performance specifications for oily-water separating equipment and oil content meters,[76] and 25 years after Annex I entered into force in 1983, deliberate vessel pollution remains a serious and persistent problem. It is estimated that operational discharges of oil from ships made up about 45 per cent of the estimated vessel-source input of 457,000 tons per year in the period 1988–1997.[77] In the past few years, federal prosecutors in the USA have been active in pursuing 'magic pipe' cases, and several ship-owners have been found guilty of violation of the Act to Prevent Pollution Ships, the US implementation of MARPOL Annex I. In one case, an investigation involving ports in several US states, Overseas Shipholding Group Inc. pleaded guilty to deliberate vessel pollution from nine ships and false pollution log entries on three additional ships, and agreed to pay USD 37 million. Only recently has the EU established an equivalent instrument with the Directive on Ship-source Pollution and Criminal Penalties.

Some Continuing Problems

The 'magic pipe' is an example where the different problems of international regulation come together. The underlying problem seems to be the immensely slow process of international regulation. The awareness that maritime transport is seriously and rapidly degrading the marine environment is not translated into swift international regulatory response. Moreover, the international regulatory response is not adequate, and fails to cover all

[76] Resolution a.233 (vii)] from 1971 from the Inter-Governmental Maritime Consultative Organization (IMCO), which in 1982 became the International Maritime Organization, IMO.

[77] A report from 1996 by GESAMP, the joint United Nations Group of Experts on the Scientific Aspects of Marine Pollution.

aspects of the problem: oily-water separating equipment has been mandatory in MARPOL for decades, but adequate port reception facilities for the discharge of sludge and oil waste, and proper facilities for onboard burning (if there are no shore facilities available or if no discharge can be made), have become mandatory only in the past few years. Mandatory equipment for separating oily water was one of the major features of MARPOL back in 1973. However, still a major share of the ship-sourced oil pollution consists of deliberate vessel discharges. Lack of international consensus on an effective approach has resulted in regional initiatives that push regulatory development – like the initiatives of the USA and the EU regarding deliberate operational discharges, and with respect to, *inter alia,* marine litter, invasive species in ballast water and emissions to the air. Nor has there been a solution to the problem of enforcement of Annex I and the regional implementations, enforcement that is exercised on the basis of restricted coastal and port-state jurisdiction.

FUTURE STRATEGIES

The principle of *mare liberum* – freedom to roam the seas without restriction – was formulated for another situation in another era. The concept of *mare liberum* still seriously limits effective enforcement of the regulation of the various, often untraceable, ways in which ships damage the oceans. As a consequence of this all, non-compliance by ships – in those cases where there are regulations in place – still prevails. Today's system, where open registers have become the main driving force for the development of the maritime industry, including the associated negative aspects, needs to be evaluated.

For the effective protection of the marine environment, further development of existing legislation schemes is essential. Examples are the review of MARPOL Annex V on ship-generated waste and the convention on ship recycling, which contain too many loopholes. In the future, regulation of 'new' marine problems, like the effects of underwater noise on marine life,[78] will have to be dealt with a higher sense of urgency. New regulations will need to be developed within a shorter time-frame than the current practice.

Most pollution from ships takes place out of sight, on the high seas. This means that enforcement can be very problematic. Additional strategies are needed in order to curb the environmental impacts of maritime transportation, related to:

[78] See Papanicolopulu, chapter 24 in this book.

- *Effective inspection and enforcement*. In a competitive market like maritime transportation, an unscrupulous entrepreneur can still find it worth his while to send an underqualified crew to sea in a barely seaworthy vessel. Since the chances of being caught are still relatively small and the fines low compared to the costs saved, some operators see this as a calculated risk. Through more effective inspections and strict enforcement, it should be possible to eliminate substandard shipping.
- *Data collection*. Methods to collect and disseminate data on the environmental impact of ships include examples such as the Safe Sea Net when it comes to safety of shipping and the EMEP modelling system[79] when it comes to air emissions, both enabling ambitious targets for ship emissions to be set. Another scheme is Equasis, a public website containing a database with information about ships: age, number of detentions, flag, where insured, etc.[80] Inspection by states in ports (Port State Control) also provides useful information, mostly on safety aspects and construction of ships. Detaining ships that do not fulfil international standards is a powerful tool in combating substandard shipping; every day in port will cost the owner a fortune.
- *Setting of conditions on sustainability when promoting shipping activities*. An example here is the Motorways of the Seas.[81] These conditions should include manning, maximum levels of air emissions, handling of all waste-streams on board, and safety. A very promising development in this respect is the development of a Clean Shipping list in Sweden. This project offers a system where cargo owners have a choice of transport companies not only on the basis of time or costs, but also on environmental criteria. The Clean Shipping Index[82] is a model which charter parties can use to calculate the sustainability performance of various maritime carriers.
- *Use of economic and other incentives to improve the environmental performance of shipping*. When regulation is regarded as a baseline to guarantee a reduction of impacts, the introduction of economic incentives serves as an extra bonus for quality operators. The first step should to identify and formulate technical criteria for the international environmental indexing of ships. In some ports, notably in Scandinavian coun-

[79] EMEP is a cooperative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe.

[80] See <www.equasis.org>.

[81] The aim of the 'Motorways of the Sea' is to introduce new intermodal maritime-based logistics chains in Europe and to move freight from land-based transport to sea. See <http://ec.europa.eu/transport/intermodality/motorways_sea>.

[82] See <www.cleanshippingproject.se>.

tries, incentive systems are already in place. The port of Gothenburg offers reduced fairway dues and shore power to frequently visiting ships that have emission control systems in place. In some ports, like the port of Rotterdam, ships carrying a Green Award receive reductions of up to 6 per cent on port duties.[83]

- *Stimulation of research and development for new technical solutions to notorious problems*. There is a strong link between regulation and innovation; developing regulation will open up markets for the *avant-garde* in ship development. One example is the current development of ballast-water treatment systems, which is directly driven by upcoming regulations on the use of ballast water on ships.
- *Communication of the advantages of 'clean operation'*. Examples include the European Ecoports project,[84] focusing on environmental port operations, and the Clean Cargo Working Group, a cooperation of large charter companies.[85]
- *Investing in the human element*. At the end of the day it is people who build, maintain and operate the ships and take decisions that may have far-reaching consequences. Training of seafarers – both before they start working on a ship and when they have become part of the crew – is a keystone of clean shipping. At present, knowledge of the marine ecosystem is not a part of the curriculum taught. To fill this gap, in 2002 the ProSea Foundation[86] was initiated in the Netherlands. This organisation provides training for marine professionals: seafarers, cadets, fishermen, and port representatives among others. In 2007 the IMO decided to review the STCW Convention. During the 2010 STCW diplomatic conference (Manila, Philippines, 21–25 June 2010), additional requirements on 'Marine Awareness' were included as a structural element in the curriculum of seafarers.

[83] See <www.greenaward.org>.
[84] See <www.ecoports.com>.
[85] See <www.bsr.org/membership/working-groups/clean-cargo.cfm>.
[86] See <www.prosea.info>.

17

Global Shipping and the Introduction of Alien Invasive Species

Stephan Gollasch

INVASIVE ALIEN SPECIES – INCREASING THREAT TO MARINE ECOSYSTEMS

Due to the negative impacts caused, alien aquatic species received more attention in north-western Europe since the first surveys of such species were prepared – for the German North Sea coast,[1] Britain and Ireland,[2] Norway,[3] the Dutch[4] and Danish coasts.[5] The first North Sea inventory of alien aquatic

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[1] S. Gollasch, *Untersuchungen des Arteintrages durch den internationalen Schiffsverkehr unter besonderer Berücksichtigung nichtheimischer Arten*. Dissertation, University of Hamburg (Hamburg: Verlag Dr. Kovac, 1996); S. Nehring and H. Leuchs, *Neozoa (Makrozoobenthos) an der deutschen Nordseeküste – Eine Übersicht* (Bundesanstalt für Gewässerkunde Koblenz, Report BfG-1200, 1999); S. Nehring, 'International Shipping – A Risk for Aquatic Biodiversity in Germany', in W. Nentwig, S. Bacher, M.J.W. Cock, H. Dietz, A. Gigon and R. Wittenberg (eds), *Biological Invasions – From Ecology to Control*, theme issue, *NEOBIOTA*, Vol. 6, 2005, pp. 125–143; S. Gollasch and S. Nehring, 'National Checklist for Aquatic Alien Species in Germany', *Aquatic Invasions*, Vol. 1, 2006, pp. 245–269.

[2] N.C. Eno, R.A. Clark and W.G. Sanderson, *Non-native Marine Species in British Waters: A Review and Directory* (Peterborough: Joint Nature Conservation Committee, 1997); D. Minchin and C. Eno, 'Exotics of Coastal and Inland Waters of Ireland and Britain', in E. Leppäkoski, S. Gollasch and S. Olenin (eds), *Invasive Aquatic Species of Europe: Distribution, Impact and Management* (Dordrecht: Kluwer, 2002), pp. 267–275.

[3] C.C.E. Hopkins, 'Introduced Marine Organisms in Norwegian Waters, Including Svalbard', in Leppäkoski, Gollasch and Olenin (eds), *Invasive Aquatic Species of Europe*, pp. 240–252.

[4] W.J. Wolff, 'Non-indigenous Marine and Estuarine Species in The Netherlands', *Zoologische Mededelingen*, Vol. 79, 2005, pp. 1–116.

[5] K.R. Jensen and J. Knudsen, 'A Summary of Alien Marine Benthic Invertebrates in Danish Waters', *Oceanological and Hydrobiological Studies*, Vol. 34, Supplement 1, 2005, pp. 137–162.

species was prepared in 1999[6] and has been updated recently.[7] Pan-European studies reveal that more than 1,000 non-indigenous aquatic species have been recorded from coastal Europe, including navigational inland waterways for ocean-going vessels and adjacent water bodies in close proximity.[8]

A recent summary of marine alien species in Europe, undertaken through the EU-funded Programme 'Delivering Alien Invasive Species Inventories for Europe' (DAISIE), revealed that in total 737 alien multicellular species were recorded. Due to controversial views on unicellular algal taxonomy, those species have been excluded here. The vast majority of these known invaders were found in the Mediterranean Sea (569 species); 200 were from the EU-Atlantic seaboard and 62 from the Baltic Sea.[9] The total number revealed in this inventory is lower than the results of the DAISIE study mentioned above, as here species found in adjacent lower salinity waters were excluded.

Most introductions of aquatic species, whether deliberate or accidental, have had negative effects on indigenous species communities – through predation, competition, introduction of pathogens and changes in ecosystem dynamics. Although many intentional species introductions, as for aquaculture purposes, are viewed as economically successful, the impacts on recipient ecosystems have not always been fully evaluated.

Most studies have concluded that shipping is the prime invasion vector of non-indigenous species. However, for several species, the invasion vector cannot easily be determined. For example, the Pacific oyster *Crassostrea gigas* may be introduced either as adults attached to ship hulls, as larvae carried in ballast water of ships, with imports of stock for aquaculture purposes, or for direct human consumption but released into the wild.[10]

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[6] K. Reise, S. Gollasch and W.J. Wolff, 'Introduced Marine Species of the North Sea Coasts', *Helgoländer Meeresuntersuchungen*, Vol. 52, 1999, pp. 219–234.

[7] S. Gollasch, D. Haydar, D. Minchin, W.J. Wolff and K. Reise, 'Introduced Aquatic Species of the North Sea Coasts and Adjacent Brackish Waters', in G. Rilov and J. Crooks (eds), *Biological Invasions in Marine Ecosystems. Ecological, Management, and Geographic Perspectives*, Ecological Studies 204, (Berlin: Springer, 2009), pp. 507–528; S. Gollasch, 'Alien Species in the North Sea', prepared for The Interreg IVB North Sea Region Programme: *Ballast Water Opportunity*, WP4, 2010. See <http://projects.nioz.nl/northseaballast>.

[8] N. Streftaris, A. Zenetos and E. Papathanassiou, 'Globalisation in Marine Ecosystems: The Story of Non-indigenous Marine Species across European Seas', *Oceanography and Marine Biology*, Vol. 43, 2005, pp. 419–453; Gollasch, *Untersuchungen des Arteintrages durch den internationalen Schiffsverkehr*.

[9] B.S. Galil, S. Gollasch, D. Minchin and S. Olenin, 'Alien Marine Biota of Europe', in DAISIE (eds), *Handbook of Alien Species in Europe. Invading Nature: Springer Series in Invasion Ecology*, Vol. 3 (New York: Springer, 2009), pp. 93–104.

[10] S. Gollasch, 'Is Ballast Water a Major Dispersal Mechanism for Marine Organisms?', in W. Nentwig (ed.), *Biological Invasions, Ecological Studies*, Vol. 193 (Berlin: Springer, 2007), pp.

Other invasion vectors (not dealt with in this contribution) include target and non-target species introductions for aquaculture, fisheries, ornamental trade, live seafood imports, research and habitat restoration as well as management efforts.[11] Canals may link previously separated water bodies; in many cases the removal of such migration barriers has prompted species migrations (e.g. inland waterways and canals for ocean-going ships).[12] Indeed, more than 50 per cent of the alien species reached the Mediterranean Sea via the Suez Canal.[13]

Historically one of the first species that might have been introduced with shipping to Europe is the Soft-shell clam, *Mya arenaria*. Shells from the Kattegat were dated to between 1245 and 1295, and it was suggested that the species may have been brought to Europe with solid gravel ballast already in Viking times.[14] The very first claim of ballast-water mediated introduction of a species introduction into Europe was made more than 100 years ago, when an Asian phytoplankton algae, *Odontella* (= *Biddulphia*) *sinensis*, was found in high densities in the North Sea.[15]

If we include the secondary spread of introduced species after their prime introduction event, every three weeks over the period 1998 to 2000 a new species was found in a European country. However, that figure includes single records of alien specimens, and not all species recorded form self-sustaining populations. On a regional basis, the figure is probably very different.[16]

49–57.

[11] Ibid.; S. Gollasch, 'International Collaboration on Marine Bioinvasions – the ICES Response', in A. Occhipinti-Ambrogi and C. Sheppard (eds), 'Marine Bioinvasions: A Collection of Reviews', *Marine Pollution Bulletin*, Vol. 55, 2007, pp. 353–359; E.J. Cook, G. Ashton, M. Campbell, A. Coutts, S. Gollasch, C. Hewitt, H. Liu, D. Minchin, G. Ruiz and R. Shucksmith, *Non-Native Aquaculture Species Releases: Implications for Aquatic Ecosystems*, in M. Holmer, K. Black, C.M. Duarte, N. Marb and I. Karakassis (eds), *Aquaculture in the Ecosystem* (New York: Springer, 2008), pp. 156 –183.

[12] S. Gollasch, B.S. Galil and A. Cohen (eds), *Bridging Divides – Maritime Canals as Invasion Corridors* (Dordrecht: Springer, 2006).

[13] B.S. Galil, 'The Suez Canal', in Gollasch, Galil and Cohen (eds), *Bridging Divides*, pp. 207–301; Galil et al., 'Alien Marine Biota of Europe'.

[14] K.S. Petersen, K.L. Rasmussen, J. Heinemeier and N. Rud, 'Clams before Columbus?', *Nature*, Vol. 359, 1992, p. 679; Galil et al., 'Alien Marine Biota of Europe'.

[15] C.J. Ostenfeld, 'On the Immigration of *Biddulphia sinensis Grev.* and Its Occurrence in the North Sea during 1903–1907', *Meddelelser fra Kommissionen for Havundersogelser*, Vol. 1, 1908, pp. 1–44.

[16] D. Minchin and S. Gollasch, 'Vectors – How Exotics Get Around', in Leppäkoski, Gollasch and Olenin (eds), *Invasive Aquatic Species of Europe*, pp. 183–192; ICES, *Report of the Working Group on Introductions and Transfers of Marine Organisms (WGITMO), 25–26 March 2004, Cesenatico, Italy* (Copenhagen: ICES, 2004).

NON-INDIGENOUS AQUATIC SPECIES IN THE NORTH SEA REGION

In total 180 non-indigenous or cryptogenic[17] species have been reported in the North Sea (Figure 17.1). The dominant introduction vectors are shipping and intentional introductions for stocking or aquaculture purposes.[18] By far the majority of the non-indigenous species have local distributions, with only 10 taxa found in all seven North Sea countries (Belgium, Denmark, Germany, the Netherlands, Norway, Sweden and the United Kingdom).

Most of the introduced species in the North Sea are benthic animals, and more than two-thirds have established self-sustaining populations. Others were only found with single individuals or in very small numbers. For some species, such as the Chinese mitten crab *Eriocheir sinensis* and the Pacific Oyster *Crassostrea gigas*, population densities fluctuate, and occasional mass occurrences have been reported.[19]

Although 136 non-indigenous species (81.9 per cent) are marine taxa, the proportion of marine vs. brackish water invaders has varied by country, with marine species always dominant. Investigations on invasive alien species may give different results in different countries. Important factors here include the ecological impacts, size, and available taxonomic expertise and awareness of researchers. Almost certainly other alien species occur as well, but have simply not been reported yet. The absence of a species in a neighbouring country may reflect some of these cases. As an example, the phytoplankton algae *Thalassiosira tealata* has been reported as alien species for Belgium, Norway and the UK. However, no records are known for Germany

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[17] Cryptogenic species are species where it is unknown whether they are native or introduced.

[18] Gollasch, 'International Collaboration on Marine Bioinvasions – the ICES Response'; Gollasch et al., 'Introduced Aquatic Species of the North Sea Coasts'.

[19] S. Diederich, G. Nehls, J.E.E. van Beusekom and K. Reise, 'Introduced Pacific Oysters (Crassostrea gigas) in the Northern Wadden Sea: Invasion Accelerated by Warm Summers?', *Helgoland Marine Research*, Vol. 59, 2005, pp. 97–106; K. Reise, N. Dankers and K. Essink, 'Introduced Species', in K. Essink, C. Dettmann, H. Farke, K. Laursen, G. Lüerßen, H. Marencic and W. Wiersinga (eds), *Wadden Sea Quality Status Report 2004*, Wadden Sea Ecosystem No.19 (Wilhelmshaven: Common Wadden Sea Secretariat, 2005), pp. 155–161; H. Ojaveer, S. Gollasch, A. Jaanus, J. Kotta, A.O. Laine, A. Minde, M. Normant and V. Panov, 'Chinese Mitten Crab *Eriocheir sinensis* (H. Milne-Edwards, 1853) *(Crustacea, Decapoda, Varunidae)* Population in the Baltic Sea – A Supply-side Invader?', *Biological Invasions*, Vol. 9, 2007, pp. 409–418; Gollasch et al., 'Introduced Aquatic Species of the North Sea Coasts'; S. Gollasch and D. Minchin, 'Species Accounts of 100 of the Most Invasive Alien Species in Europe. *Crassostrea gigas (Thunberg)*, Pacific (giant) Oyster *(Ostreidae, Mollusca)*', in DAISIE (eds), *Handbook of Alien Species in Europe*; S. Gollasch, 'Species Accounts of 100 of the Most Invasive Alien Species in Europe. *Eriocheir sinensi*s Milne-Edwards, Chinese Mitten Crab (Varunidae, Crustacea)', in DAISIE (eds), *Handbook of Alien Species in Europe*.

and Denmark.[20] This may be due to uncertainties in taxonomic phytoplankton identification.

Figure 17.1 Introduction vectors of alien species in the North Sea

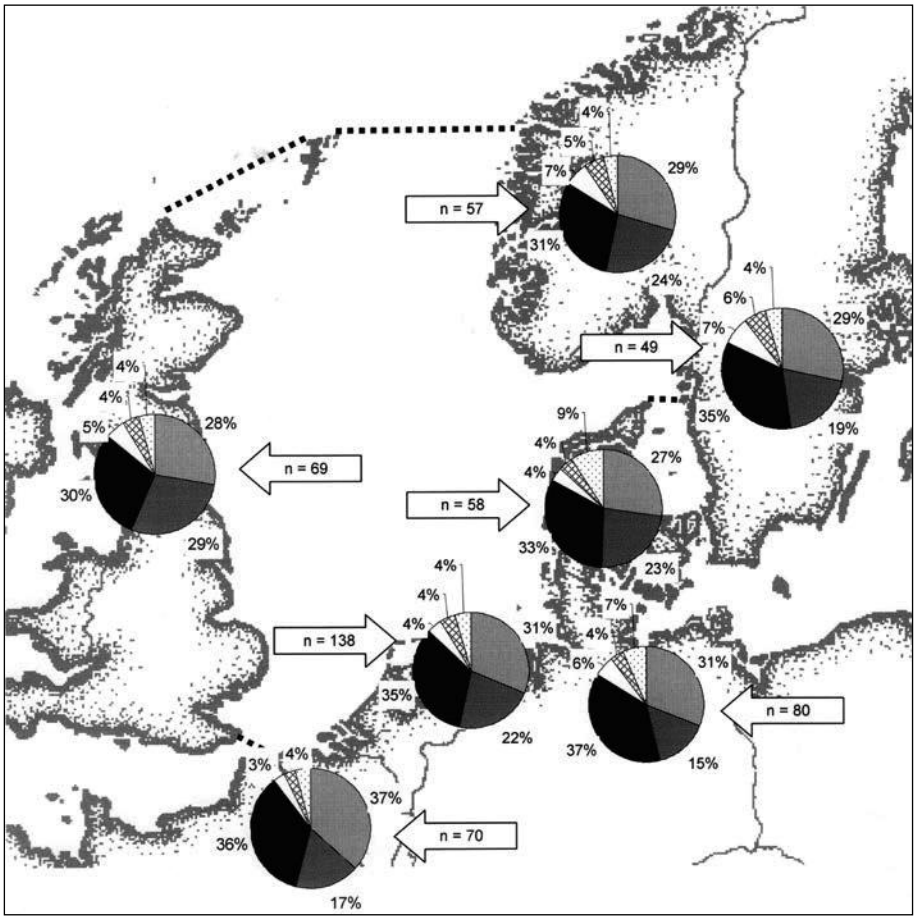

Figure 17.1 Pie charts show relative importance of likely introduction vectors for alien species (excluding cryptogenic species) per country (black = ballast water, dark grey = aquaculture & stocking, light grey = hull fouling, white = unclear vector, square shaded = unknown vector, dot shaded = other vectors). The total number of alien invasive species per country is given next to each pie chart.

Source: Modified after Gollasch et al. 2009 and Gollasch 2010.[21]

[20] Gollasch et al., 'Introduced Aquatic Species of the North Sea Coasts'.

[21] Gollasch et al., 'Introduced Aquatic Species of the North Sea Coasts'; Gollasch, 'Alien Species in the North Sea'.

The most recently identified non-indigenous species are the snail *Rapana venosa*, the fish *Neogobius melanostomus*, and the comb jelly *Mnemiopsis leidyi*, recorded for the first time in the North Sea and adjacent waters after 2005.[22] All three species are known to be negatively-impacting invaders, and studies are underway to evaluate their impact in the North Sea region.

Shipping

Worldwide, there are more than 480,000 annual ship movements with the potential for transporting organisms.[23] Calculations on the amount of ballast water carried with the world's fleet of merchant ships indicate that somewhere between 2–12 billion tons of ballast water are transported annually.[24]

Ships load ballast in order to provide stability and to keep their propellers submerged to ensure manoeuvrability. In ballast tanks and as well as other ship vectors (including hulls, anchor chains and sea chests) ships may carry 4,000 to 7,000 taxa every day, ranging from viruses to fishes.[25] Part of the explanation for the great diversity of organisms in transit with ships are three different 'habitats' inside ballast water tanks: fouling on tank walls, ballast water itself, and the sediment that accumulates at the bottom of ballast tanks.[26] Further, in the fouling of vessel hulls, mobile species such as crabs are frequently found between the sessile foulers. These organisms may be carried over great distances, as shown with the Hairy-clawed shore crab, *Hemigrapsus penicillatus*, which was found in high densities in heavily fouled areas of a vessel after docking in Europe in 1993. It may well be that this vessel introduced the crab to Europe, as it was first reported shortly after the fouled vessel was investigated. Possibly a few individuals of the crab were scratched off the hull by a floating object in the water or otherwise

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[22] Gollasch, 'International Collaboration on Marine Bioinvasions – the ICES Response'; Gollasch et al., 'Introduced Aquatic Species of the North Sea Coasts'.

[23] H. Seebens and B. Blasius, 'The Globalization of Marine Ecosystems', *Einblicke*, Vol. 51, 2010, pp. 8–11.

[24] D. Pughuic, 'Ballast Water Management and Conrol: An Overview', *Tropical Coasts*, Vol. 8, 2001, pp. 42–49.

[25] Gollasch, *Untersuchungen des Arteintrages durch den internationalen Schiffsverkehr*; Carlton, personal communication, February 2011; D. Minchin, S. Gollasch and I. Wallentinus, *Vector Pathways and the Spread of Exotic Species in the Sea*, ICES Cooperative Research Report 271 (Copenhagen: ICES, 2005).

[26] A. Taylor, G. Rigby, S. Gollasch, M. Voigt, G. Hallegraeff, T. McCollin and A. Jelmert, 'Preventive Treatment and Control Techniques for Ballast Water', in Leppäkoski, Gollasch and Olenin (eds), *Invasive Aquatic Species of Europe*, pp. 484–507.

dropped off the ship, and then went on to form a founder population in Europe. Since, the crab has spread,[27] with new records almost every year.

Organisms transported in ballast water are very diverse. In a survey of the results from all European ballast-water sampling studies, where almost 600 vessels were sampled, more than 1000 taxa were identified from ballast tanks, ranging from unicellular algae up to fish with body length up to 15 cm.[28]

Impact

Non-indigenous and some cryptogenic species[29] may have an impact on coastal systems, but in 1999 it was concluded that in the North Sea most alien species do not show major unwanted economic or ecological impacts.[30] However, the recently introduced Pacific oyster *Crassostrea gigas* has been shown to be spreading,[31] competing with the native blue mussel *Mytilus edulis*. The spread of the Pacific oyster may be triggered by warm summers which support recruitment.[32] Further, cold winters, a key factor for good recruitment of *M. edulis*, have been absent in recent years. Low water temperatures may depress the abundance of *C. gigas*,[33] so the continued tendency of rising water temperatures in the region may further promote the spread of this species.[34]

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[27] Gollasch, *Untersuchungen des Arteintrages durch den internationalen Schiffsverkehr*; S. Gollasch, 'The Asian decapod *Hemigrapsus penicillatus* (de Haan, 1833) *(Decapoda, Grapsidae)* Introduced in European Waters, Status quo and Future Perspective', *Helgoländer Meeresuntersuchungen*, Vol. 52, 1999, pp. 359–366.

[28] S. Gollasch, E. Macdonald, S. Belson, H. Botnen, J. Christensen, J. Hamer, G. Houvenaghel, A. Jelmert, I. Lucas, D. Masson, T. McCollin, S. Olenin, A. Persson, I. Wallentinus, B. Wetsteyn and T. Wittling, *Life in Ballast Tanks*., in Leppäkoski, Gollasch and Olenin (eds), *Invasive Aquatic Species of Europe*, pp. 217–231; M. David, S. Gollasch, M. Cabrini, M. Perkovič, D. Bošnjak and D. Virgilio, 'Results from the First Ballast Water Sampling Study in the Mediterranean Sea – the Port of Koper Study', *Marine Pollution Bulletin*, Vol. 54, 2007, pp. 53–65.

[29] Cryptogenic species are those where we are uncertain whether they are introduced or native.

[30] Reise, Gollasch and Wolff, 'Introduced Marine Species of the North Sea Coasts'.

[31] K. Reise, S. Olenin and D.W. Thieltges, 'Are Aliens Threatening European Aquatic Coastal Ecosystems?', *Helgoland Marine Research*, Vol. 60, 2006, pp. 77–83; Reise, Dankers and Essink, 'Introduced Species'.

[32] Diederich et al., 'Introduced Pacific oysters'.

[33] G. Nehls, S. Diederich, D.W. Thieltges and M. Strasser, 'Wadden Sea Mussel Beds Invaded by Oysters and Slipper Limpets: Competition or Climate Control?', *Helgoland Marine Research*, Vol. 60, 2006, pp. 135–143.

[34] Gollasch and Minchin, 'Species Accounts of 100 of the Most Invasive Alien Species in Europe. *Crassostrea gigas (Thunberg)*, Pacific (giant) oyster'.

According to available data,[35] the total documented costs of invasive alien species in Europe are estimated to be at least EUR 12 billion per year. These costs result mainly from damages and costs of control and management measures. Most of the information on monetary impacts concerns negative effects on terrestrial plants and vertebrates. Several important European economic sectors are affected by alien species, with agriculture, fisheries and aquaculture, forestry and the health sector being among the stakeholders most affected. It should be noted that the cost figure stated above is an underestimate, as data were not available for all European countries; moreover, in several cases the existing data were not sufficiently specific to enable a good cost estimate.[36]

AVOIDANCE MEASURES

In view of the unpredictable impacts of alien species, regulations should be implemented to minimise such impacts, which may only be done by minimising the number of new alien species arrivals. The Convention on Biological Diversity (CBD) sets a general prohibition on introducing invasive alien species in its Article 8h, but measures must be implemented in all relevant sectors.

Aquaculture

In aquaculture such avoidance measures have been known for quite some time. In the following, the key instruments will be presented only briefly, for reasons of comparison, as the focus of this chapter is on shipping. For dealing with intentional introductions of species, a step-by-step approach to planning, assessing the risks and implementing introduction programmes is recommended. This procedure should incorporate guidelines for assessing the potential impacts, as already outlined in many international codes of practice, such as those put forward by EIFAC,[37] the ICES[38] and the IUCN.[39]

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[35] C. Shine, M. Kettunen, P. Genovesi, F. Essl, S. Gollasch, W. Rabitsch, R. Scalera, U. Starfinger and P. ten Brink, *Assessment to Support Continued Development of the EU Strategy to Combat Invasive Alien Species,* Final Report for the European Commission (Brussels: Institute for European Environmental Policy (IEEP), 2010).

[36] Ibid.

[37] EIFAC, 'Codes of Practice and Manual of Procedures for Consideration of Introductions and Transfers of Marine and Freshwater Organisms', FAO/EIFAC Occasional Paper No. 23, 1988.

[38] 'ICES Code of Practice on the Introductions and Transfers of Marine Organisms 2005' (Copenhagen: ICES, 2005) available at <www.ices.dk/pubs/Miscellaneous/ICESCodeofPractice.pdf>

[39] C.L. Hewitt, M.L. Campbell and S. Gollasch, *Alien Species in Aquaculture – Considerations for Responsible Use* (Gland: IUCN/World Conservation Union, Global Marine Programme, 2006).

These codes include risk assessment provisions and guidance on, *inter alia*, quarantine measures to minimise unwanted impacts from any candidate species to be introduced or 'fellow travellers' such as parasites and disease agents. However, these codes are voluntary. A mandatory instrument, such as a sector-focused protocol under the CBD, would achieve a much higher level of protection. One such instrument is Council Regulation (EC) No 708/2007 of 11 June 2007 concerning the use of alien and locally absent species in aquaculture. It is recognized that aquaculture has benefited economically from the introduction and translocation of species in the past (as with rainbow trout, Pacific oyster and Atlantic salmon). Future efforts should optimise the benefits associated with species introductions and translocations, while avoiding negative impacts on ecosystems and indigenous species, by restricting the spread of these species.

Shipping

The International Maritime Organization (IMO), the UN body which deals, *inter alia*, with minimising pollution from ships, has developed two conventions relevant to biological invasions.

International Convention on the Control of Harmful Anti-Fouling Systems on Ships

This Convention was developed to address the unwanted effect of poisonous, tri-butyl-tin (TBT)-containing, anti-fouling paints in the aquatic environment. Consequently, the use of TBT was banned. However, concerns have been expressed that alternative ship coatings may prove less effective, resulting in the arrival of more hull-fouling species in new habitats.

To address these concerns, several countries initiated a discussion group at IMO which developed hull fouling management options.

International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Convention)

Ballast water exchange in open seas is recommended as a partial solution to reduce the number of species in transit. At some point in the future, ballast-water treatment will be required. The IMO has developed a set of guidelines to address certain key issues of the Convention in greater detail and to ensure uniform implementation.[40]

[40] S. Gollasch, M. David, M. Voigt, E. Dragsund, C. Hewitt and Y. Fukuyo, 'Critical Review of the IMO International Convention on the Management of Ships' Ballast Water and Sediments', *Harmful Algae*, Vol. 6, 2007, pp. 585–600. See also Vidas and Markovčić Kostelac, chapter 21 in this book.

The Ballast Water Convention is to enter into force 12 months after the date on which not less than 30 states, the combined merchant fleets of which constitute not less than 35 per cent of the gross tonnage of the world's merchant shipping, have ratified. As of 31 January 2011, 27 countries had ratified or acceded to the Convention, representing approximately 25 per cent of the world's merchant-shipping gross tonnage.

Ballast Water Management in Europe

Although the Ballast Water Convention is not yet in force, various regional approaches to ballast water management are developing worldwide. In the EU, such measures have been developed at regional and national levels. The first voluntary ballast-water management requirements were introduced by HELCOM and OSPAR countries:[41] for shipping in the north-east Atlantic and the Baltic Sea, the ballast water exchange standard as stated in Regulation D-1 of the Ballast Water Convention is applicable on a voluntary basis since 1 April 2008:

- Vessels entering the area should carry a ballast-water management plan which complies with the relevant IMO Guideline.
- All ballast water operations should be recorded on all vessels entering the area.
- Ballast water of all tanks should be exchanged according to the requirements outlined in the D-1 Standard of the Ballast Water Convention: i.e. at least 200 nautical miles from nearest land and in waters of more than 200 m depth.

These requirements apply to vessels on trans-Atlantic voyages, and those entering the OSPAR and HELCOM region on shipping routes passing the West African coast before entering the north-east Atlantic. Where compliance is not possible, vessels are expected to undertake ballast water exchange in accordance with the same distance and depth limits within the north-east Atlantic. In those cases where also this is impossible, ballast water exchange should be carried out as far as possible from the nearest land, but always at least 50 nautical miles away and in depths of at least 200 m.[42]

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[41] HELCOM/OSPAR, General Guidance on the Voluntary Interim Application of the D-1 Ballast Water Exchange Standard in the Northeast Atlantic and the Baltic Sea, of 26 February 2008, available at <www.ospar.org/html_documents/ospar/html/ospar_helcom_guidance_ballast_water.pdf>. See also HELCOM, Baltic Sea Action Plan, available at <www.am.lt/VI/files/0.639044001195625648.pdf>.

[42] HELCOM, General Guidance on the Voluntary Interim Application of the D-1 Ballast Water Exchange Standard.

The Adriatic countries have prepared a common approach to ballast water management considering a new legal framework for implementation,[43] and some national-level requirements have also been identified in countries bordering on the Black and Caspian Seas. However, there is no common European policy on ballast water, and no legal mandatory requirements are in place.[44]

In the North Sea region, the new Interreg IVB Project 'Ballast Water Opportunity' is currently underway,[45] with termination scheduled for December 2013. Ballast Water Opportunity is a project for regional cohesion, innovation and future strategies in ballast water policies and ballast water management. The focus is on coherence and harmonisation of implementation, monitoring and enforcement, innovation based on scientific knowledge for implementation, enforcement and development of future strategies to reduce ship-borne bio-invasions. The project is coordinated by the Royal Netherlands Institute for Sea Research, an institute with long-standing expertise and scientific background knowledge in the testing of systems for ballast water management.[46]

CONCLUSIONS

The dominant vectors for the introduction of alien species into the North Sea have been shown to be the shipping-associated vectors and aquaculture, including their associated non-target biota. More than two-thirds of the recorded non-indigenous species in the North Sea region have established self-sustaining populations. However, their distributions are clearly local: only ten non-indigenous species are known from all the seven countries bordering the North Sea.

Some non-indigenous species cause significant impacts in their new environments; such impacts may affect economic stakeholders as well. However, it is very difficult, if not impossible, to predict the potential impact of a recently-found invader. Some invaders known to cause an impact in other temperate environments (as in North America or Asia) may show a similar impact in the North Sea region – but in some cases, new species have proven to have unpredicted impacts.

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[43] See in further detail in Vidas and Markovčić Kostelac, chapter 21 in this book.

[44] M. David and S. Gollasch, 'EU Shipping in the Dawn of Managing the Ballast Water Issue', *Marine Pollution Bulletin*, Vol. 56, 2008, pp. 1966–1972.

[45] See <http://projects.nioz.nl/northseaballast>.

[46] In this project, the author is responsible for organism detection technologies, with a focus on shipboard investigations.

Since ballast water discharged into North Sea harbours each day can carry millions of individuals, we need a better understanding of the vector mechanisms involved, and of how to reduce the introduction of unwanted species in the future. Perhaps it might be advisable to begin by focusing management measures on the most important introduction vector, so as to reduce the number of new invaders most efficiently.

In the North Sea as in many other regions, the rate of invasions has increased, especially since the 1950s. This trend seems set to continue, due to changes in ecosystems related to climate change, and also because of the expansion of world shipping. However, this should not be seen as an unchangeable trend: we can reduce it by applying the recommendations on voluntary ballast water management, as well as aquaculture-related legislation on alien species.

18

Globalisation and Challenges for the Maritime Arctic

Lawson W. Brigham

NEW CHALLENGES EARLY IN THE CENTURY

The end of the 20th century witnessed the dawn of extraordinary changes for the maritime Arctic. The region has long been understood to be a large storehouse of untapped natural resources such as oil and gas, and mineral wealth. Exploration and development of these natural resources, driven by higher commodity prices and worldwide demand, have accelerated to a point where the Arctic is set to be a new and potential regional power in the global economy. A key theme of this chapter is that economic connections of the Arctic to the globe are driving new challenges for Arctic marine transport and all marine activities in this once-remote region.

Changes in Arctic sea ice, and the geopolitics of delimitation of the outer continental shelf, are also influencing future governance and uses of the Arctic Ocean. Marine access is changing in unprecedented ways as Arctic sea ice undergoes an historic transformation of thinning and extent reduction. These physical changes have significant implications for longer seasons of navigation and new access to previously hard-to-reach Arctic coastal regions. Simultaneously, the process of setting the limits of the outer continental shelf in the Arctic Ocean under Article 76 of the UN Convention on the Law of the Sea (LOS Convention) poses key changes and geopolitical challenges for the High North. These changes, taken together with economic drivers, present unique challenges to the existing legal and regulatory structures which cannot meet today's needs for enhanced Arctic marine safety and environmental protection. Such challenges will require historic high levels of close cooperation among the eight Arctic states and broad engagement with the indigenous peoples of the Arctic, many non-Arctic

stakeholders, and a host of actors within the global maritime industry. In response to this 'new maritime Arctic', the Arctic Council has taken proactive steps to begin addressing many of the critical safety and environmental issues related to expanded marine operations in the Arctic.[1]

ECONOMIC CONNECTIONS TO THE GLOBE

Development of Arctic natural resources is linking the maritime Arctic to the rest of the planet. The largest zinc mine in the world, 'Red Dog', is located in northwest Alaska in the Chukchi Sea. Several of the largest bulk carriers in the world sail into US Arctic waters in the summer (ice-free) months to load zinc ore from barges operating from the small port facility at Kivalina. The ore is carried to markets in East Asia and British Columbia. Across the Arctic Ocean in the Russian Arctic is the Siberian industrial complex at Norilsk, the largest producer of nickel and palladium in the world (and one of the largest copper and platinum producers).[2] Since 1979, year-round navigation has been maintained between Murmansk and Dudinka, port city for Norilsk on the Yenisey River, so that nickel plates can be shipped west to domestic and global markets. A marine shuttle system of independently-operated (without icebreaker escort), icebreaking container carriers ensures the uninterrupted flow of nickel product to markets. In northern Baffin Island is one of the world's largest deposits of high grade iron ore. The development of the 'Mary River mine complex', perhaps during the next decade, will require a marine transport system of icebreaking carriers that can link the mined ore to key European steel mills. Year-round marine operations have become technically feasible, given the advanced capability of the icebreaking carriers that are being considered.

Hydrocarbon developments in the Arctic, principally in Norway and Russia, have also stimulated increased Arctic marine traffic. LNG (liquefied natural gas) has been shipped to markets in Spain and the US East Coast from the onshore Hammerfest facility in the Norwegian Arctic (the gas is piped from the offshore seabed complex Snøhvit). This strategy reflects a shift from North Sea production to the Norwegian Arctic offshore for future exploration and development. At the Varandey offshore terminal in the Pechora Sea, oil from western Siberia (onshore) is shipped to Murmansk in advanced icebreaking tankers using a second shuttle service in the region.

[1] The Arctic Council is an intergovernmental forum established by the Ottawa Declaration of 19 September 1996 of the eight Arctic states (Canada, Denmark-Greenland-Faroe Islands, Finland, Iceland, Norway, Sweden, Russia and the United States).

[2] Norilsk Nickel website available at <www.nornik.ru/en/about>.

The investors and stakeholders in this venture represent a prime example of the global nature of recent Arctic development: the offshore terminal was developed by Lukoil (Russia) and ConocoPhillips (USA), the new icebreaking ships were built by Samsung Heavy Industries in Korea using Finnish Arctic ship technology, and the tankers are operated by the Russian-flag company Sovcomflot, the largest shipping firm in Russia. During the summer of 2010, exploratory drilling was conducted off Greenland's west coast near Disco Island, with Cairn Energy of Scotland as the leaser and Stena Drilling of Sweden the operator. [3] More drilling off Greenland is anticipated throughout the decade. While full development of the Shtokman field in the eastern Barents Sea (largest offshore gas field in the world) has been delayed, due *inter alia* to depressed global gas prices, the project represents an interesting global partnership involving Gazprom, the Russian energy giant, Total from France and StatoilHydro from Norway. The two Western companies are to provide significant technical and operational expertise.

Russia's Northern Sea Route (NSR) is also showing signs of increased use, especially for full passages. During summer 2009, two German heavy lift ships, operated by Beluga, carried heavy plant modules from Korea to the Ob River; both ships later sailed into the Atlantic Ocean, completing an east-to-west NSR passage.[4] In summer 2010, a Russian-flag high-tonnage tanker sailed from Murmansk to China; and an iron bulk-ore carrier (Danish flag) sailed from Kirkenes, Norway, across the length of the NSR to China. One of the Norilsk nickel shuttle carriers also completed a voyage from Murmansk and Dudinka to Shanghai. These voyages all represent a new maritime connection of Russian Arctic natural resources to global markets.

Recent Russian and foreign commercial agreements highlight the linkages of the Russian Arctic to the global economy. In June 2009, Lukoil and Sinopec (China Petroleum & Chemical Corporation) signed an agreement to carry oil (3 million tons) from the Varandey terminal in the Pechora Sea to China. In November 2010, Sovcomflot and CNPC (China National Petroleum Company) agreed to cooperate in using the NSR to ship oil and gas out of the Russian Arctic to China.[5] And STX Finland and United Shipbuilding Corporation (a merger of 42 shipyards in Russia) agreed in December 2010 to form a joint venture company focusing on Arctic shipbuilding technology;

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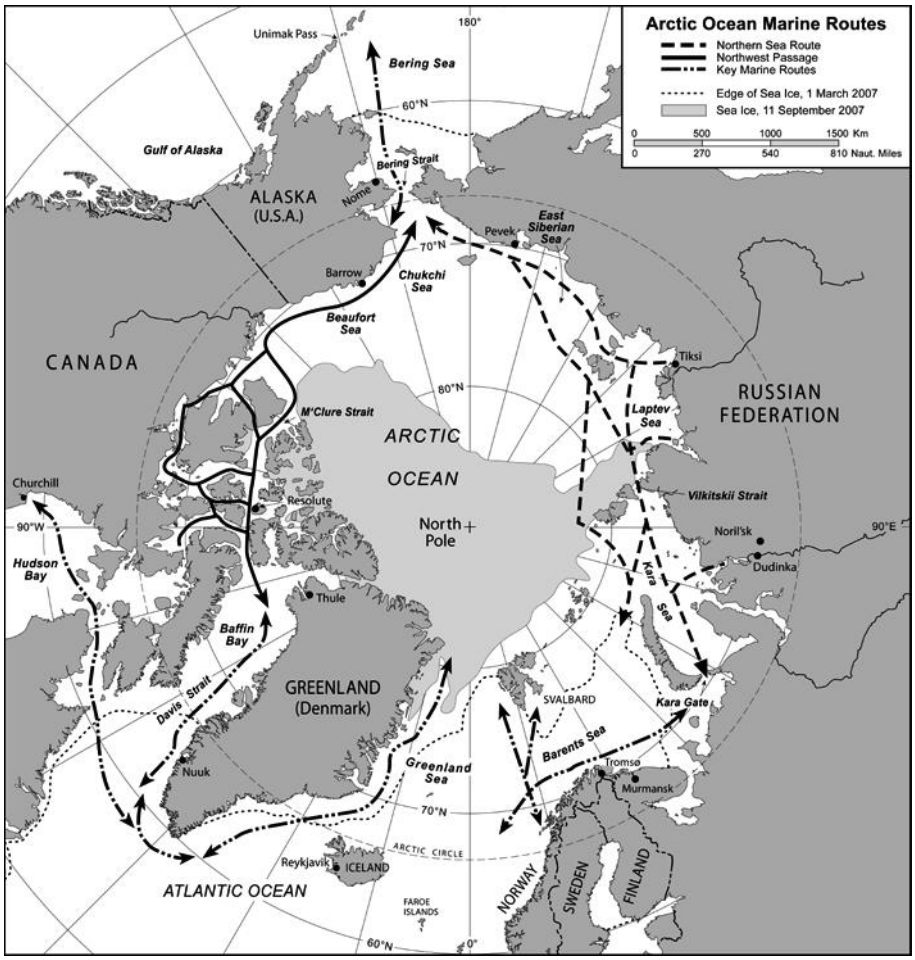
[3] Cairn, Greenland operations update available at <www.cairnenergy.com/operations/Greenland>.

[4] 'A Shortcut through the Arctic Ocean', *Blue Line Beluga Magazine*, Issue 2, 2009, pp. 10–12.

[5] 'Sovcomflot Group and China National Petroleum Corporation become Strategic Partners', Sovcomflot press release, 22 November 2010.

Figure 18.1 The maritime Arctic showing marine routes and sea ice maximum and minimum extents for 2007



icebreakers and specialised icebreaking vessels will be the primary ship construction.[6] A BP and Rosneft stock shares-swap in January 2011 (the first such swap between a major international oil company and a major national oil company) was primarily related to future joint exploration and development of offshore oil in the Kara Sea.[7] Each of these commercial agreements

[6] 'Russia, Finland to Build Icebreakers for Arctic region', *The Voice of Russia*, 22 December 2010. Noted in the article is the long-term cooperation between Russia and Finland in the construction of Arctic ships.

[7] 'BP and Rosneft to Swap Stakes: British and Russian Oil Giant also Agree to Jointly Explore and Develop Arctic', *Wall Street Journal*, 15-16 January 2011, p. B1. The agreement is to ex-

increases the economic ties of the Arctic to the global economy, principally through natural resource developments in the Russian Arctic.

ARCTIC SEA ICE CONSIDERATIONS

Arctic sea ice continues to retreat in extent and thickness early in the 21st century. Over the past three decades, minimum or average Arctic sea-ice coverage has declined by nearly 12 per cent each decade – in all, a remarkable total decrease of 34 per cent coverage.[8] However, despite the extraordinary changes in coverage and observed thinning of sea ice, much of the Arctic Ocean still remains fully or partially ice-covered in winter, spring and autumn. This situation is likely to continue, as confirmed by Global Climate Model simulations of Arctic sea ice in retreat; simulations show the winter sea-ice cover remaining through the century and beyond.[9] These simulations also indicate the disappearance of old or multi-year sea ice from the central Arctic Ocean perhaps as early as 2030. This would mean the entire Arctic Ocean could plausibly be ice-free for a (short) period of time each year, and the ice developing in subsequent months would be first-year ice, which is more easily navigable. The practical aspects of these changes and the continued presence of sea ice for much of the year are significant factors for new regulatory requirements for Arctic ships. Future ships navigating in Arctic waters are likely to require some level of polar or ice-class capability (for example, enhanced construction standards and equipment requirements) to sail safely and efficiently in the Arctic Ocean. In summary, it is highly plausible that in the future there will be greater marine access and longer seasons of navigation throughout the Arctic Ocean, except perhaps during winter. However, high seasonal sea-ice variability in Arctic coastal regions will persist; and a more mobile, dynamic ice cover will not necessarily provide 'easier' ice conditions for marine operations.

THE ARCTIC MARINE SHIPPING ASSESSMENT

At the 2004 Arctic Council Ministerial Meeting in Reykjavik, the ministers called for an 'Arctic shipping assessment'.[10] During the ensuing five years,

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plore the south Kara Sea in the Russian Arctic, one of largest untapped oil and gas reserves in the world.

[8] 'Arctic Sea Ice Extent is Third Lowest on Record', NASA, 6 October 2009, available at <www.nasa.gov/topics/earth/features/seaicemin09_prt.htm>.

[9] Regarding findings related to Arctic sea ice, see: Arctic Council, *Arctic Marine Shipping Assessment 2009 Report*, available at <www.pame.is/ amsa/amsa-2009-report>, p. 35.

[10] The Reykjavik Declaration, 4th Arctic Council Ministerial Meeting, 24 November 2004.

nearly 200 experts led by Canada, Finland and the United States under the Council's working group PAME (Protection of the Arctic Marine Environment) analysed current and future marine activity, created a list of critical findings, and proposed a set of recommendations in the Arctic Marine Shipping Assessment (AMSA). AMSA focused on marine safety and environmental protection measures, consistent with the Arctic Council's dual mandates of environmental protection and sustainable development. The resulting assessment in the *Arctic Marine Shipping Assessment 2009 Report* can be seen as: a strategic guide to a host of Arctic actors and stakeholders; a baseline assessment and snapshot of Arctic marine activity early in the 21st century; and, importantly, a policy framework document for the Arctic Council, since the Report was negotiated and consensus was reached for its approval by the eight Arctic states in April 2009.[11] Ninety-six findings are presented in the Report under a broad range of key themes, including marine geography, climate and sea ice, a history of Arctic marine transport, governance and law of the sea, current marine use (the AMSA database), scenarios and future uses, human dimensions and indigenous issues, environmental considerations and impacts, and the Arctic marine infrastructure deficit. To support the AMSA effort, 13 major workshops were held on scenarios of the future, marine insurance, Arctic indigenous use, environmental impacts, infrastructure and integration of the AMSA research. Fourteen AMSA townhall meetings were held in Arctic communities to directly link the concerns and shared interests of indigenous residents.

A baseline database of Arctic marine activity (for the calendar year 2004) was essential to the credibility of AMSA. The Arctic community required a first-order understanding of the numbers of ships operating in the Arctic Ocean, by ship type, marine use, season, and region of operation. 'Arctic shipping' in AMSA is broadly defined to include such ship types as tankers, container ships, general cargo vessels, icebreakers, cruise ships, fishing vessels, ferries, tug-barge combinations, and survey/exploration vessels supporting offshore development. An AMSA survey was sent for checking to the Arctic states to ensure that the information provided would be the official national Arctic shipping data. Each of the Arctic states would also use its own definition of what constitutes their nation's 'Arctic region'. The AMSA database lists an estimated 6000 individual vessels operating in the Arctic region during 2004, with nearly all Arctic voyages being destinational and regional (not trans-Arctic). Four primary types of Arctic vessel activity were noted: community resupply, fishing, bulk carriers, and marine tourism; fishing vessels made up slightly less than half of the total and bulk carriers 20

[11] Arctic Council, *Arctic Marine Shipping Assessment Report.*

per cent of the total.[12] The regions with the highest concentrations of marine traffic were coastal Norway and northwest Russia (Norwegian, Barents and Pechora Seas), the North Pacific Great Circle Route near the Aleutian Islands in Alaska, and summer cruise ships off Greenland's west coast.

In the AMSA ocean governance review, it is clear that Arctic marine navigation and overall marine uses are to be conducted within the fundamental framework provided by the LOS Convention. The Arctic region holds one of the earth's oceans, the Arctic Ocean, and the LOS Convention sets out the legal framework for the regulation of shipping and activity according to maritime zones of jurisdiction. This finding is consistent with the May 2008 Illulissat Declaration of the five Arctic Ocean coastal states, who stated to the world that the Arctic does not require a new treaty or agreement, since the LOS Convention is the primary and appropriate basis for marine governance in the region.[13] Also important to the Arctic Ocean is that the LOS Convention gives coastal states the right to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction and control of marine pollution in ice-covered waters. AMSA also reaffirms that it is the International Maritime Organization (IMO) to which the Arctic states should turn concerning issues related to Arctic maritime safety, security and environmental protection. All eight Arctic states are active members of the IMO, and they will need to work together to achieve Arctic-specific rules and regulations compatible with existing IMO conventions and standards.

SCENARIOS AND FUTURES

One of the major challenges for the AMSA team was to identify the main uncertainties that will shape the future of marine activity and use to 2050. A scenario-based approach was used to create a set of plausible futures, in which the different stories of future Arctic marine activity can illuminate where crucial uncertainties may play out. AMSA scenario participants identified nearly 120 driving forces or factors that may influence future levels of marine activity. Included among the factors deemed most influential by AMSA are:

- world trade patterns and radical changes in global trade dynamics
- global oil prices
- safety of other global maritime routes

[12] Arctic Council, *Arctic Marine Shipping Assessment Report*, p. 72.

[13] The five Arctic Ocean coastal states (Canada, Denmark-Greenland-Faeroe Islands, Norway, Russia and the United States) met in Illulissat, Greenland, for an Arctic Ocean Conference, 27–29 May 2008. The Illulissat Declaration was one outcome of this meeting.

- legal stability and overall governance of Arctic marine use
- occurrence of a major Arctic marine disaster
- transit fees for Arctic shipping
- engagement of the marine insurance industry
- climate change severity (more disruptive, sooner than anticipated)
- limited windows and seasonality for Arctic marine operations (and economic implications)
- global (IMO) agreements for Arctic ship construction rules and standards
- new natural resource discoveries
- escalation of Arctic maritime disputes
- conflicts between indigenous and commercial users of Arctic waterways
- emergence of China, Korea and Japan as Arctic maritime nations.[14]

These select factors or driving forces illustrate the complexity and broad, global connections that can influence future uses of the Arctic Ocean. Two primary factors were selected to anchor, as axes of uncertainty, the scenarios matrix used for the development of plausible futures:

1. *Resources and trade*: the level of demand for Arctic natural resources and trade. This driver relates to the uncertainties of global prices for commodities such as oil and gas, and hard minerals; potential global market developments (e.g. in Asia); and regional political instabilities.
2. *Governance*: the degree of relative stability of rules and standards for marine use both within the Arctic and internationally. Less stability may imply a shortfall in transparency and a rule-based structure, and create an atmosphere where actors and stakeholders, such as the Arctic states and the global maritime industry, tend to work on a unilateral basis. More stability implies a stable, efficiently operating system of legal and regulatory structures and an atmosphere of international collaboration.[15]

These two selected factors for the AMSA scenarios matrix met three key criteria: degree of plausibility, relevance to the Arctic and maritime affairs, and being at the right level or threshold of the many external factors. Thus, for the AMSA scenarios effort, the globalisation of the Arctic and the development of Arctic natural resources, as well as the governance of Arctic marine activity, were deemed most influential among the many drivers in determining the future of Arctic marine environment. Full consideration was given to climate change; the continued retreat of Arctic sea ice is assumed to provide opportunities for improved marine access and potentially longer

[14] Arctic Council, *Arctic Marine Shipping Assessment Report*, p. 93.
[15] Ibid., p. 94.

seasons of navigation. Greater access facilitates Arctic marine uses, but also important are global economic factors such as demand for natural resources.

Four scenarios were created by crossing the two primary drivers. A *Polar Lows* scenario (low demand and unstable governance) shows a future of low demand for natural resources and minimal marine traffic. In this scenario, less attention is given to marine regulations and standards, which remain weak and undeveloped. The *Arctic Race* scenario (high demand and unstable governance) is a future of generally high global prices for resources and a high demand for Arctic natural resources. This plausible future implies an 'economic rush' for Arctic development (not a geopolitical race), based in part on global markets, where much of the global maritime industry moves to the Arctic Ocean to support resource development and marine tourism. However, in this scenario there is lack of an integrated set of maritime rules and regulations and inadequate marine infrastructure to support such high levels of Arctic marine activity. A *Polar Preserve* scenario (low demand and stable governance) is a future of low demand for Arctic resources, since global economic and geopolitical interests are focused elsewhere. This is an Arctic situation where environmental concerns drive a movement toward a systematic preservation of the Arctic; many Arctic marine regions are closed to navigation and development. The fourth AMSA scenario, *Arctic Saga* (high demand and stable governance), is a future of high global demand for Arctic natural resources, significant increases in Arctic marine traffic, and a stable, fully-developed governance system for multiple Arctic marine uses. This Arctic world leads to a healthy rate of Arctic development that includes broad concern for the preservation of Arctic cultures and ecosystems, as well as shared economic and political interests of the Arctic states.[16]

The AMSA scenarios proved to be a powerful way to communicate to a wide audience the complexities influencing the future of Arctic marine navigation. The effort, facilitated by unconstrained thinking, identified the many plausible linkages of the Arctic to the global system and served to highlight the global economic forces that are influencing the North.

ENVIRONMENTAL CONCERNS

One important part of AMSA was a scientific review of the environmental impacts of current and future Arctic marine activity. The scientific team deemed the most significant threat from ships to the Arctic marine environment to be the release of oil from accidental or illegal discharge. This places an appropriate pressure on prevention programmes and regulatory systems

[16] Ibid., pp. 95–97.

(including enforcement) to minimise the possibilities of discharges of oil and toxic chemicals into Arctic waters. The team also addressed a range of key impacts, including:

- the introduction of alien species from ballast water, cargo, and hull fouling;
- the transfer of organisms from northern ecosystems of similar latitudes and conditions (for example, from the North Pacific to the North Atlantic across the Arctic Ocean);
- ship strikes on whales and other marine mammals;
- the regional impacts of black carbon emissions on ice melt;
- potential impacts of anthropogenic noise from ships and other marine activities on marine mammals;
- negative impacts on the migration corridors and natural chokepoints for marine mammals and birds which correspond broadly to current and future shipping routes;
- lengthening of the Arctic navigation season (later in the autumn and earlier in the spring) and the potential consequences for Arctic ecosystems and migration patterns;
- the unintended, potentially negative, consequences of Arctic ship emissions including greenhouse gases, nitrogen oxides, sulphur oxides and particulate matter.[17]

Two of the environmental issues emphasised were geographic in focus. The team highlighted that two of the world's richest fisheries, in the Bering and Barents Seas, are also the location for heavy marine traffic in Arctic waters. Any spill in these regions could have major economic, cultural, social and environmental impacts. Also noted were Arctic waters with marine traffic that have a heightened ecological significance and are also geographically restricted, such as Kara Gate in the Russian Arctic, Bering Strait, Hudson Strait and Lancaster Sound in the Canadian Arctic, and the Pechora Sea in the southeastern reaches of the Barents Sea.

LACK OF MARINE INFRASTRUCTURE

One of the greatest concerns and significant risks identified in AMSA is the lack of marine infrastructure in all regions of the maritime Arctic except for the Norwegian coast and coastal regions of northwest Russia. 'Marine infrastructure' can be defined broadly as including: marine charts (and hydrographic/bathymetric information); communications; salvage; aids to naviga-

[17] Ibid., pp. 152–153.

tion; icebreaker capacity; environmental monitoring of weather, sea ice and icebergs; environmental response capacity (for example with an oil spill); search and rescue capability; deepwater ports and port reception facilities; ship monitoring and tracking; and other key needs such as places of refuge. This huge deficit in marine infrastructure makes it very difficult to evaluate the full risks associated with Arctic marine operations, and exposes most new Arctic marine projects to a non-existent safety net. AMSA emphasised that the remoteness, vastness and harshness of the Arctic environment make emergency response in the Arctic difficult, even in the best of conditions.[18] AMSA further noted that the Arctic Ocean's hydrographic database is extremely sparse, and an observing network of meteorological and oceanographic observations critical to safe navigation is not adequate for current and future marine operations. Of all the challenges to increasing use of the Arctic Ocean, reducing this infrastructure deficit may be the most difficult to deal with, because of the large investments required. The Arctic states and maritime industry must recognise that new public–private funding ventures partnerships will be needed and new schemes for cost recovery of selected infrastructure should be designed. Prioritising hydrographic surveys in response to advancing traffic, addressing icebreaker fleet renewal, defining satellite requirements for enhanced polar communication, and developing an integrated system for monitoring and tracking Arctic ships – these are examples of the tasks ahead for the Arctic states regarding critical marine infrastructure.

AMSA RECOMMENDATIONS

AMSA's 17 recommendations as approved by the Arctic ministers focus on three inter-related themes:

1. Enhancing Arctic Marine Safety
2. Protecting Arctic People and the Environment
3. Building the Arctic Marine Infrastructure.[19]

These themes are fundamental to a multi-faceted response to expanded Arctic marine use and to the investment requirements necessary to achieve enhanced marine safety and environmental protection throughout the Arctic Ocean. The AMSA team noted that implementation of these recommendations might require increased international cooperation, especially at the IMO, and new public–private partnerships. Most of the marine safety recom-

[18] Ibid., p. 155.

[19] 'Recommendations' in ibid., pp. 6–7.

mendations involve the IMO and underline the global nature of the marine industry. Surely the most important is the call for development of uniform and mandatory standards and requirements for ships operating in the Arctic. Related is the move to support augmentation of global IMO ship-safety and pollution-prevention conventions with specific, mandatory requirements for Arctic ship construction, design, equipment, crewing, training and operations. The Arctic states also decided to develop a Search and Rescue instrument, and formed a task force in April 2009 led by the United States and Russia. An aeronautical and maritime Arctic Search and Rescue agreement is to be signed at the May 2011 Ministerial in Nuuk, Greenland. Key recommendations also focused on the Arctic states linking together with unified positions at international organisations, and strengthening passenger-ship safety in Arctic waters.

For the theme Protecting Arctic People and the Environment, the Arctic states recognise the importance of effective communications and engagement with Arctic coastal communities early in all marine transport initiatives. They will also consider conducting surveys of Arctic indigenous marine use, which will be necessary if integrated, multiple-use management schemes are applied to coastal marine areas. Critical issues such as invasive species, oil spills, marine mammal impacts (ship strikes, noise and disturbances), and ship-stack emissions are addressed in the recommendations with a view to involving the IMO and other relevant international organisations. Further, the Arctic states have acknowledged the potential for specially designated Arctic marine areas in need of unique environmental protection measures, e.g. IMO-designated 'special areas' and Particularly Sensitive Sea Areas (PSSAs) consistent with international law.

The Arctic states recognise the critical importance of the recommendations related to the third theme, Building the Arctic Marine Infrastructure, and they focus on development of a comprehensive Arctic marine traffic awareness system to improve monitoring and tracking of marine activities. This effort will require future real-time sharing of ship data (across national boundaries) and enhanced communication systems. Future response capabilities are critical to protecting the unique Arctic marine ecosystem, and the Arctic states are committed to developing a circumpolar pollution response capacity through Arctic-wide and regional agreements. Key AMSA recommendations also note the need to bring Arctic navigation charts to a level acceptable for current and future safe navigation, and greatly enhanced systems for acquiring, analysing and transferring meteorological, oceanographic, sea-ice and iceberg information to a host of new users. Each of these Arctic infrastructure initiatives will require significant and long-term funding.

PERSPECTIVES ON TRANS-ARCTIC NAVIGATION

The AMSA 2009 Report provides an overview of the issues and challenges of trans-Arctic navigation.[20] The AMSA team was careful to focus the assessment on issues related to marine safety and environmental protection, not on the economic viability of various Arctic trade routes, whether across the Northwest Passage, the Northern Sea Route, or even the central Arctic Ocean. The global marine industry will judge the efficiency, reliability, seasonality, and economic viability of potential trans-Arctic trade routes. Marine insurers and ship classification organisations will add to the evaluation of any future trans-Arctic routes. Furthermore, a mandatory polar code of navigation and other measures implemented by the IMO in accordance with international law should be considered applicable to all modes of Arctic navigation, whether they be destinational, intra-Arctic (such as a route between Churchill, Canada, to Murmansk) or perhaps trans-Arctic in the future. The AMSA scenario-creation effort did indicate that the primary mode of marine transport in a future Arctic Ocean is likely to be destinational, with regional traffic related to the offshore development and the carriage of natural resources out of the Arctic.[21] The global demand for natural resources creates the need for new marine transport systems (like the marine shuttle systems of northwest Russia) and results in increasing regional commercial traffic in the Arctic coastal seas.

Key issues to be addressed in viewing the potential of trans-Arctic shipping routes include:

- *The continuing presence of Arctic sea ice.* The central Arctic Ocean and coastal seas will remain fully or partially ice-covered for 9 to 10 months each year. It is likely that 'polar class' or capable ships will be the norm rather than an exception, incurring added expenses to Arctic commercial shippers.
- *The seasonality and reliability of Arctic navigation routes.* If the Arctic Ocean were to be used for trans-Arctic navigation, could the new global routes be economically viable if operated seasonally? How can the new Arctic ships be integrated into a company's global marine operation? There are also questions of reliability of any new routes, given the regional variability of Arctic sea ice and the unpredictability of the weather in these remote regions.

[20] Ibid., pp. 101–105.
[21] Ibid., p. 102.

- *The need for icebreaker convoy or escort.* Many of the new icebreaking carriers are designed to be independently operated, voyaging in ice without the need for icebreaker escort. There are a host of significant economic and safety issues relevant to such future shipping operations. One economic question is the funding of escorting icebreakers and any fee system applied in Arctic waterways.
- *The risks of trans-Arctic navigation.* Long voyages in ice (of perhaps 2000 nautical miles) can potentially increase the risks of ship or cargo damages. Possible schedule disruptions and the lack of marine infrastructure (as a safety net) will surely be factors influencing future marine insurance rates.
- *A trans-shipment option.* The possibility of using trans-shipment ports at the ends of trans-Arctic voyages is one option being explored. In theory, the Arctic icebreaking ships would operate year-round and deliver select cargoes to northern trans-shipment ports in the Atlantic and Pacific oceans.[22]

The integration of trans-Arctic navigation with global shipping routes in the other oceans of the world will be attended by much uncertainty and potentially high operating costs. While crossing the Arctic Ocean may be theoretically possible even today with advanced ice-capable ships, the economic and operational aspects of these routes have not yet been fully explored. Modest volumes of cargo may be shipped trans-Arctic during future summer seasons of navigation, but it is likely that most of the operations will be destinational voyages driven by natural resource development and global demands for key commodities.[23]

A ROADMAP FORWARD

An independent effort by a group of experts, brought together by the University of Alaska, Fairbanks, with the University of the Arctic, has explored the way forward and implementation of the AMSA recommendations. A workshop held in October 2009 (less than six months after the approval and release of AMSA by the Arctic ministers) analysed the AMSA recommendations and provided a roadmap, a set of actions and a list of key issues for each.[24] Also discussed were relevant funding issues related to the need for

[22] Ibid., p. 101. Discussed is a trans-Arctic container vessel shuttle system between ports in Alaska (Aleutian Islands) and Iceland.

[23] L.W. Brigham, 'Think Again: The Arctic', *Foreign Policy*, September-October, 2010, p. 74.

[24] *Considering a Roadmap Forward: the Arctic Marine Shipping Assessment*, University of Alaska Geography Program Arctic Policy Report No. 1, 2010, available at <www.snap.uaf.edu>.

indigenous marine use surveys throughout the Arctic Ocean, closing the huge marine infrastructure deficit, and developing robust oil-spill liability trust funds in the Arctic. Only through public–private partnerships can the last two issues be adequately dealt with. The expert discussions revealed several high priority Arctic policy issues that are critical outcomes of AMSA. These were identified by the workshop experts as the *highest priority* and requiring near-term action:

- A mandatory polar code of navigation developed and implemented by the IMO.
- Full tracking and monitoring of Arctic commercial shipping activity (using the Automatic Identification System or AIS mandated by IMO).
- An Arctic Search and Rescue agreement (preferably to be signed by the Arctic ministers in May 2011).
- Surveys of indigenous marine use (so that the information can be used in marine strategies and decision-making focused on the management of multiple uses in Arctic waterways).
- A circumpolar response capacity agreement among the Arctic states (potentially involving non-Arctic states and focusing on pooling resources and enhancing regional capacities).
- Implementation of an Arctic Observing Network to fill a critical gap in Arctic marine infrastructure. Such a network would support both scientific research and marine operations.

Other high-priority issues included increased hydrography and charting in Arctic waters, enhanced oil spill research and research on mitigation of impacts on marine mammals, protected Arctic marine areas, harmonised best practices for cruise ships operating in Arctic waters, ice navigator competency requirements, full Arctic coverage communications systems, ballast water and invasive species issues, and the application of ecosystem-based management of Arctic coastal regions. The implications of the AMSA recommendations are broad, and the Fairbanks workshop results helped to provide focus and momentum to the critical issues facing the Arctic states, indigenous communities and the marine industry at a time when the marine uses of the Arctic Ocean are evolving at an increasingly rapid pace.

CONCLUSIONS

The Arctic is poised to become increasingly integrated with the global economy. It is highly plausible that Arctic natural resources will be transported by modern carriers to emerging global markets in ever-increasing cargo quantities and numbers of ships. Arctic offshore hydrocarbon developments

– off Alaska in US Arctic waters, off the west coast of Greenland, in the Norwegian Arctic, and in the Barents and Kara Seas of the Russian Arctic – will require support fleets and marine transport systems to carry high-value cargoes out of the Arctic to world markets. The same can be said for hard minerals produced in northwest Alaska and at Norilsk Nickel in western Siberia, and potential developments on Baffin Island for high-grade iron ore and Greenland for various scarce minerals. Russia's Northern Sea Route holds the promise of more domestic-flag and international ship traffic during longer summer seasons of navigation. Again, the primary use of the route will be the carriage of natural resources out of the Russian Arctic to markets in China, Europe and North America. The challenges of these new global connections for the Arctic states and new shippers are many, especially in view of the current lack of Arctic marine infrastructure, and the urgent need for mandatory standards for Arctic ship construction and certification of the ice navigators.

The Arctic Council's Arctic Marine Shipping Assessment represents a key step forward in responding to the new uses of the Arctic Ocean by the global marine industry. The 17 recommendations of this assessment under the broad themes of safety, protection and infrastructure provide a policy framework and strategic guidance to a host of Arctic and non-Arctic stakeholders and actors. Pursing a long-term implementation plan for these broad recommendations will require sustained international cooperation, particularly at the IMO. Facilitating the safe use of the Arctic Ocean while protecting the peoples of the Arctic and the marine environment will be one of the great challenges to the maritime world during the 21st century.

19

The International Maritime Organization and the Protection of the Marine Environment

Jean Claude Sainlos

GLOBAL AND REGIONAL INTERACTION

The primary mandate of the International Maritime Organization (IMO) is the development of universal, globally applicable rules, regulations and standards regarding maritime safety, maritime security and marine environment protection. When it comes to international shipping, the rules and standards which shall apply to ships are those developed by the 'competent international organisation' – the IMO.[1] Since the entry into force of the Convention on the International Maritime Organization (IMO Convention) in 1958,[2] a global regulatory regime has been put in place, consisting of more than 50 conventions and protocols covering maritime safety and security, prevention, reduction and control of pollution (both marine and atmospheric) from ships, liability and compensation, preparedness for and response to maritime accidents, and other issues including facilitation of maritime traffic and salvage. This comprehensive body of international conventions and protocols is supported by hundreds of other measures such as codes, guidelines and recommended practices. Altogether, they regulate almost every aspect of shipping and ship operations, including ship design, construction, equipment, operation, maintenance, manning and eventual disposal: literally, from the drawing board to the scrapyard.

However, as underlined by the IMO Secretary General, the IMO global regime also takes regional conditions into account, as necessary. To this end, some IMO global conventions, in particular those concerning environmental

[1] See Art. 211 of the 1982 United Nations Convention on the Law of the Sea (LOS Convention).
[2] The convention was done in Geneva, on 6 March 1948; see text at <http://treaties.un.org/doc/Treaties/1958/03/19580317%2005-05%20PM/Ch_XII_1p.pdf>.

issues, provide for special measures, or more stringent measures, in certain regions due to their environmental characteristics. In addition, the Particularly Sensitive Sea Area (PSSA) mechanism allows specific measures to apply in designated areas that need special protection.

For the global regime to be effectively implemented, and in some cases for the specific regional measures to be developed and promulgated, the IMO encourages and supports regional cooperation. Although the work of the organisation has demonstrated that international standards developed, agreed, implemented and enforced *universally* are the only effective way to regulate such a diverse and truly international industry as shipping, there are still attempts for regional or unilateral measures. The main reasons behind that trend are: the political pressure following a major maritime accident; the temptation for regional organisations/agreements (environmental ones in particular) to develop their own, regionally-tailored measures to protect their specific regional marine environments from shipping activities seen as a threat; and, above all, very often poor or limited knowledge of the IMO regulatory regime and procedures, with sometimes the belief that they can do better and faster than the IMO.

The purpose of this chapter is to provide insight into how the IMO global regime works and interacts with the regional concerns in the field of marine environment protection. We begin by recalling the basic principles behind the primary IMO mandate of developing universal standards, explaining the methods of work of the organisation and its ability to respond quickly and effectively to emerging issues. Secondly, a brief overview is provided of the specific measures addressing regional concerns contained in global conventions and the mechanisms for the designation of special areas and particularly sensitive sea areas. Thirdly, some IMO initiatives regarding regional cooperation are presented.

PRIMARY MANDATE OF THE IMO: DEVELOPING UNIVERSAL STANDARDS

The main purposes of the IMO, as a specialised agency of the United Nations, are

> to provide machinery for co-operation among Governments in the field of governmental regulation and practices relating to technical matters of all kinds affecting shipping engaged in international trade; and to encourage and facilitate the general adoption of the highest practicable standards in matters concerning maritime safety, efficiency of navigation and prevention and control of marine pollution from ships.[3]

[3] Art. 1 of the IMO Convention.

The IMO is also empowered to deal with administrative and legal matters related to these purposes. As its influence has grown, the organisation has also taken on major responsibility for the security of ships and port facilities, and for the provision of technical assistance to developing countries to build up their maritime capacities.

In the 1950s, each shipping nation had its own maritime laws. There were comparatively few international treaties, and those that existed were not accepted or implemented by all maritime states. In consequence, standards and requirements varied considerably and were sometimes even contradictory. It was generally understood that this situation was damaging to shipping safety. Not only were standards different in content, some were also more stringent than others. Ship-owners who spent relatively little money on safety had an economic advantage over their more conscientious rivals, and this was a threat to any serious attempt to improve shipping safety. One of the most important early tasks allocated to the IMO was to develop international standards which would replace the multiplicity of national legislations existing at the time.

The conventions and other standards developed by the IMO have transformed that initial situation. Many of the main IMO treaties have been ratified by states that are, collectively, responsible for more than 98 per cent of the world's fleet. It is because of the extensive network of global regulations that the IMO has developed and adopted over the several decades that we can say that shipping is a today safe and secure mode of transport, comparatively clean and environmentally friendly, and highly energy-efficient.

Wide Acceptance of IMO Standards

There are several reasons for the wide acceptance of the IMO instruments. For one thing, the measures themselves are recognised as being sensible and practical as well as of high standard. Their strength derives from *broad expert participation*. The measures are the result of the tremendous technical work carried out by the best maritime expertise available in government delegations and in the industries taking part in IMO bodies and meetings. At the IMO, all the interested parties contribute to the decision-making process. Not only do the member governments send their top experts to IMO technical meetings, the process also benefits from the contribution of specialists from non-governmental organisations (NGOs) and international organisations (IGOs). Representing all sectors of the industry, as well as other civil-society and geographical interests, these organisations play an active role in the work of the IMO. The fact that IMO measures have such a detailed and

appropriate technical content is due, in no small measure, to the expert input of these various NGOs and IGOs.

Whenever possible, the IMO acts on a *consensus* basis, with conventions and other measures normally being adopted unanimously, usually without a formal vote. There is, of course, a voting procedure, but it is very rarely employed in the normal course of IMO business. In this way, the natural reluctance a party might feel at being asked to implement measures that it might not have accepted fully in the first place is circumvented.

The IMO measures are mandatory in so many countries that it is now *commercially important* for ships to conform to them. If ships are not built and equipped according to IMO standards it may be impossible to operate them internationally. It is in order to discourage discriminatory action, in line with the principle of universality in the regulation of shipping, and to embed a 'level playing field' philosophy, that the 'no-more-favourable treatment' clause was introduced in all major IMO conventions. That clause is combined with a vigorous port-state control policy, to neutralise any benefits that ships flying the flag of a non-party state might hope to derive; at the same time, it renders the exodus of ships from party state to non-party state flags meaningless.

The *compliance control* mechanisms built up in IMO conventions through surveys, certifications and inspections (by flag states and port states) make it increasingly more difficult for substandard ships to escape detection. In particular, this is due to port-state control inspections which are now being carried out increasingly rigorously.

IMO conventions and codes often have a wider impact than the statistics might indicate. A large part of the shipping industry and of the ship-owners who participate and follow the work of the organisation *anticipates* the IMO measures. During the 1970s most tankers were constructed according to the standards laid down in MARPOL, even though that convention was not yet in force at the time. And today, new ships under construction are constructed according to standards laid down into recently adopted conventions, although those are not yet into force.

The fact that the IMO has, over the years, been able to adopt a wide range of measures to prevent and control pollution caused by ships and to mitigate the effects of related damage is proof of the determination of governments and the industry to reduce, to the minimum, the impacts that shipping may have on the marine environment.

However, there are serious concerns about the slow pace of ratification of the IMO's environment-related conventions recently adopted. It took almost eight years for MARPOL Annex VI to achieve its criteria for entry into force. The 2004 Ballast Water Convention is not yet in force; and the 2001

International Convention on the Control of Harmful Anti-fouling Systems on Ships entered into force in September 2008, seven years after its adoption.[4]

There are two key concerns here. First, if instruments are not brought into force reasonably soon after their adoption, implementation may be delayed, to the detriment of the environment. And second, any delay in tackling the issues regulated by these instruments may motivate individual countries or groups of countries to develop unilateral or regional measures, with all the attendant negative repercussions such actions may entail.

Coping with Changes

The shipping industry has changed more dramatically in the last fifty years than in any other period in history. In 1959, when the IMO became operational, the world of shipping was not very different from the one that had existed twenty years previously. Since then, shipping has undergone a revolution. Globalisation has transformed international trade, and new powers have emerged in shipping.

According to the shipping market analyst Fearnleys, world seaborne trade rose from around 13,850 billion tonne-miles to some 30,680 billion tonne-miles in the twenty years between 1986 and 2006 – an increase of around 121 per cent.[5] The carriage of oil and petroleum products accounted for a significant part of this increase.

There are now many more type of ships and specialised ships. New technologies and techniques have been developed. The average age of ships has increased steadily until it is now around 15 years. This has implications for safety and the environment, because old ships tend to be more vulnerable to corrosion and breakdown than new ones, making the implementation of high standards increasingly essential.

The IMO has continually adjusted its regulatory regime not only to technical developments within the shipping industry, but also to the evolving demands and expectations of the maritime sector. IMO conventions are under continuous review by the relevant IMO Committees which amend them as necessary, so as to keep them up to date, including incorporation of the most recent technological developments.

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[4] For the status of IMO conventions, see the document *Status of Multilateral Conventions and Instruments in Respect of which the International Maritime Organization or its Secretary-General Performs Depositary or Other Functions*, updated monthly, and available at the IMO website, <www.imo.org>.

[5] IMO, *International Shipping and World Trade: Facts and Figures*, Maritime Knowledge Centre, October 2009, p. 25; available at <www.imo.org>.

An example of such a policy was a comprehensive review by the IMO of the Annex VI of MARPOL on air pollution and its associated technical code IMO agreeing, just two months after entry into force in July 2005. That was prompted by the need to take account of experience gained as well as improvements in engine and fuel technology and to further reduce emissions from ships. As a result of that review process, in 2008 the Marine Environment Protection Committee (MEPC) of the IMO adopted amendments to Annex VI, which entered into force in 2010.

We should also recall that all MARPOL Annexes have recently been significantly revised (in particular Annexes II, III, V and VI),[6] coping with the changes and making the MARPOL convention a modern and updated instrument.

These changes have undoubtedly made the work of the IMO more complex, but at the same time more necessary. It is difficult to see how international shipping standards could have been introduced and adapted to meet these changes so quickly and effectively without the existence of a permanent forum such as the IMO.

Responding to Emerging Environmental Challenges

The IMO agenda is driven by the major concerns of the time. In recent years, its environmental work has covered a broad variety of issues, from air quality to the microscopic aquatic life forms transported around the world in ships' ballast water. Among the main emerging environmental issues recently or currently addressed are the following:

Control of harmful anti-fouling systems on ships

The 2001 International Convention on the Control of Harmful Anti-Fouling Systems on Ships (AFS Convention) entered into force on 17 September 2008. Several guidelines for its implementation have been adopted,[7] and a

[6] MARPOL Annexes are: Annex I, Regulations for the prevention of pollution by oil; Annex II, Regulations for the control of pollution by noxious and liquid substances in bulk; Annex III, Regulations for the prevention of pollution by harmful substances carried by sea in packaged form; Annex IV, Regulations for the prevention of the pollution by sewage from ships; Annex V, Regulations for the prevention of the pollution by garbage from ships; and Annex VI, Regulations for the prevention of air pollution from ships. In particular, most recent revisions related to Annex II (adopted by MEPC 61 on 1 October 2010 and expected to enter into force on 1 January 2014) and Annex V (approved by MEPC 61 and expected to be adopted by MEPC 62 in July 2011).

[7] Guidelines for survey and certification of anti-fouling systems on ships – adopted by resolution MEPC.102(48); Guidelines for brief sampling of anti-fouling systems on ships – adopted by resolution MEPC.104(49); and Guidelines for inspection of anti-fouling systems on ships – adopted by resolution MEPC.105(49).

guidance on best management practices for removal of anti-fouling systems from ships, including TBT hull paints has been adopted by MEPC 59 in July 2009.[8]

Control of transfer of harmful aquatic organisms and pathogens through ships' ballast water and sediment

The transfer of aquatic organisms through ships' ballast water into alien ecosystems can cause immense ecological and economic damage. The 2004 Ballast Water Convention has not yet entered into force; however, the MEPC has adopted a package of 14 guidelines aimed at assisting countries in implementing the new Convention. The MEPC meeting in October 2010 gave final approval to six ballast-water management systems that make use of active substances, bringing the total number of systems with final approval to 18. These recent developments should encourage IMO member states to ratify the Ballast Water Convention.[9]

Air pollution from ships

The revised MARPOL Annex VI and the associated NOx Technical Code were adopted by the MEPC in October 2008 and entered into force on 1 July 2010, under the 'tacit acceptance' amendment procedure. The main changes to MARPOL Annex VI relate to a significant progressive reduction in emissions of sulphur oxide (SOx) and nitrogen oxide (NOx) emissions from marine engines and particulate matter from ships, and a reduction of the limits applicable in Emission Control Areas (ECAs). The revised Annex VI will allow, in certain circumstances, for ECAs to be designated for SOx and particulate matter, or NOx, or for all three types of emissions from ships.

Emission of greenhouse gases from ships

Since Annex VI does not cover emissions of greenhouse gases from ships, the IMO has also initiated work on this matter. This work is based on the mandate that the organisation has, through its constitutive Convention and the UN Framework Convention on Climate Change, as well as the Kyoto Protocol, to pursue the limitation or reduction of emissions of greenhouse gases from ships. The IMO has adopted an action plan and is working towards the development and adoption of a regime that will regulate shipping at the global level and contribute to the reduction of greenhouse gases emissions. That is definitely the most important topic currently on the IMO

[8] The guidance has been disseminated as AFS.3/Circ.3.

[9] For further discussion on aspects of the Ballast Water Convention, see Vidas and Markovčić Kostelac, chapter 21 in this book.

agenda, and may have important consequences for the future of the organisation.

Recycling of ships

Ship recycling also has become a growing concern, not only from the environmental point of view but also with regard to the occupational health and safety of workers in the recycling industry. The IMO International Convention for the Safe and Environmentally Sound Recycling of Ships was done at Hong Kong on 15 May 2009, but is not yet in force.

Other issues

Due to the increasing attention to the risk of ship strikes with cetaceans, the IMO is developing a 'Guidance document for minimizing the risk of the ship strikes with cetaceans'. Another important recent issue is noise from commercial shipping.[10] At its October 2008 session the MEPC decided to include a new item on the committee agenda, on 'noise from commercial shipping and its adverse impacts on marine life'.

Responding to Emergencies

The world's major oil pollution disasters have proved to be among the greatest challenges the IMO has had to face, with demands for rapid actions from politicians, press and the public. It was major oil pollution incidents such as the *Torrey Canyon*, *Amoco Cadiz*, *Exxon Valdez*, *Erika* and *Prestige* that prompted the IMO to react immediately and adopt new regulations or amend existing ones. An important package of measures followed most of those incidents, the adoption of the double-hull mandatory requirement being a notable example.

It was the accident of the oil tanker *Exxon Valdez* in March 1989 that led to one of the most important changes to Annex I of the MARPOL Convention since the adoption of the 1978 Protocol. The *Exxon Valdez* was the largest crude oil spill in US waters and probably the one to gain the greatest media coverage, with US public opinion demanding urgent action.

The US Oil Pollution Act of 1990 (OPA 90) made it mandatory for all oil tankers calling at US ports to have double hulls. The USA also submitted to the IMO a proposal for making double hulls mandatory under MARPOL Annex I.

[10] For further discussion on the issue of underwater noise, see Papanicolopulu, chapter 24 in this book.

In 1991 a major comparative study of the performances of the double-hull and mid-height deck tanker designs was carried out by the IMO. The conclusions, reached in January 1992, were that the two designs could be considered equivalent, although each provides better or worse outflow performance under certain conditions. The MEPC agreed to make double hulls or alternative designs mandatory, provided that such methods would ensure the same level of protection against pollution in the event of a collision or stranding. The amendments to MARPOL Annex I introducing double hulls (or an alternative) were adopted in March 1992 and entered into force in July 1993.

On 12 December 1999 the oil tanker *Erika* broke in two off the coast of Brittany. As a result of the *Erika* disaster, proposals were submitted to the MEPC to accelerate the phase-out of single-hull tankers contained in the 1992 MARPOL Annex I amendments. The amendments to Regulation 13G in Annex I of MARPOL were adopted by the MEPC in April 2001 and entered into force in September 2002.

The *Prestige* tanker incident of November 2002 led to calls for further changes to MARPOL Annex I. The MEPC agreed to hold an extra session, convened in December 2003, to consider the adoption of proposals for an accelerated phase-out scheme for single-hull tankers, along with other measures, including extended application of the Condition Assessment Scheme (CAS) for tankers. The amendments were adopted on 4 December 2003 and entered into force in April 2005. A new MARPOL regulation was also adopted regarding the prevention of oil pollution from oil tankers carrying heavy-grade oil: a ban on the carriage of heavy-grade oil in single-hull tankers of 5,000 tons dwt and above, after the date of entry into force of the regulation (5 April 2005), and in single-hull oil tankers of 600 tons dwt and above, but less than 5,000 tons dwt, no later than the anniversary of their delivery date in 2008.

The IMO has shown itself to be an effective regulatory body and has developed mechanisms for meeting emergencies effectively and swiftly. But the best way of dealing with an emergency is not always to introduce more regulations, especially if the emergency resulted from existing regulations being ignored. Moreover, some actions taken as a result of an emergency may prove to be over-hasty in the long run.

Responding Swiftly

Effective and swift responses to emergencies and emerging issues, as well as coping with the changes, have been made possible by the existence of the IMO as a permanent body, its methods of work (involving all the interested parties in the decision-making process) and its procedures. The organisation

has streamlined its procedures over the years, so that changes to regulations affecting virtually every ship in the world can be made within months.

In the 1960s, IMO conventions could be modified only by an amendment procedure that required the positive acceptance of proposed changes by at least two-thirds of the parties to a convention. In practice this procedure proved so cumbersome that most amendments never received the acceptances required to enter into force, while those that did were often outdated already before entering into force.

In the early 1970s, therefore, the IMO adopted a new amendment system known as 'tacit acceptance'. Instead of an amendment entering into force only after being expressly accepted by a specified number of parties, it was assumed that the amendment would automatically enter into force on an agreed date unless it was expressly *rejected* by a specified number of parties. Because of the consensus approach used by the IMO when adopting measures, this system was approved, and has now been incorporated into most technical instruments of the organisation.

Tacit acceptance has helped, but the main reason for the IMO's success in acting quickly is the sense of urgency displayed by its member states. The time for bringing MARPOL amendments into force under tacit acceptance is 16 months; once in force, these apply to more than 98 per cent of world tonnage.

The reaction of the IMO to major emergencies certainly compares favourably with other international responses. For example, in the case of *Prestige*, which occurred in November 2002, Spain in July 2003 introduced a submission for amendments to MARPOL Annex I to the MEPC; the amendments were adopted in December 2003 and entered into force in April 2005.

ADDRESSING REGIONAL CONCERNS

While advocating a global approach, the IMO nevertheless recognises that some areas need protection over and above that sought under regular circumstances. To this end, MARPOL defines certain sea areas as 'Special Areas', where the adoption of special mandatory measures for the prevention of sea pollution is required, so that such areas are provided with a higher level of protection. Also, the Ballast Water Convention provides for the designation of 'ballast water exchange areas' in sea areas which do not meet the distance and depth parameters set in that convention, as well as the establishment of 'special requirements in certain areas'.[11] Such designations and measures are

[11] See Annex to the Ballast Water Convention, Section C, 'Special Requirements in Certain Areas'. See further discussion by Vidas and Markovčić Kostelac, chapter 21 in this book.

to be made in consultation with adjacent or other interested states. Further, the IMO has adopted criteria for the identification and designation of 'Particularly Sensitive Sea Areas', deemed to require an even higher degree of protection because of their particular significance for ecological or socio-economic or scientific reasons, and because they may be vulnerable to damage by maritime activities.

Special Areas under MARPOL

MARPOL Annex I (Prevention of pollution by oil), Annex II (Control of pollution by noxious liquid substances) and Annex V (Prevention of pollution by garbage from ships), define certain sea areas as 'Special Areas' in which, for technical reasons relating to their oceanographical and ecological conditions and their sea traffic, more stringent requirements for the prevention of sea pollution are mandated. Under MARPOL, these Special Areas are provided with a higher level of protection from operational discharges than other sea areas.

A Special Area may encompass the maritime zones of several states, or even an entire enclosed or semi-enclosed area. Special Area designation should be made on the basis of the criteria and characteristics listed in the Guidelines for the Designation of Special Areas under MARPOL,[12] to avoid unnecessary proliferation of such areas. A proposal to designate a given sea area as a Special Area should be submitted to the Marine Environment Protection Committee. The Guidelines describes the procedures to be followed for the designation of a Special Area.

While the rigorous discharge requirements for many Special Areas under MARPOL Annexes I and V have taken effect, others have not. Until the parties to MARPOL bordering those Special Areas have informed the MEPC that there are adequate reception facilities in their Special Areas, the Committee cannot establish a date for the discharge requirements of those Special Areas to take effect.

For example, the MEPC in October 2006 adopted an amendment to MARPOL Annex I establishing the 'Southern South African waters' as a Special Area; that amendment entered into force on 1 March 2008. Taking into account the information provided by South Africa to MEPC in March 2006 regarding the adequate reception facilities in that area, MEPC in July 2007 adopted a resolution establishing 1 August 2008 as the date on which the discharge requirements were to take effect for the Special Area of the Southern South African waters. Recognising that the new discharge require-

[12] Resolution A.927 (22) adopted on 29 November 2001.

ments for these Special Areas can take formal effect only from 1 August 2008, the MEPC invited parties to MARPOL to encourage the shipping industry, and tanker operators in particular, to comply with them voluntarily, with immediate effect.

In another example, the MEPC in March 2008 agreed to set the date of 1 May 2009 from which the discharge requirements in respect of the Mediterranean Sea area (as a Special Area under MARPOL Annex V) were to take effect. The move followed discussion of a submission from the Mediterranean coastal states introduced by the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC), declaring that adequate reception facilities for wastes, as required by MARPOL Annex V, are available and cover the relevant ports within the region.

The Antarctic Area is a Special Area under MARPOL Annexes I, II and V. With respect to Annex V (Prevention of pollution by garbage from ships), the area covered lies south of 60° S latitude. This means that discharges of oily wastes and any discharge into the sea of noxious liquid substances or mixtures containing such substances are prohibited there. Under Annex V, the countries from whose ports ships depart en route to or arrive from the Antarctic area undertake to ensure that adequate facilities are provided for the reception of all garbage from all ships, without causing undue delay, and according to the needs of the ships using them. The flag states are obliged to ensure that all ships entitled to fly their flag, before entering the Antarctic area, have sufficient capacity on board for the retention of all garbage while operating in the area and have concluded arrangements for discharging such garbage at a reception facility after leaving the area.

MARPOL Annex VI (Regulations for the prevention of air pollution from ships) establishes SOx Emission Control Areas with more stringent controls on sulphur emissions. The recently adopted revised Annex VI will allow for an Emission Control Area to be designated for SOx and particulate matter, or NOx, or all three types of emissions from ships, subject to a proposal from a party or parties to that Annex, which would be considered for adoption by the IMO if supported by a demonstrated need to prevent, reduce and control one or all three of those emissions from ships. The Annex defines an 'Emission Control Area' as an area where the adoption of special mandatory measures for emissions from ships is required to prevent, reduce and control air pollution from NOx or SOx and particulate matter or all three types of emissions and their attendant adverse impacts on human health and the environment. An Emission Control Area is any sea area, including any port area, designated by the IMO in accordance with the criteria and procedures set forth in Appendix III to Annex VI.

Over the years, several Special Areas have been established under MARPOL Annexes I, II and V. In addition, two Emission Control Areas (the Baltic Sea area and the North Sea) have been established under MARPOL Annex VI. A summary of these areas, and their current status (as of 31 January 2011), is provided in Table 19.1.

Table 19.1 Special Areas: adoption, entry into force and date of taking effect

Special Area	**Date of adoption**	**Date of entry into force**	**In effect from**
Annex I: Oil			
Mediterranean Sea	2 Nov 1973	2 Oct 1983	2 Oct 1983
Baltic Sea	2 Nov 1973	2 Oct 1983	2 Oct 1983
Black Sea	2 Nov 1973	2 Oct 1983	2 Oct 1983
Red Sea	2 Nov 1973	2 Oct 1983	*
'Gulfs' area	2 Nov 1973	2 Oct 1983	1 Aug 2008
Gulf of Aden	1 Dec 1987	1 Apr 1989	*
Antarctic area	16 Nov 1990	17 Mar 1992	17 Mar 1992
North-west European Waters	25 Sept 1997	1 Feb 1999	1 Aug 1999
Oman area of the Arabian Sea	15 Oct 2004	1 Jan 2007	*
Southern South African waters	13 Oct 2006	1 Mar 2008	1 Aug 2008
Annex II: Noxious Liquid Substances			
Antarctic area	30 Oct 1992	1 July 1994	1 July 1994
Annex V: Garbage			
Mediterranean Sea	2 Nov 1973	31 Dec 1988	1 May 2009
Baltic Sea	2 Nov 1973	31 Dec 1988	1 Oct 1989
Black Sea	2 Nov 1973	31 Dec 1988	*
Red Sea	2 Nov 1973	31 Dec 1988	*
'Gulfs' area	2 Nov 1973	31 Dec 1988	1 Aug 2008
North Sea	17 Oct 1989	18 Feb 1991	18 Feb 1991

Special Area	Date of adoption	Date of entry into force	In effect from
Antarctic area (south of 60° S latitude)	16 Nov 1990	17 Mar 1992	17 Mar 1992
Wider Caribbean region including the Gulf of Mexico and the Caribbean Sea	4 July 1991	4 Apr 1993	1 May 2011
Annex VI: Prevention of air pollution by ships (SOx Emission Control Areas)			
Baltic Sea	26 Sept 1997	19 May 2005	19 May 2006
North Sea	22 July 2005	22 Nov 2006	22 Nov 2007
North American (SOx and NOx)	26 Mar 2010	1 Aug 2011	1 Aug 2012

* The Special Area requirements for these areas have not yet taken effect because of lack of notifications from MARPOL parties whose coastlines border the relevant special areas on the existence of adequate reception facilities (Regulations 38.6 of MARPOL Annex I and 5.4 of MARPOL Annex V). Source of Table: International Maritime Organization, <www.imo.org>.

Protecting the Antarctic and Arctic Areas from Shipping

In March 2006, a submission raising concerns about the increased number and type of vessels operating in the Antarctic area, and recent incidents involving ships in distress in the area, was put forward to the IMO. The MEPC noted the suggestion that, since that the Antarctic area was a Special Area under MARPOL Annexes I, II and V, the IMO might consider the following: addressing strengthening the standards of ice vessel; banning use of heavy grade fuel oils; addressing concerns over discharges of oily substances, sewage, grey water and waste; addressing the introduction of alien species through ballast water, hull-fouling and other pathways; and establishing a vessel traffic monitoring and information system for vessels operating in the Antarctic area.[13]

Ships operating in the Arctic environment are exposed to various unique risks. Poor weather conditions and the relative lack of good charts, communications systems and other navigational aids pose challenges for mariners. The remoteness of the areas makes rescue or clean-up operations difficult

[13] Member governments were invited to submit relevant proposals to future meetings of the MEPC, and also to the Sub-Committee on Bulk Liquids and Gases (BLG). The work program of BLG included 'Amendments to MARPOL Annex I on the use and carriage of heavy grade oil (HGO) on ships in the Antarctic area'.

and costly. Cold temperatures may reduce the effectiveness of numerous components of the ship, ranging from deck machinery and emergency equipment to sea suctions. When ice is present, it can impose additional loads on the hull, propulsion system and appendages. To assist in responding to those problems the IMO has approved a set of guidelines for ships operating in Arctic ice-covered waters.[14]

These guidelines are intended to address those additional provisions deemed necessary for consideration beyond existing requirements of the International Convention for the Safety of Life at Sea (SOLAS), in order to take into account the climatic conditions of Arctic ice-covered waters and to meet appropriate standards of maritime safety and pollution prevention. The Guidelines aim to promote the safety of navigation and to prevent pollution from ship operations in Arctic ice-covered waters, and are currently recommendatory.

Not all ships which enter the Arctic environment will be able to navigate safely in all areas at all times of the year. A system of Polar Classes has therefore been developed to designate different levels of capability. In parallel to the development of the Guidelines, the International Association of Classification Societies (IACS) has developed a set of 'Unified Requirements' which, in addition to general classification society rules, address all essential aspects of construction for ships of Polar Class.

Meanwhile, the IMO Sub-Committee on Ship Design and Equipment, at its session in March 2007, commenced work on developing amendments to the Guidelines for ships operating in Arctic ice-covered waters, to make them applicable to ships operating in the Antarctic Treaty area as well.

In addition to the inclusion of provisions relating to operation of ships in the Antarctic region, it was agreed that the Guidelines needed to be generally updated in order to take into account technical developments since their approval in 2002, especially with regard to damage stability, double bottoms and the carriage of pollutants in spaces adjacent to the outer hull. The update should also consider the particularities of the Southern Hemisphere with regard to environmental and port-state control issues and should take account of the IACS Unified Requirements for polar ships and the Finnish ice navigation rules. Moreover, the view was expressed in the Sub-Committee on Ship Design and Equipment that special consideration should be given to passenger ships that visit the polar regions only in summer.

[14] IMO doc. MSC/Circ.1056/MEPC/Circ.399, December 2002.

Ballast Water Management Areas

Regulation A-2 of the Ballast Water Convention requires that discharge of ballast water shall be conducted only through 'Ballast Water Management' in accordance with the provisions of the Annex to the Convention (200 nautical miles distance, 200 meters depth).[15] Regulation B-4.2 of the Convention stipulates that in sea areas where the distance from the nearest land or the depth does not meet the parameters described in Regulation B-4.1, the port state may designate areas, in consultation with adjacent or other states, as appropriate, where a ship may conduct ballast water exchange.[16]

In October 2004, MEPC identified the need for additional guidance on the designation of areas for ballast water exchange. At its session in October 2006, MEPC adopted the Guidelines on designation of areas for ballast water exchange (G14). The purpose of these Guidelines is to provide guidance to port states for the identification, assessment and designation of sea areas where ships may conduct ballast water exchange in accordance with Regulation B-4.2.

The port state should consult with adjacent or other states, as appropriate, when identifying, assessing and designating potential areas for ballast water exchange. If multiple parties wish to designate ballast water exchange areas jointly, they could do so through a regional agreement.[17]

The location and size offering the least risk to the aquatic environment, human health, property or resources should be selected for designation. The spatial limits of the ballast water exchange area should be clearly defined and be in accordance with international law. It may also be possible for the designation of a ballast water exchange area to apply over specified timeframes, and these should be clearly defined.

A party or parties intending to designate areas for ballast water exchange under Regulation B-4.2 should communicate this intention to the IMO prior to implementing the designated exchange area. The IMO shall circulate information regarding designated ballast water exchange areas to its members. The port states should provide adequate advice to ships on the location and terms of use of the areas designated for ballast water exchange.

The use of the designated ballast water exchange area and any impacts on the aquatic environment, human health, property or resources of the port state or those of other states should be monitored and reviewed on a regular basis. Furthermore, in certain areas, if a party, individually or jointly with

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[15] Ballast Water Convention, Regulation B-4.1.

[16] As to specific situation of enclosed/semi-enclosed seas, see discussion by Vidas and Markovčić Kostelac, chapter 21 in this book.

[17] See Art. 13(3) of the Ballast Water Convention.

other parties, determines that additional measures are necessary to prevent, reduce or eliminate the transfer of harmful aquatic organisms and pathogens through ships' ballast water and sediments, such party or parties may, consistent with international law and following a specific described procedure, require ships to meet a specified standard or requirement.

Particularly Sensitive Sea Areas

A PSSA is an area that needs special protection through IMO action because of its significance for recognised ecological, socio-economic, or scientific attributes, where such attributes may be vulnerable to damage by international shipping activities. At the time of designation of a PSSA, one or more associated protective measures, which meet the requirements of the appropriate legal instrument establishing such measure, must have been approved or adopted by the IMO to prevent, reduce, or eliminate the threat or identified vulnerability.

The IMO is the only international body responsible for designating marine areas as Particularly Sensitive Sea Areas and adopting associated protective measures. An application to the IMO for designation of a PSSA and the adoption of associated protective measures, or an amendment thereto, may be submitted only by an IMO member state. Where two or more member states have a common interest in a particular area, they should formulate a coordinated proposal containing integrated measures and procedures for cooperation between the jurisdictions of the proposing states.

The IMO has adopted and revised a set of guidelines for the identification and designation of Particularly Sensitive Sea Areas, aimed at providing guidance to member states in the formulation and submission of applications, and establishing the procedures for designation of PSSAs. The first set of PSSA guidelines was adopted in 1991 and subsequently revised in 1999, 2001 and 2005.[18] The latest revision was undertaken in response to the requests for more clarity and strengthening of procedure expressed by several member states following the designation of the Western European Waters as a PSSA in 2004.

Member states wishing the IMO to designate a PSSA should submit an application to MEPC based on the criteria outlined in the guidelines, provide information pertaining to the vulnerability of this area to damage from international shipping activities and include the proposed associated protective

[18] The current revised Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas were adopted by the IMO Assembly at its 24th session in December 2005; see Resolution A.982(24).

measures for preventing, reducing or eliminating the identified vulnerability. Applications should be submitted in accordance with the procedures set forth in the guidelines and the rules adopted by the IMO for submission of documents. In preparing its submission, a member state may request technical assistance from the organisation.

Associated protective measures for PSSAs are limited to actions that are to be, or have been, approved or adopted by the IMO. They include the following options:

- designation of an area as a Special Area under MARPOL;
- adoption of ships' routeing and reporting systems near or in the area;
- installation of Vessel Traffic Services (VTS);
- other measures aimed at protecting specific sea areas against environmental damage from ships, provided that they have an identified legal basis in an IMO instrument.

When a PSSA receives final designation, all associated protective measures should be identified on charts in accordance with the symbols and methods of the International Hydrographic Organisation. Member states should ensure that any associated protective measure is implemented in accordance with international law as reflected in the UN Convention on the Law of the Sea. They should ensure that ships flying their flag comply with the associated protective measures adopted to protect the designated PSSA.

PSSAs, when adopted with due sense of proportionality and after careful consideration of the environmental attributes of a particular area or region, and with special ship-routeing and other relevant measures accompanying them, have the potential to contribute substantially to a higher degree of protection and preservation of the environment.

Table 19.2 PSSAs designated by the IMO

PSSA	Proposing country or countries	Designation year
Great Barrier Reef	Australia	1990
Sabana-Camagüey Archipelago	Cuba	1997
Malpelo Island	Colombia	2002
Sea around the Florida Keys	USA	2002
Wadden Sea	Denmark, Germany, Netherlands	2002
Paracas National Reserve	Peru	2003
Western European Atlantic Waters	Belgium, France, Ireland, Portugal, Spain, the United Kingdom	2004

PSSA	Proposing country or countries	Designation year
Torres Strait (extension of the existing Great Barrier Reef PSSA)	Australia, Papua New Guinea	2005
Canary Islands	Spain	2005
Galapagos Archipelago	Ecuador	2005
Baltic Sea area (except Russian waters)	Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Sweden	2005
Papahānaumokuākea Marine National Monument	USA	2007

SUPPORTING REGIONAL COOPERATION

Adopting conventions, codes and recommendations is important, but the key point is their enforcement. This is the responsibility of member states and not the IMO. In that respect, regional cooperation is a way for strengthening effective implementation and enforcement of the IMO global regime. Supporting regional cooperation is an important element of IMO policy. Several IMO conventions call for regional cooperation, while the IMO Sub-Committee on Flag State Implementation encourages the development of regional port-state control regimes and provides for a technical cooperation programme.

Conventions Calling for Regional Cooperation

OPRC Convention/HNS Protocol

The International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) was adopted in November 1990 in the aftermath of the *Exxon Valdez* oil tanker accident. The Convention entered into force in May 1995.

In 2000, the IMO adopted the Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances (OPRC-HNS Protocol) which follows the principles of the OPRC for hazardous and noxious substances other than oil. The Protocol entered into force in June 2007.

Both instruments are designed to facilitate international cooperation and mutual assistance in preparing for and responding to a major pollution incident by oil or by hazardous and noxious substances and to encourage states to develop and maintain an adequate capability to deal with pollution emergencies.

The OPRC and the HNS protocol strongly encourage regional cooperation, and both have an article on the promotion of bilateral and multilateral cooperation in preparedness and response, providing: 'Parties shall endeavour to conclude bilateral or multilateral agreements for pollution preparedness and response'.[19] In several places in those two instruments, reference is made to regional agreements, regional systems and regional organisations.

The OPRC has been the basis for developing and strengthening regional cooperation in preparedness and response to accidental pollution. This activity benefits the support of the OPRC Technical Group, which is a subsidiary body of the MEPC.

The Ballast Water Convention

In order to further the objectives of the Ballast Water Convention, parties with shared interests in protecting the environment, human health, property and resources in a given area – in particular, those parties bordering enclosed and semi-enclosed seas – are strongly encouraged under Article 13(3) of the Convention to enhance regional cooperation, including through the conclusion of regional agreements consistent with the Convention.

The Guidelines on designation of areas for ballast water exchange (G14) recommend that several parties wishing to jointly designate ballast water exchange areas could do so under Article 13(3) of the Convention through a regional agreement. According to Article 13(3), parties shall seek to cooperate with the parties to regional agreements in order to develop harmonised procedures.

Regional Port State Control Regimes

The major IMO technical conventions contain provisions for ships to be inspected when they visit foreign ports, to ensure that they meet IMO requirements. **'**Port-state control' refers to the inspection of foreign ships in national ports to verify that the condition of the ship and its equipment comply with the requirements of international regulations and that the ship is manned and operated in compliance with these rules.

These inspections were originally intended as a back-up to flag-state implementation and under the no-more-favourable-treatment clause to ensure that ships flying the flag of a non-party comply with the requirements of applicable IMO conventions. Experience has shown that such inspections can be extremely effective, especially if organised on a regional basis. A ship going to a port in one country will normally visit other countries in the

[19] Art. 10 of the OPRC, and Art. 8 of the OPRC-HNS Protocol.

region before embarking on its return voyage, and it is to the advantage of all if inspections can be closely coordinated. This ensures that as many ships as possible are inspected, while also preventing ships being delayed by unnecessary inspections. Primary responsibility for ship standards rests with the flag state - but port-state control provides a safety net to catch substandard ships.

The IMO has established a Sub-Committee on Flag State Implementation to assist member governments in implementing conventions and other instruments which they have ratified. It is mainly through this sub-committee that the IMO has encouraged the establishment of and is supporting regional port-state control organisations and agreements on port-state control. Memoranda of Understanding (MOUs) on port-state control have been signed covering all of the world's oceans:

- Europe and the North Atlantic (Paris MOU)
- Asia and the Pacific (Tokyo MOU)
- Latin America (Acuerdo de Viña del Mar)
- Caribbean (Caribbean MOU)
- West and Central Africa (Abuja MOU)
- the Black Sea region (Black Sea MOU)
- the Mediterranean (Mediterranean MOU)
- the Indian Ocean (Indian Ocean MOU)
- Arab States of the Gulf (Riyadh MOU).

The IMO periodically organises workshops for secretaries and directors of information centres of all the regional port-state control regimes. The workshops are funded by the IMO Technical Co-operation Fund and aim at providing support to regional port-state control regimes by establishing a platform for cooperation and also providing a forum for the people involved to meet and exchange ideas and experiences. The workshops also seek to encourage harmonisation and coordination of port-state control activities and the development of practical recommendations which can be forwarded to the IMO for further examination by its relevant bodies.

Technical Cooperation

Cooperation within the framework of the regional seas programme of UNEP

Soon after the creation of the United Nations Environment Programme (UNEP) in 1972, the IMO collaborated with UNEP within the framework of its regional seas programme. The IMO has been involved in the component of the regional seas programme dealing with preparedness and response to accidental marine pollution. It has carried out the preparatory work for the

adoption of regional agreements on cooperation in cases of emergencies, and supported the follow-up activities related to this issue.

In some regions this cooperation has led to the establishment of regional centres dedicated to combating accidental marine pollution. One such centre is administered and managed by the IMO, two are supported by the IMO under an MOU, and the IMO collaborates closely with three other regional centres.

In 1976, following a decision made by the diplomatic conference which adopted the Protocol to the Barcelona Convention on cooperation in cases of emergencies, the IMO, in cooperation with UNEP, established a centre in Malta to coordinate anti-pollution activities in the Mediterranean. This Regional Marine Pollution Emergency Response Centre (REMPEC) is operated under, and financed by, the parties to the Barcelona Convention, within the framework of the Mediterranean Action Plan of the Regional Seas Programme of UNEP, and is administered by the IMO through an agreement with UNEP.

In 2002, with the adoption of a revised Protocol, the mandate of REMPEC was expanded to include regional cooperation in promoting the effective implementation and enforcement of international regulations to prevent, reduce and control pollution of the marine environment from ships. It is within this context that REMPEC is carrying activities and implementing projects (mainly financed by the European Community) related to MARPOL. In particular, REMPEC conducted a project on port reception facilities which, *inter alia,* other led MEPC, as mentioned above, to set a date for the entry into effect of the discharges requirements under MARPOL Annex V for the Mediterranean region.

Under a Memorandum of Understanding, the IMO supports and provides technical back-stopping to two Regional Activity Centres, one in the Caribbean region and the other in the North-west Pacific region. Those centres assist the countries in their respective regions in preventing, preparing for and responding to major pollution incidents.

The IMO also cooperates with and provides some support to three regional centres: in the Gulf region, in the Red Sea and Gulf of Aden, and in the Black Sea.

The integrated technical cooperation programme

Through its technical cooperation programme the IMO has financed and implemented projects aiming at strengthening regional cooperation. For example, it is through the IMO technical cooperation programme that regional contingency plans for combating accidental pollution were developed and

adopted in the Caribbean region, the North-west Pacific region, the South Asian Sea region, the Black Sea region, the Caspian region and the Indian Ocean region.

GEF- financed projects

The IMO is the executing agency for several projects financed by the Global Environment Facility (GEF). It served as the executing agency of the GEF/ UNDP/IMO Regional Programme on Partnerships in Environmental Management for the Seas of East Asia, which has played an important role in developing regional cooperation on the implementation of IMO conventions. Moreover, the IMO is executing a new GEF/UNDP/IMO project on ballast water.[20] The main objective of this project is to assist particularly vulnerable countries and/or regions in enacting legal and policy reforms to meet the objectives of the Ballast Water Convention. The project emphasises a regional approach.

CONCLUDING REMARKS

Shipping can be effectively legislated for only at the global level, but that does not mean that measures to address regional concerns are irrelevant. Specific measures for dealing with regional concerns can be incorporated in global IMO conventions; moreover, mechanisms do exist within the IMO for additional measures to be considered and adopted for areas which require special protection. In addition, country or a group of countries who see a need for improving an existing regulatory regime may always introduce a proposal at the IMO, instead of pursuing unilateral or regional action.

Due to its highly technical nature and the time constraints involved, the IMO regulatory process does not always allow sufficient opportunities for raising awareness among legislators and the public of the benefits of IMO environmental regulations and the need to support their prompt and effective implementation. Greater attention should be given to the work of the IMO at the regional level to ensure effective implementation and enforcement of IMO conventions, as well as broader participation and contributions to the work of the organisation.

[20] The project: 'Building Partnerships to Assist Developing Countries to Reduce the Transfer of Harmful Aquatic Organisms in Ships' Ballast Water'.

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Regulatory Layers in Shipping

Henrik Ringbom[*]

In the past it might have been appropriate to characterise the inter-relationship between various layers of regulation in shipping as resembling the traditional 'Russian doll'. In this comparison, the various regulatory layers are neatly nested into the broader (global) agreements that encompass the narrower (regional) agreements which in turn encompass the even narrower (subregional) agreements.[1] Irrespective of whether this analogy was ever entirely accurate, we may ask whether it still remains useful for describing today's realities of shipping regulation.

Within the international (global) maritime community it is often held that the international character of maritime transport calls for global rules, and that the International Maritime Organization (IMO) is the sole institution to prescribe rules for international shipping. This view finds broad support in state practice, the law of the sea and in common sense. After all, if reasonable conditions for exercising business are to be maintained, ships moving around worldwide can hardly be expected to be differently designed, equipped or manned in each jurisdiction they enter.

Yet it would be a mistake to assume that reality is quite as straightforward as that. Various types of regional organisations have become increasingly active in the field of maritime regulation, environmental protection in particular, and unilateral acts by individual states still feature prominently in international discussions. Not all types of shipping standards are necessarily

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[*] The views expressed in this chapter are solely those of the author and do not necessarily reflect those of the European Maritime Safety Agency (EMSA) or any other EU institution.

[1] S. Sadowski, 'Protection of the Marine Environment of the North Sea: "The Russian Doll" Effect', in H. Ringbom (ed.), *Competing Norms in the Law of Marine Environmental Protection: Focus on Ship Safety and Pollution Prevention* (London: Kluwer Law International, 1997), pp. 109–119.

unsuitable for legislation at the regional or national level, and this point is also in some measure acknowledged by international law.

As there are no signs of a reversal of the development towards a more scattered regulatory regime in shipping, it seems justified to assess the current role and inter-relationship of the regulatory layers in greater detail. The outline of this chapter is based on a geographical categorisation of the rules – as to whether they are global, regional or national in scope. The focus is on the first two categories. Further differentiation based on the character and function of the rules may be necessary to shed light on the interaction between different types of rules within those broad categories. The breadth of the topic makes it necessary to limit the scope by highlighting only some examples of the kinds of tensions that may arise between and within the different regulatory layers. The geographical focus is mainly limited to the situation in the EU.

The chapter opens by examining the interplay between two main types of global rules relevant for the regulation of shipping: that is, the relationship between the 'jurisdictional' rules of the law of the sea and the 'technical' rules of the IMO. The next section deals with regional rules. Due to their differences in nature and content, EU rules will be distinguished from other types of European regional rules, and the relationship between different types of European rules will be discussed as well. The importance of implementation, which principally involves the national regulatory layer, is addressed briefly in the final section.

GLOBAL RULES

The Law of the Sea Convention and the IMO

The balance between the desire of flag states to maintain harmonised rules for shipping and the interests of coastal states in proclaiming sovereignty over their coastal waters was a key issue in the negotiations leading up to the 1982 United Nations Convention on the Law of the Sea (the LOS Convention). The Convention, frequently referred to as 'the Constitution for the Oceans', significantly limits the power of coastal states to set their own standards for foreign ships in their coastal waters. In the exclusive economic zones, their jurisdiction is essentially limited to implementing 'generally accepted international rules and standards established through the competent international organization or general diplomatic conference'.[2] References to

[2] The LOS Convention, Art. 211(5). See also the regime for specific environmentally sensitive areas of the exclusive economic zone in Art. 211(6) and the exception provided for ice-covered waters in Art. 234.

the 'organization' are consistently in the singular in respect of shipping, and it is widely accepted that the organisation in question is the IMO. In the territorial sea, too, coastal-state jurisdiction over foreign ships in innocent passage is limited to generally accepted international rules and standards insofar as the rules relate to 'the design, construction, manning and equipment' of ships.[3] These international rules accordingly represent a ceiling beyond which coastal states may not extend their national laws. For flag states, those same international rules represent a minimum requirement. All flag states are to ensure that their ships comply with the generally accepted international rules and standards, wherever the ships are and even irrespective of whether the flag state has formally accepted those standards.[4]

Accordingly, the LOS Convention has avoided the need to formulate more precise prescriptive and enforcement obligations for flag and coastal states by referring to an abstract, and continuously changing, set of international rules to be developed elsewhere, notably at the IMO. This solution was a deliberate choice made by the drafters, to avoid 'freezing' the requirements at a given technical level, while still preserving the international character of the shipping rules.[5] In practice this construction has proved effective. For example, shipping has, thus far, generally escaped the regulatory consequences of a series of international initiatives to establish marine protected areas (as under the framework of the 1992 Convention on Biological Diversity and several regional marine environment protection conventions and protocols),[6] while measures dealing specifically with protecting sensitive areas from the environmental risks of ships have been left for the IMO to elaborate.[7]

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[3] The LOS Convention, Art. 21(2).

[4] Ibid., Arts 94(5) and 211(2). See also the Final Report of the International Law Association's Committee on Coastal State Jurisdiction relating to Marine Pollution over Vessel-Source Pollution, *International Law Association, London Conference* (London: International Law Association, 2000), pp. 443–500 (hereinafter ILA Final Report 2000).

[5] See ibid., pp. 474–475 and E. J. Molenaar, *Coastal State Jurisdiction over Vessel-Source Pollution* (The Hague: Kluwer Law International, 1998), pp. 157–158 and the references cited therein.

[6] For an overview see V. Frank, *The European Community and Marine Environmental Protection in the International Law of the Sea: Implementing Global Obligations at the Regional Level* (Leiden: Martinus Nijhoff, 2007), pp. 331–363.

[7] The main examples are 'Special Areas' and 'Emission Control Areas' in the International Convention for the Prevention of Pollution by Ships (MARPOL); ships' routeing measures in Regulation V/10 of the International Convention for the Safety of Life at Sea (SOLAS) and related resolutions and the concept of PSSAs, which is discussed below; see also Sainlos, chapter 19 in this book.

Nevertheless, and despite frequent claims to the contrary, the LOS Convention does not bestow a regulatory monopoly on the IMO. In particular, the IMO does not have a veto on the question of which aspects of maritime safety or environment protection may be regulated by individual states and which may not. This is due to two main considerations.

Firstly, even if it is widely assumed that the 'competent international organization' referred to in the LOS Convention in most cases means the IMO, this is nowhere made explicit. More importantly, that reference is usually coupled with the alternative of a 'general diplomatic conference', which clearly opens the door for other international bodies or institutions to develop the rules that will represent the maximum level of coastal state regulation for shipping. Examples where this option could be relevant include the transboundary movement of hazardous waste, which is managed under the framework of a specific UN convention,[8] and the more recent debate as to whether the regulation of greenhouse gas emission from shipping should be the responsibility of the IMO or should be undertaken within the UN Framework Convention on Climate Change. It is clear, however, that if the IMO establishes international rules for shipping that are ratified and widely accepted by states, the LOS Convention provides very strong protection against competing regional or national coastal-state rules.

Secondly, the limitations in the LOS Convention referred to above do not exclude all complementary regulatory measures for states who feel that the international rules do not meet their needs. On the one hand, there are several possible measures, such as discharge standards, navigational requirements or liability rules, which are not explicitly ruled out in the territorial sea. Since a state is sovereign over its territory, including its territorial sea, such measures fall within the jurisdiction of the coastal state, provided that it otherwise complies with the LOS Convention. On the other hand, and much more importantly, the LOS Convention is almost completely silent on the extent to which jurisdiction may be exercised over ships that visit a port of the state imposing the requirement. This opens the door for standards and requirements which go beyond those agreed internationally with respect to ships (voluntarily) calling at the port of that state. In the absence of specific rules on this in the LOS Convention, the matter is left to general international law, which recognises no right of access of ships to ports. Port states accordingly retain a degree of liberty to impose their own standards for port-bound foreign ships. The limits of this liberty are defined by international conventions, where applicable, and by general principles of international

[8] Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal, Basel, 1989; see also <www.basel.int>.

law, such as the proportionality principle, the prohibitions of non-discrimination and abuse of rights, and general requirements of reasonableness – none of which offer very precise guidance on how far port states may go in this respect.[9] If states decide to implement such requirements in a coordinated manner at the regional level, the effects will obviously intensify and may in practical terms come close to competing with IMO standards.

Thus, the IMO has been granted a very privileged position in the international law of the sea – but that position is still far from a monopoly, and the organisation cannot rely on its 'constitutional' status to fend off competing regulatory initiatives by others. The risk of competing regulatory action by states, regions or other international organisations constantly hangs over the regulatory work of the IMO. If it wishes to maintain its role as the chief regulator of shipping it cannot afford to risk leaving its more progressive members unsatisfied. The increasing involvement of regional organisations in the regulation of shipping, despite the absence of a formal mandate in the LOS Convention, has further emphasised the challenge to the IMO. It is widely considered that the IMO has generally responded both quickly and satisfactorily to new challenges of various kinds, resulting in a notable increase of shipping regulation over the past few decades.

The IMO and the LOS Convention: Relationship between 'Technical' and 'Jurisdictional' Rules

A different aspect of the relationship between the LOS Convention and the IMO concerns the extent to which the latter can utilise its privileged position to alter the balance between coastal and maritime interests which has been established in the LOS Convention. Can the IMO, in other words, rely on the 'delegation' it has obtained through the LOS Convention for setting the detailed standards, in order to adopt jurisdictional rules itself? Can it create new jurisdictional rights or obligations for states – for example, by limiting navigation in certain areas altogether? As several rules adopted by the IMO over the past decades illustrate, the distinction between 'technical' and 'jurisdictional' rules is not always clear.

Through the amendments to Chapter V of the International Convention on Safety of Life at Sea (SOLAS) introduced since 1995,[10] the IMO has indicated its readiness to address matters which are of direct relevance to states'

[9] For a more detailed study of the extent of port-state regulatory jurisdiction, see H. Ringbom, *The EU Maritime Safety Policy and International Law* (Leiden: Martinus Nijhoff, 2008), pp. 204–237.

[10] See in particular Regulations V/10 on ships' routeing systems, V/11 on ship reporting systems and V/12 on vessel traffic services.

prescriptive jurisdiction in their coastal waters, which represents a departure from its traditional policy to refrain from engaging in jurisdictional matters.[11] The amendments clarify the conditions for establishing navigational/reporting requirements in coastal waters and their legal nature. In doing so, they arguably alter the jurisdictional balance as established in the LOS Convention[12] – which may be taken as evidence that the IMO recognises that the law of the sea may be developed through collective international actions and is prepared to make use of this possibility.

In the view of the present author, this development is not necessarily problematic; it is foreseen in the LOS Convention, whose drafters specifically intended the IMO to be the body through which future specifications of the jurisdictional balance were to take place, within certain limits.[13] SOLAS is a widely accepted international convention and amendments thereto, through the commonly used procedure of tacit acceptance,[14] will hence bind a great many of the states concerned.[15] From a practical point of view as well, the development of the jurisdictional balance within the framework of the international organisation most directly concerned with the consequences would seem to represent the most appropriate way to make allowances for new technical and political developments, and, where necessary, add a degree of flexibility to the jurisdictional regime, without thereby calling into question the overall legitimacy of the LOS Convention. Indeed, through increased recognition by the IMO that the LOS Convention regime is neither designed nor intended to prohibit future alterations in the jurisdictional bal-

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[11] Generally on IMO policy in respect of coastal state jurisdiction, see A. Blanco-Bazán, 'The Environmental UNCLOS and the Work of IMO in the Field of Prevention of Pollution from Vessels', in A. Kirchner (ed.), *International Maritime Environmental Law*, *Institutions, Implementation and Innovations* (The Hague: Kluwer Law International, 2003); and IMO doc. LEG/MISC/4, p. 8.

[12] For example, Regulations V/10 and V/11 provide for the adoption by IMO of mandatory routeing and reporting systems in the exclusive economic zone. See also G. Plant, 'The Relationship between International Navigation Rights and Environmental Protection: A Legal Analysis of Mandatory Ship Traffic Systems', in Ringbom (ed.), *Competing Norms*, pp. 26–27; and ILA Final Report 2000, p. 453.

[13] Arts 311(2) and (3) place limits on *inter se* agreements among the LOS Convention parties which may affect the object and purpose or 'basic principles' of the Convention or the enjoyment by other states parties of their rights and obligations. See also the somewhat more liberal Article 237 of the Convention, which deals specifically with environmental agreements.

[14] See L. Shi, 'Successful Use of the Tacit Acceptance Procedure to Effectuate Progress in International Maritime Law', *University of San Francisco Maritime Law Journal*, Vol. 11, 1998/99, pp. 299–332.

[15] As per 31 January 2011, 159 states had ratified or acceded to the 1974 SOLAS, together representing more than 99.16 per cent of the world's tonnage.

ance, other types of strains on that balance, and on the LOS Convention as such, may be reduced.

The development and implementation of the concept of a 'Particularly Sensitive Sea Area' (PSSA) is somewhat different, in that it is not founded in any convention but is based on a series of guidelines adopted in the form of IMO Assembly resolutions, the latest being from 2005.[16] In this case there is no clear legal foundation for the protective measures adopted in the PSSA, in particular for areas designated outside the territorial sea. This raises the question whether IMO approval of those measures is legally sufficient, in view of the broad mandate that the LOS Convention provides to this organisation for establishing the detailed limits and content of flag- and coastal-state jurisdiction; or whether measures must be limited to those which have a solid legal basis elsewhere. In the latter case, the concept of PSSA adds little to the rights and possibilities that states already have under international law and is, hence, essentially useless in jurisdictional terms. On the other hand, the former case may seem granting *carte blanche* to the IMO to supplement or revise international law of the sea more or less as it wishes. Neither of these propositions is likely to represent accurately the true character of the PSSA concept, and the whole issue might be taken as an illustration of the more general dilemma of international law, which aspires to establish an internationally binding legal order while also respecting the individual liberty and sovereignty of the participating states.

Despite various attempts within the IMO to clarify the precise role and legal functions of PSSA protective measures, the current PSSA Guidelines still give rise to uncertainty. Three categories of available measures are identified: 1) any measure which is already available in an existing IMO instrument; 2) any measure which does not yet exist but 'could become available through amendment of an IMO instrument or adoption of a new IMO instrument' (but the legal basis for such measures is available only after relevant adoption/amendment); and 3) 'any measure proposed for adoption in the territorial sea, or pursuant to [the LOS Convention] Article 211(6)'.[17] These formulations leave open the possibility for the IMO to adopt protective measures which do not have a basis in the existing IMO conventions. This could follow from the open-ended possibility referred to in the third category,[18] in particular from the uncertain scope of the measures referred to

[16] The most recent guidelines are to be found in the Annex to IMO Resolution A.982(24) 'Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas' (hereinafter 'the PSSA Guidelines').

[17] PSSA Guidelines, para. 7.5.2.3 (footnote omitted).

[18] See also V. Frank, 'Consequences of the *Prestige* Sinking for European and International

in Article 211(6),[19] and from the broad understanding of the term 'IMO instruments', which according to the IMO's Marine Environment Protection Committee includes 'resolutions adopted under the IMO Convention by the Assembly, MEPC, or MSC'.[20]

The view has consequently been expressed that as long as, the IMO agrees on the protective measures in its relevant committees, one should adopt a flexible understanding of the available protective measures.[21] To this author as well, it seems justifiable to underline the role of the LOS Convention in delegating powers to the IMO in matters of this kind. Clearly, the Convention was made to 'last' for a long time; and the principal vehicle it employs for adapting to changing needs is to refer the more detailed regulation of ship-source pollution to the IMO rather than individual coastal states.[22] It also seems justified to de-emphasise the capacity of an unclear and overly detailed procedural provision such as Article 211(6) to limit the availability of protective measures for present-day purposes.[23]

Law', IJMCL, Vol. 20, 2005, p. 29, noting that while the first two categories can be applied independently of the PSSA designation, it is with respect to the third category of measures that 'the PSSA concept plays its major role'. M. Detjen, 'The Western European PSSA – Testing a Unique International Concept to Protect Imperilled Marine Ecosystems, *Marine Policy*, Vol. 30, 2006, p. 449, takes the view that the third category 'only makes sense if it allows for measures beyond generally accepted international rules'.

[19] Article 211(6)(a) refers to 'special mandatory measures', whereby a state, following IMO approval, may adopt laws and regulations 'implementing such international rules and standards or navigational practices as are made applicable, through the organization, for special areas'. As to the 'additional laws and regulations' foreseen under Article 211(6)(c), it is specifically stated that they may relate to discharges and navigational practices but shall not cover design, construction, manning or equipment standards other than generally accepted international rules and standards. The latter subparagraph encompasses a potentially very wide range of measures, the scope of which is uncertain. See Molenaar, *Coastal State Jurisdiction*, pp. 404–407; Blanco-Bazán, *Environmental UNCLOS*, p. 43; and A. Merialdi, 'Legal Restraints on Navigation in Marine Specially Protected Areas', in T. Scovazzi (ed.), *Marine Specially Protected Areas* (The Hague: Kluwer Law International, 1999), p. 34.

[20] See IMO doc. MEPC 53/24, para. 8.25.11.

[21] See the comments made at the IMO Legal Committee, referred to in IMO doc. LEG 87/17, para. 199. The UN Division for Ocean Affairs and the Law of the Sea was particularly clear on this point in IMO doc. LEG 87/17, Annex 7, p. 2: 'if NAV approves the measure as being in conformity with IMO requirements, then it would also be in conformity with UNCLOS, as UNCLOS defers to IMO on navigational rules, regulations and standards'.

[22] Merialdi, 'Legal Restraints on Navigation', p. 32, refers to the drafting history of the special area regime in the LOS Convention and notes that the states opposing the notion of special areas 'did not object to the idea of special areas itself. It was the unilateral method put forward by coastal States for the designation of such areas that they saw as unacceptable'.

[23] See also L.S. Johnson, *Coastal State Regulation of International Shipping* (Dobbs Ferry, NY: Oceana, 2004), at p. 110: 'Article 211(6) is confusing and is unlikely to provide a reliable vehicle to address coastal State concerns'; and L. de La Fayette, 'The Marine Environment Protec-

Yet one can hardly go so far as to interpret the LOS Convention as representing *carte blanche* for the IMO committees to decide on whatever protective measures they may see fit for the purpose. Apart from the somewhat awkward circular reasoning which underlies that approach (ultimately justifying the IMO's right to adopt the protective measures by the fact that the IMO adopts the measures), the LOS Convention does not seem to support such a complete mandate. Some caution should therefore be exercised when assessing the availability of measures not specifically regulated in other conventions. First, several of the relevant LOS Convention references to the international (IMO) rules and standards are coupled with the requirement that they are 'generally accepted'.[24] It is by no means certain that a decision or resolution by an IMO committee meets that requirement simply because it has been adopted by the IMO.[25] Second, any protective measure by coastal states remains subject several more general restraints imposed elsewhere in the Convention, notably the specific safeguards contained in Articles 223–233 and under general principles of international law referred to above.[26] Finally, it should be borne in mind that the designation of a PSSA offers few additional remedies for coastal states to ensure compliance with the protective measures. The PSSA Guidelines do not challenge the restricted at-sea enforcement regime of the LOS Convention, but merely provide that coastal states 'should ensure that any associated protective measure is implemented in accordance with international law as reflected in [the LOS Convention]'.[27]

So far, the measures actually approved for PSSAs have not been overly controversial from a jurisdictional perspective. Despite certain efforts to introduce more far-reaching measures – notably in the Western Europe PSSA and in the Torres Strait – the measures agreed have usually been of a kind that could be adopted also without the PSSA status.[28] However, that does not exclude the possibility that the IMO might adopt a different approach in the

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tion Committee: The Conjunction of the Law of the Sea and International Environmental Law', IJMCL, Vol. 16, 2001, at p. 191: '[i]n no case should Article 211(6) be interpreted to restrict the protection of the marine environment and the living resources of the sea'.

[24] This applies both for flag states (Art. 211(2)) and for coastal states when introducing rules for foreign ship in the territorial sea or the exclusive economic zone (Arts 21(2) and 211(5)).

[25] While the idea is gaining ground that formally non-binding instruments such as IMO resolutions may also qualify as 'generally accepted rules and standards', a key criterion for general acceptance is linked to their support in state practice. See ILA Final Report 2000, pp. 479–480 with further references. It may also be noted that a separation between the requirements of 'general acceptance' and regular IMO decisions on special areas is implicit in the text of Art. 211(6)(c) of the LOS Convention.

[26] See text in footnote 9 above.

[27] PSSA Guidelines, para. 9.2.

[28] See Ringbom, *EU Maritime Safety Policy*, pp. 457–470, with further references.

future, thereby altering the nature of the PSSA concept. Indeed, one of the most ingenious features of the PSSA is that it offers a *possibility* for states to go beyond their regular environmental jurisdiction in exceptional circumstances, without having to rely on more heavyweight procedures such as revisions of the relevant international conventions, including the LOS Convention. The concept has aptly been described as a 'safety valve' for use in case of exceptional pressure.[29] In this way, the PSSA has the potential to develop into a moderate 'LOS Convention reviser', exercised through the IMO. This in itself is significant and may serve to explain both the interest in and the controversies still surrounding the concept. The IMO is not prevented from taking a more liberal approach to develop the PSSA framework away from the jurisdictional limitations which apply to individual coastal states under the LOS Convention, bearing in mind the limits discussed above.

REGIONAL RULES

The relationship between the global regulatory layer and regional shipping rules tends to give rise to controversies. For reasons already indicated, regional organisations or bodies have not been granted a prominent role in the LOS Convention for the regulation of shipping. No additional prescriptive jurisdiction for regions is foreseen in the Convention, and the very purpose of notions such as 'the competent international organization' and 'generally accepted international rules and standards' is to exclude the extension of requirements not widely accepted at global level to foreign ships. However, if regions are not any better off than individual states, they are no worse off either. As noted, the LOS Convention leaves some space for individual states to legislate independently in their coastal waters and, in particular, concerning ships entering their ports. And whatever states are entitled to do individually they may also choose to do in a coordinated manner at the regional level. In shipping, therefore, the potential strength of regional initiatives lies more in the effects of coordinated action than in additional rights.

In Europe, we may distinguish between two different types of regional organisations involved in the regulation of shipping: on the one hand, the EU, which now comprises 27 member states and whose rules apply also to the three non-EU states of the European Economic Area (EEA); and on the other hand, the regional organisations established for the protection of the environment of particular regional seas. Before we turn to the substantive aspects of the regional rules, the intricate legal relationships of the different types of rules involved are briefly outlined.

[29] Merialdi, 'Legal Restraints on Navigation', p. 38.

The Legal Setting

The geographical reach of the EU now extends to four regional seas which are covered by separate environmental protection conventions and protocols.[30] All but one of these regions include states that are not members of the EU/EEA, the exception being the North-East Atlantic region. The European Community is a contracting party to most of the relevant regional framework conventions, but has not yet acceded to the Black Sea Convention.[31] In addition, the member states bordering the regional seas are parties to these conventions in their own right. The result is a highly complex legal patchwork that is governed at the same time by rules of international law, EU law *and* the national laws of the states concerned.

International law is of a horizontal nature and does not recognise a *prima facie* hierarchical distinction between global and regional rules. Inconsistencies are to be resolved by means of the more sophisticated yet less straightforward rules for interpreting and resolving incompatibilities between treaties under general international law.[32] It is reasonable to assume, however, that the 'constitutional' character of the LOS Convention, in combination with the widespread acceptance that it reflects international customary law, may provide specific authority to this Convention. Under international law, the presence of incompatible national rules does not represent a justification for failing to comply with a treaty obligation.[33] On the other hand, the national implementing rules will normally be the critical ones for deciding how, or if, a given international legal obligation is implemented in practice.

EU law adds to the complexity of the picture. In contrast to the regional seas agreements, which are governed by international law, EU law ranks higher than national rules; and EU secondary legislation (in the form of regulations and directives) is to a large extent directly applicable in the member states even without formal incorporation in the national legal system. On the other hand, it is now accepted by the European Court of Justice that international conventions which have been concluded by the Community rank higher than acts of secondary legislation.[34] While such agreements do not necessarily have direct effect,[35] this acceptance serves to clarify several questions about the application of competing requirements under EU law

[30] Those regions are the Baltic Sea, the North-East Atlantic (and for certain subject matters, only the North Sea), the Mediterranean Sea, the Black Sea.
[31] On the Black Sea, see Oral, chapter 25 in this book.
[32] See in particular Arts 30–32 of the 1969 Vienna Convention on the Law of Treaties.
[33] Ibid., Art. 27.
[34] See Case C-344/04 (*IATA*), *European Court Reports 2006*, I-403, para. 35.
[35] See, e.g., the case referred to in footnote 63 below.

in relation to the LOS Convention or the regional seas conventions. However, it does not clarify the position in relation to the IMO conventions, which have not been formally concluded by the Community. Moreover, the Community's participation in 'mixed' agreements (where both member states and the Community are parties) is limited to the spheres of its (exclusive) competence, the extent of which is in turn to be assessed on the basis of a complex set of guiding principles laid down by the European Court of Justice, which are not always easy to digest. For maritime transport, the exclusivity of the Community competence is closely linked to the existence of EU legislation in the relevant field, but also to the nature of that legislation.[36]

From the perspective of international law, however, the European Community, despite all its distinct and unique features, remains an intergovernmental organisation. It may accordingly be bound by obligations, and may benefit from rights, contained in international conventions it has entered into with third parties. To the extent that the EU's rules affect third parties they will not affect the binding nature of general international law, whether at member-state or EU level. An international convention concluded by the Community which is in conflict with internal Community rules will therefore generally prevail in terms of international law, as long as the convention, or the Community's conclusion thereof, cannot be considered invalid. Similarly, in the case of conflict between the EU rules and an agreement between a member state and a third party, the agreement will remain in force between the member state and the third state, despite its incompatibility with EU law.

The European Union Rules

As the EU is the regional organisation which has gone furthest in challenging the global (IMO) rules, it may be interesting to study this development in greater detail.[37] It took until 1993 until the EU was given any significant role in the regulation of shipping, but since then the development has been very rapid. The 35-odd relevant EU directives and regulations now cover virtually every aspect of safety at sea, ranging from classification societies, port-state control and seafarers' training to technical and operational requirements for specific classes of ships (notably passenger ships and oil tankers), rules on standards for pollution and waste management and, to some extent, even to

[36] For analyses of the EU-law relationship between international and EU shipping law, see Ringbom, *EU Maritime Safety Policy*, pp. 53–143 and Frank, *The European Community*, pp. 257–269.

[37] A fuller legal analysis is provided in the sources referred to in footnote 36 above.

issues of maritime civil liability, insurance and compensation. Four new acts of EU legislation were adopted in the 'third package' of EU maritime safety measures, adopted in 2009.[38]

The EU rules are categorised below in two different groups: port-state requirements which entail obligations for ships entering EU ports; and coastal-state requirements which extend to ships transiting the coastal waters of the member states. Both types of rules cover ships flying the flag of non-EU countries.

Port-state requirements

Given the jurisdictional framework outlined above, it should come as no surprise that the EU has predominantly sought to regulate these matters by means of rules which apply to all ships entering the ports of member states. By opting for port-state regulation, many jurisdictional restraints may be circumvented, and there are no easily identifiable maximum limitations on requirements of this type. As opposed to national rules, moreover, regional rules for port-bound ships will cover a large portion of coastal traffic as well, since a significant portion of the ships that transit the coastal waters of one member state will be heading for the port of another. Regionally coordinated port-state requirements also reduce the economic risk that ships might divert to a neighbouring port state with more lenient standards or practices.

Roughly two out of three EU legal measures adopt a port-state perspective, and a certain tendency towards more independent requirements over time may be noted. Gradually, through a series of small steps, and somewhat bigger steps following accidents, precedents have built up to establish a legal regime which seemed unthinkable only a decade earlier.

While early measures focused mainly on ensuring compliance with widely accepted international rules,[39] certain later acts have somewhat relaxed the requirement for an international foundation for the rules.[40] Other examples

[38] The new instruments cover flag-state obligations (Directive 2009/21), common principles for accident investigation (Directive 2009/18), liability insurance obligations (Directive 2009/20) and ship-operators' liabilities with respect to passengers (Regulation 392/2009). In addition, the package entails significant alterations of the existing directives on port-state control (Directive 2009/16), classification societies (Regulation 391/2009 and Directive 2009/15) and traffic monitoring (Directive 2009/17).

[39] The prime example is the Port State Control Directive (Directive 95/21) which represents one of the cornerstones of the EU's maritime safety policy. The control and enforcement of international standards adopted by the IMO and the International Labour Organisation (ILO) was the original objective of the Directive; this remains so, despite numerous subsequent amendments of it.

[40] An example is the enforcement of ILO Convention No. 180 on working time through Directive 1999/95. In this case, the basis for the application of the rule lies in the international entry

include EU measures which seek to achieve early implementation of international rules at regional level (after their adoption, but before their international entry into force),[41] even where there is uncertainty over whether the international rules in question will ever enter into force;[42] and the mandatory application of international standards which are laid down in non-mandatory terms, such as IMO codes or resolutions.[43]

Another EU strategy has been to introduce measures which seek to 'improve' the international rules by filling perceived gaps in them. An uncontroversial way to do this is to extend the scope of application of IMO rules to ships to which they would otherwise not apply – notably, to ships engaged only in domestic traffic in a member state.[44] In other cases, the EU has sought to complement the international conventions in substantive terms. A relatively uncontroversial example is the 2000 Directive on port reception facilities for waste, which builds upon the obligations of the International Convention for the Prevention of Pollution by Ships (MARPOL), but goes several steps further by strengthening the obligations of ships to deliver their waste in ports and by imposing rules on how port states are to handle and charge for the wastes they receive.[45] More controversially, certain EU port-state rules regulate matters that have been discussed but in the end left out of the international conventions, due to lack of sufficiently widespread support. A case in point here is the requirement to carry a voyage data recorder (VDR) on board.[46] Another example concerns stability requirements for ro-ro passenger ships. Standards which were not accepted at the IMO, but which were nevertheless implemented by certain Northern European states, were eventually, in 2003, made applicable throughout the EU.[47] In Directive

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into force of that ILO Convention, even though the Convention was brought into force through the ratification of only five states, which casts doubts on its truly international reach.

[41] See Regulation No 3051/95 on the safety management of ro-ro passenger vessels.

[42] Council Directive 97/70 setting up a harmonised safety regime for fishing vessels of 24 metres in length and over. This Directive implements, and to some extent exceeds, the 1993 Torremolinos Protocol on the Safety of Fishing Vessels, which has not entered into force.

[43] For example, Directive 2001/96 establishing harmonised requirements and procedures for the safe loading and unloading of bulk carriers.

[44] See, e.g., Council Directive 98/18 on safety rules and standards for passenger ships.

[45] Directive 2000/59 on port reception facilities for ship-generated waste and cargo residues.

[46] The phased-in requirements of Article 10 and Annex II(II) of Directive 2002/59 establishing a Community vessel traffic monitoring and information system encompassed a broader range of ships than SOLAS Regulation V/20 and had the effect of requiring existing cargo ships, which had specifically been excluded from the coverage of the international obligation, to be equipped with a VDR when calling at EU ports. Subsequently, however, SOLAS Regulation V/20 was amended, thereby reducing the differences with the EU VDR requirements on this point.

[47] Directive 2003/25 on specific stability requirements for ro-ro ships.

2005/33, the EU introduced fuel-quality requirements which had no equivalents in MARPOL Annex VI, but which apply only during the ship's stay in port.[48]

By far the most controversial EU rules, from a legal and political point of view, are those that regulate matters already covered by international rules, but where different standards are introduced for ships entering EU ports. There are not many examples of this type, but the EU regulation of construction requirements for oil tankers is a case in point.

Following the *Erika* accident in December 1999, the EU agreed to phase out single-hulled oil tankers more rapidly than the international schedule established in MARPOL. The EU phasing-out scheme introduced a timetable that corresponded more closely to that applying in the USA under the 1990 Oil Pollution Act – but, unlike the latter, the EU scheme retained the international technical rules and definitions on the construction of oil tankers as laid down in MARPOL. However, these EU rules never gave rise to any conflict with the international rules, since MARPOL was amended in parallel to incorporate the EU requirements, subject to some minor compromises, which were eventually accepted by the EU. Once EU Regulation 417/2002 entered into force, it therefore corresponded to the amended international rules.[49]

Not long after the entry into force of that Regulation, however, the next major oil tanker incident involving an ageing single-hull tanker occurred in EU coastal waters. The November 2002 sinking of the *Prestige* prompted the Community to revisit its phasing-out scheme in order to attune it more closely to what had originally been proposed by the Commission. The revised EU Regulation included a tighter phasing-out schedule than its predecessor and also introduced construction requirements for ships carrying heavy grades of oil.[50] This time, adoption of the EU Regulation was not linked to a corresponding amendment of MARPOL. It entered into force while international negotiations to re-amend MARPOL were still ongoing, and the two phasing-out schemes remained at odds until the MARPOL amendments entered into force on 5 April 2005, some 18 months after the entry into force of EU Regulation 1726/2003. Today the two regimes are basically identical.

A similar trend towards a gradual increase in the stringency of EU rules may also be observed in the field of the measures employed for enforcing

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[48] Article 4b. These rules entered into effect on 1 January 2010.

[49] Regulation 417/2002 on the accelerated phasing-in of double-hull or equivalent design requirements for single-hull oil tankers.

[50] Regulation 1726/2003 amending Regulation 417/2002 on the accelerated phasing-in of double-hull or equivalent design requirements for single-hull oil tankers.

these rules. The EU port-state control regime has gradually moved beyond the traditional two-step approach consisting of an inspection and, where necessary, detention of ships. The first version of Directive 95/21 already introduced a new tool, in banning from all EU ports ships which had been ordered to proceed to the nearest appropriate repair yard but had failed to do so.[51] The use of this remedy has been broadened in subsequent amendments and is now applied almost routinely on ships which have had multiple detentions in EU ports over a certain period.[52] Other developments in the enforcement regime include greater use of mandatory inspections of certain categories of ships, 'automatic' detention in the case of certain deficiencies, and the public 'black-listing' of non-complying ships and their operators.

For the enforcement of standards which are of regional scope and hence not covered by port-state control, other solutions have been envisaged for ensuring compliance. An early and cautious variant was the linking of non-compliance with the regional rules to an increased probability of inspection, or a more detailed inspection, by port-state control.[53] Later acts have sometimes introduced separate regional enforcement measures which are similar to detentions, but have a different name and function and do not technically fall under port-state control. Examples include the prohibition on leaving port before delivering waste under Directive 2000/59, and the mandatory rest periods under Directive 1999/95.

Since the turn of the millennium, more powerful remedies have been introduced, most notably the refusal of access to EU ports for whole categories of ships on the basis of criteria which may be verified ahead of arrival, without physical inspection of the ship in question. This remedy is applied with respect to oil tankers which do not meet the double-hull requirements of Regulation 1726/2003.

Another way to enforce the EU rules, thus far employed only with respect to passenger ships in regular service, is making the fulfilment of the prescribed rules a condition for commencing a particular service to or from EU ports. This has been done through the introduction of a new concept, the 'host state', which has no counterpart in the law of the sea.

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[51] Directive 95/21, Art. 11(4).

[52] See Directive 2009/16, Art. 16. A list of ships currently banned from EU ports is available at <www.emsa.europa.eu/ end185d007d002d001d001.html>.

[53] The original Port State Control Directive foresaw this type of enforcement solution with respect to non-compliance with Council Directive 93/75 concerning minimum requirements for vessels bound for or leaving Community ports and carrying dangerous or polluting goods (Annex I) or non-compliance with Article 8 of Council Directive 94/58/EC on the minimum level of training of seafarers (Annex III).

The latest development of the range of enforcement measures available to port states came in 2005 with the adoption of the 'pollution sanctions Directive', which, together with the associated Framework Decision 667/2005, for the first time introduced the obligation to impose criminal sanctions on persons committing pollution in violation of international discharge standards.[54] The combined effect of the two measures is to make violations of MARPOL discharge standards for oil and noxious liquid substances 'infringements' and subject to criminal penalties, to the extent such violations have been committed 'with intent, recklessly or through serious negligence'. The Framework Decision has subsequently been annulled for reasons related to EU law,[55] and an amended Directive, which acknowledges this and replaces the need for the Framework Decision, was adopted in 2009.[56]

Coastal-state requirements

The EU has been considerably less active in the field of coastal-state regulation. Given the limitations imposed by the law of the sea on rules of this type, it is nevertheless noteworthy that three measures, at least largely 'coastal' in nature, have been adopted since the turn of the millennium. The first truly 'coastal' measure was the 'traffic monitoring Directive', drafted in the aftermath of the *Erika* accident in 1999 and approved in 2002.[57] This Directive regulates, *inter alia,* the procedures and criteria to be followed by member states when adopting ship reporting systems, vessel traffic services or ships' routeing measures in their coastal waters.[58] These rules are generally closely linked to the international rules and standards as laid down in SOLAS Chapter V and related guidelines; their applicability to ships flying the flag of third states in most cases requires acceptance of the corresponding traffic measures by the IMO.[59] The Directive also includes certain provisions that make use of the jurisdiction available to coastal states under international law following marine incidents. Article 19 transforms a

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[54] Concerning US legislation and practice, see R.A. Udell, 'United States Criminal Enforcement of Deliberate Vessel Pollution: A Document-Based Approach to MARPOL', in D. Vidas (ed.), *Law, Technology and Science for Oceans in Globalisation* (Leiden: Martinus Nijhoff, 2010), pp. 269–290.

[55] Case C-440/05, *European Court Reports 2007*, I-9097.

[56] Directive 2009/123.

[57] Directive 2002/59 establishing a Community vessel traffic monitoring and information system, as amended by Directive 2009/17.

[58] Ibid., Arts. 5, 7 and 8.

[59] Art. 8(b) represents an exception by stipulating that foreign ships are to comply with vessel traffic services established beyond the territorial sea of member states, insofar as those ships are bound for a member state.

member-state's right under international law to take appropriate measures following a maritime incident, irrespective of its location,[60] into an obligation for EU member states.

More recently, the EU has adopted two directives that regulate discharges and emissions from ships. Both Directive 2005/33, regulating the sulphur content in ship fuels, and Directive 2005/35, providing for sanctions against violations of MARPOL discharge standards, extend their requirements to ships passing through the coastal zones of member states. While the bulk of the provisions in both directives correspond to international standards as laid down in the relevant MARPOL annexes, both instruments go beyond those standards to some extent, which makes them more interesting from the perspective of international law.

The Directive on sulphur content in fuel has deviated from MARPOL in two ways. First it slightly exceeds the international standards in a temporal sense, by implementing more stringent requirements for the North Sea 'Sulphur Emission Control Area' before the corresponding international rules entered into force.[61] Secondly, it introduces more stringent fuel-quality requirements for passenger ships in regular traffic to or from EU ports than those which follow from MARPOL Annex VI. The Directive will be amended soon following the revision of MARPOL Annex VI in October 2008.

The pollution sanctions of the Directive apply a specific possibility foreseen in the LOS Convention (Article 218(1)) which allows a port state to enforce (and hence to prescribe) violations of international discharge standards in and even beyond the coastal zones of that state. It introduces sanctions for any violation of MARPOL discharge standards that have been committed intentionally, recklessly or through serious negligence. Yet two aspects of the Directive depart from its otherwise strict adherence to the international rules. Firstly, it removes the exception provided for in MARPOL Regulations I/4(2) and II/3(2) for owners and masters, insofar as they have not caused the discharge intentionally or 'recklessly and with knowledge that damage would probably result', in favour of a more general scheme based on intent, recklessness or serious negligence, when the violation has occurred in the territorial sea of a member state. Secondly, it extends the sanctions regime to *any* person who has been found to cause the damage, rather than only to specified persons like the owner or master of the ship.

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[60] See the 1969 International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties and Art. 221 of the LOS Convention.

[61] The more stringent standards for the North Sea under the Directive applied as from 11 August 2007, while the corresponding amendment of MARPOL Annex VI became applicable on 22 November 2007.

These features of the Directive were challenged in the European Court of Justice by a group of industry associations that sought to have the Directive invalidated because it was considered to violate international law.[62] This case is the first – and so far only – example where EU maritime law has been challenged for allegedly being incompatible with international law. Unfortunately, the Court's ruling failed to shed much light on that issue. The Court upheld the validity of the Directive, but not on the basis of a substantive assessment of the applicants' claim. It merely addressed the formal position and nature of MARPOL and the LOS Convention in European Community law, which led it to conclude that the applicants, who were private persons rather than states or institutions, could not rely directly on either Convention to challenge the validity of the Directive.[63]

The gradual increase in prescriptions over foreign ships in the coastal zones has not been matched by any corresponding development with respect to enforcement at sea. With all three 'coastal' directives discussed above, enforcement is predominantly to be undertaken in ports. An ambition for some degree of at-sea enforcement of the requirements relating to sulphur content in fuel is to be found in a vague reference that enforcement of the regional standards for passenger ships is to be ensured by member states '*at least* in respect of … vessels of all flags while in their ports',[64] while member states, in respect of the standards in Sulphur Emission Control Areas, 'may *also* take additional enforcement action in respect of other vessels in accordance with international maritime law'.[65] The pollution sanctions directive is clearer in this respect, specifically establishing that a member state may take enforcement measures against ships committing a violation in the EEZ, although, for some reason, the directive fails to make use of the considerably more robust jurisdiction under the LOS Convention Article 220(2) for violations which have occurred in the territorial sea.

Interaction between the EU and the Regional Seas

Traditionally, the regional seas agreements have been cautious about complementing or even addressing matters subject to regulation by the IMO. To

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[62] Case C-308/06, (*Intertanko et al.*), *European Court Reports 2008*, I-4057. See also the referral by the High Court of Justice of England and Wales, Queen's Bench Division, in *Intertanko et al. v. Secretary of State for Transport* of 4 July 2006.

[63] The judgment by the European Court of Justice was delivered on 3 June 2008. See A. K.-J. Tan, 'The EU Ship-Source Pollution Directive and Recent Expansions of Coastal State Jurisdiction', in Vidas (ed.), *Law, Technology and Science for Oceans in Globalisation*, pp. 291–305.

[64] Art. 4a(4), emphasis added.

[65] Art. 4a(3), emphasis added.

the extent they have done so, efforts have focused mostly on achieving regionally coordinated *implementation* of the global rules. Some of the regions, notably the North Sea and the Baltic Sea, have also taken an active role in coordinating initiatives of relevance for the region within the IMO. In the past decade, however, several regional organisations have expanded the sphere of their activities, from only implementing the IMO rules to supplementing them in various ways. Certain more recent instruments have established their own standards, including requirements concerning foreign ships.[66] However, in jurisdictional terms these activities still remain cautious. Most regional rules for shipping are closely related to the corresponding provisions in the IMO conventions; where differences have been introduced, these tend to be of a complementary, rather than competing nature.[67] Purely regional standards are usually adopted in the form of recommendations only.[68] The regional instruments sometimes go to considerable pains to emphasise their compatibility with the LOS Convention regime, and some specifically confirm the supreme role of the IMO as the competent international organisation to adopt rules for merchant shipping.[69]

An interesting example of the increased activities of regions in the field of shipping relates to environmental protection activities for the Mediterranean Sea.[70] Here, only an illustration of how such regional or subregional initiatives may interact with the EU is given.

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[66] Examples of this trend include Article 6(4) of the 1996 Izmir Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal, which embraces a right of prior notification in the territorial sea; the 2002 Malta Protocol Concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea, which includes coastal requirements on issues such as post-accident reporting (Art. 9(2)) or 'measures aimed at reducing the risk of accidents' (Art. 15). See also the new Regulations 4 and 10–12 to Annex IV of the Helsinki Convention, which were introduced through Recommendation 22E/5 in 2001, which included requirements on double-hulled tankers, automatic identification systems, port state control, safety management and places of refuge, sometimes with express reference to the relevant EU legislation.

[67] See Regulation 6 of Annex IV to the 1992 Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area on the mandatory discharge of all waste to a port reception facility.

[68] See Helcom Recommendations 25/7 and 28E/11 on the navigation in Baltic Sea ice conditions.

[69] See Art. 4(2) of Annex V to the 1992 Convention for the Protection of the Marine Environment of the North-East Atlantic and the preamble and Arts 1(e) and 15 of the 2002 Malta Protocol.

[70] See the detailed discussion by Raftopoulos, chapter 27 in this book. For an overview of activities in the Baltic Sea, North-East Atlantic and the Mediterranean Sea regions, see Frank, *European Community*, pp. 214–225.

In the early stages there was not very much interaction between the development of EU shipping rules and the activities of regional seas organisations. This is partly because the former tended to focus on maritime safety while the latter group avoided the subject and focused their activities on specific environmental matters. This distinction has subsequently been toned down on both sides; and, with the gradual convergence of interests, we may note increasing examples of interaction between the two types of regional legislators.

As the overlapping membership already indicates, there is considerable sharing of information and resources between the two types of bodies, and the persons involved in the day-to-day management of the matters may often be the same. While there is no doubt that there is still room for further cooperation in the maritime field, two-way interaction already exists between the EU and the regional seas organisations. This interaction may not be apparent if only one set of the rules is studied.

On the one hand, the EU has certainly acted as a catalyst for many of the rules introduced in regional seas agreements in the past decade. An example is the 2002 Malta Protocol Concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea: it includes a series of rules concerning traffic monitoring, places of refuge, illegal discharges and emergency measures which have very close counterparts in the corresponding EU legislation. Similarly, some of the rules governing the provision and use of ships' waste-reception facilities in Baltic Sea ports are based largely on the corresponding provisions of Directive 2000/59, while the revisions of Annex IV of the Convention which emanated from 2001 Copenhagen Declaration on the safety of navigation in the Baltic Sea are closely related to various post-*Erika* EU rules.[71] By extending the EU rules to their regional seas partners, EU member states extend the effects of the rules to their neighbouring countries and hence improve the protection of their own coastal waters. For this reason, the EU has in certain circumstances even agreed on specific training programmes to improve familiarity with EU maritime safety and environmental legislation in the neighbouring maritime regions.[72]

It is equally clear that regional initiatives have sometimes inspired and contributed to the development of EU legislation. The Baltic Sea strategy for port waste reception facilities,[73] for example, was in place many years before

[71] See footnote 66 above.

[72] E.g., the SAFEMED projects which cover the Mediterranean Sea and the pre-accession activities in respect of EU candidate and potential candidate countries.

[73] See Article 8(2) of the Helsinki Convention and Regulation 6 of its Annex IV.

the EU adopted its own directive on the matter; the same goes for the enforcement of ship-source pollution violations, including the harmonisation of penalties.[74] A somewhat different example relates to the management of ballast water. In this case, all European regional seas organisations, but also subregional initiatives like the one for the Adriatic Sea, were well ahead of the EU in seeking to find solutions to reduce the introduction of invasive species through ballast water from ships, while waiting for the 2004 IMO Convention for the Control and Management of Ships' Ballast Water and Sediments to enter into force.[75] Only recently has the EU taken the first steps towards a coordinated approach to the issue and a ten-point action plan for ballast water management is currently being implemented by EMSA.[76]

The increasing interaction between the EU and the regional seas organisations in the regulation of shipping not only makes sense from an administrative and resource point of view. It also contributes to greater harmonisation of the rules, which is essential in view of the overlapping membership and the complex legal relationship between the two types of rules. The EU/EMSA-led work on ballast-water management represents the first example where all four European regional seas bodies have come together under an EU umbrella to discuss their common challenges and the potential for a coordinated way ahead. This way of proceeding might well be followed up in other fields.

IMPLEMENTATION

All rules discussed above, irrespective of their origin in terms of 'layers', will make a difference to maritime safety or the environment only if they can be adequately translated into workable rules, standards and practices at the national, local and even individual level. This is a well-known dilemma in international maritime regulation, which does not, however, provide many tools for addressing insufficient implementation by governments. Another familiar dilemma is that the introduction of new rules, without proper implementation, tends to benefit those who were targeted in the first place. Ship operators who routinely flout the required standards will obtain a competitive advantage from rules that are not properly enforced, as many of their

[74] See Helcom Recommendation 19/14 and Baltic Sea Environment Proceedings No. 78 (2000), 'Guidelines on ensuring successful convictions of offenders of anti-pollution regulations at sea'.

[75] See Vidas and Markovčić Kostelac, chapter 21 in this book.

[76] In November 2008, the EMSA hosted a workshop to identify how the EU member states, the European Commission and EMSA can work together to provide a cohesive approach in implementing the ballast water management strategies of the regional forums and ratifying the Ballast Water Convention. See also <www.emsa.europa.eu/end185d012d005.html>.

more scrupulous competitors are likely to go through the often burdensome implementation process anyway. In this sense new rules, at any level, might only widen the gap between those 'good' operators in the maritime industry who do their best to comply, and the 'bad' ones who do not – and who are usually the main target of regulators.

While the IMO is frequently accused of focusing too much on the development of regulation and too little on implementation, the same criticism might as well be directed towards the regional regulatory layers. The monitoring of how rules and regulations are followed up in practice by states, ports and ships is too often neglected at all these levels.

Some positive development may be noted, however. The principal problem at global level, for at least half a century now, has been the lack of implementation of the international rules by flag states and the general lack of enforcement measures available against those flag states who fail in their obligations. In November 2005, the IMO made progress in a long-standing project concerning flag-state implementation when it introduced both a code on the implementation of mandatory IMO instruments, Part 2 of which specifically concerns flag states, and a voluntary audit scheme for IMO member states.[77] It is by no means unthinkable that these instruments will, in due course, provide a basis for the development of mandatory standards for flag state administrations.[78]

The increasing EU involvement in maritime legislation has brought along the strong enforcement apparatus of that legal system to improve the possibilities of taking legal action against member states that fail to implement EU, and indirectly international, maritime safety rules. Port-state control, for example, has traditionally been administered at the regional level by separate regional Memoranda of Understanding that harmonise inspection procedures and enforcement measures with respect to the relevant IMO and ILO rules in a given region. EU Directive 95/21 brought a more solid legal foundation to European port-state control, which still remains closely coordinated in substance with the 1982 Paris MOU on port-state control. Following the enlargement of the EU, membership of the Paris MOU now encompasses all 24 coastal EU/EEA member states as well as Canada, Croatia and the Russian Federation.

Finally, the establishment of a European Maritime Safety Agency aims specifically at ensuring the proper implementation of existing EU legislation in the maritime field. The idea of creating a Maritime Safety Agency for the EU was born in the aftermath of the *Erika* accident, and the founding

[77] IMO Resolutions A. 973(24) and A.974(24).

[78] See IMO Resolution A.946(23), para. 1.

Regulation (No. 1406/2002) was adopted in June 2002. Since then the Agency – EMSA – has grown exponentially and already employs more than 200 persons at its headquarters in Lisbon. The three main tasks of EMSA are as follows:

1) to assist the European Commission and member states in relation to the implementation of existing maritime safety and environmental legislation;
2) to further technical cooperation between member states and to exchange information and best practices; and
3) to provide operational resources to complement those of member states, for instance in relation combating oil pollution.

These tasks encompass a variety of activities, including physical inspection visits to member states in various fields to ensure and promote compliance with relevant EU legislation, such as port-state control, classification societies, seafarers' training institutions, waste facilities and ship security. Increasingly, EMSA is also becoming a regional centre for collecting and managing information on ships and maritime traffic.

With its broad mandate and range of activities, EMSA's presence will probably help to lower the (often artificial) barriers between various aspects of shipping regulation – such as between 'maritime safety' and 'environmental' rules, or between pollution 'prevention', 'monitoring' and 'response'. This is likely to promote cooperation between the EU and the regional organisations over time. Already, EMSA works together with certain regional seas organisations in joint projects to ensure implementation of relevant international and regional rules. Examples include aerial surveillance of discharges in the Baltic Sea and the North Sea, exercised in cooperation with the EU-wide satellite-based CleanSeaNet service,[79] and a Helcom/EMSA pilot project on monitoring the ban on carrying heavy grades of oil in single-hull tankers.[80]

[79] See <www.emsa.europa.eu/end185d014d015.html> and <www.helcom.fi/shipping/waste/en_GB/surveilance/>. See also O. Trieschmann, 'Illegal Oil Spills from Ships: Monitoring by Remote Sensing', in Vidas (ed.), *Law, Technology and Science for Oceans in Globalisation*, pp. 213–229; and K. Tahvonen, 'Monitoring Oil Pollution from Ships: Experiences from the Northern Baltic Practice, in ibid., pp. 231–244.

[80] See <www.helcom.fi/projects/on_going/en_GB/SHT/>.

CONCLUDING REMARKS

The overview of regulatory layers in shipping above suggests that the relationship within and between the different layers is more complex and dynamic than the 'Russian doll' analogy implies. That analogy assumes a considerable degree of harmony between the different layers, but in reality it seems that the smaller (regional) regulatory layers are not always comfortable inside their bigger (global) layer, and that within all layers various types of tensions may – and do – arise. Indeed, Sadowski, who introduced the analogy, has conceded that it has weaknesses and should not be pressed too hard: 'In practice it may sometimes be more accurate to think of this complex of arrangements as a frustrating jigsaw puzzle in which the pieces do not always fit together perfectly.'[81]

Clearly, the idea that the IMO is the sole institution which is involved in regulating international shipping is unhelpful for portraying the realities of today, as it fails to recognise the potential and actual contributions to regulation made by other international and regional organisations. The divergence between that idea and reality grows greater still if we consider the significant role played by (political) *threats* of unilateral or regional competing legislation during IMO negotiations. Quite a considerable share of the past decade's main new standards for shipping (including ship security, oil tanker construction, fuel quality requirements and liability and compensation rules) has emanated from concerns from the international maritime community that, unless the IMO agrees to certain rules, alternative national or regional rules will be developed, which in turn would undermine the organisation's authority to claim a role as the sole maritime regulator.

On the other hand, and indeed thanks to IMO responsiveness to political realities, the regulation of shipping has maintained its fundamentally global character. Certain significant exceptions still exist, notably in the United States, and also in the form of local regulations by individual nation-states, but in the broader picture the differences indicated in this chapter are of relatively minor character. Nearly all EU rules, for example, are closely related to IMO standards; while they might well include some additional components or alterations of scope, they still go along with the main thrust of the international rules and hence tend to support IMO standards rather than challenge them. This is at least equally true of the rules adopted by other regional organisations. At the moment, the authority of the IMO does not seem threatened – but, as has been seen repeatedly, things may change rapidly in the wake of serious accidents with significant political fall-out. In

[81] Sadowski, 'Protection of the Marine Environment of the North Sea', at p. 110.

the absence of such accidents, the next controversy will probably centre on the regulation of greenhouse gases from ships.

In conclusion, it seems clear that life within the global regulatory layer has become considerably more energetic over the past few decades. The heightened dynamism in maritime regulation is not likely to disappear. The activities of various regional players have increased significantly, in different ways, and even the IMO itself has taken some more liberties in relation to the jurisdictional regime of the law of the sea. At the same time, the flexibility of the LOS Convention combined with the pragmatism of the IMO has helped to overcome major challenges to the primacy of global rules in shipping. Not only has this served to maintain order in maritime regulation it has also contributed to the authority of and respect for international law.

21

Ballast Water and Alien Species: Regulating Global Transfers and Regional Consequences

Davor Vidas and Maja Markovčić Kostelac

Ecologists deem the alterations caused to biological diversity by the transfer and spread of alien (non-indigenous) invasive species to be one of the most serious threats to biodiversity – second in impact after habitat destruction.[1] Geologists remind us of the extent of the global migration caused by human activity, due in particular to marine organisms attached to ships or transported as ballast. As observed by Zalasiewicz:

> The transfer of species globally has become a merry-go-round of living organisms without precedent in the Earth's four-and-a-half-billion-year history.[2]

Unlike with the 'traditional' forms of marine pollution, the transfer of marine organisms is virtually irreversible, and the consequences may be permanent. Although maritime transport is not the sole source of the invasion, it is the major source. The current proportions can be illustrated by the following:

> Worldwide, there are more than 480,000 annual ship movements with the potential for transporting organisms. Calculations on the amount of ballast water carried with the world's fleet of merchant ships indicate that somewhere between 2–12 billion tons of ballast water are transported annually… In ballast tanks and as well as other ship vectors (including hulls, anchor chains and sea chests) ships may carry 4,000 to 7,000 taxa every day, ranging from viruses to fishes.[3]

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[1] See: *Invasive Alien Species: Comprehensive Review on the Efficiency and Efficacy of Existing Measures for the Prevention, Early Detection, Eradication and Control*, doc. UNEP/CBT/SBS TTA/6/7, Annex: 'Adverse Impacts of Invasive Alien Species', 20 December 2000, p. 18; available at: <www.cbd.int/doc/meetings/sbstta/sbstta-06/official/sbstta-06-07-en.pdf>. On invasive alien species and global shipping, see Gollasch, chapter 17 in this book.

[2] J. Zalasiewicz, *The Earth After Us: What Legacy Will Humans Leave in the Rocks?* (Oxford University Press, 2008), p. 131. See also Zalasiewicz and Williams, chapter 2 in this book.

[3] Gollasch, chapter 17 in this book, at p. 298.

With the exponential growth of global trade, facilitated by maritime traffic, the spread of alien species has grown accordingly. Three main vessels-source vectors for the transfer of organisms have persisted: ballast water (including sediment), hull fouling, and the cargo itself. This chapter focuses on ballast water – in itself important for the stability and safety of the ship and thus a key component of (global) maritime traffic.

REGULATING BALLAST WATER ISSUES: THE PARTICULAR SITUATION OF ENCLOSED OR SEMI-ENCLOSED SEAS

Over the past twenty years, the International Maritime Organization (IMO) has focused on developing international standards to reduce and ultimately eliminate the growing ecological problems related to the transfer of organisms in ballast water, while at the same time ensuring the unimpeded flow of maritime traffic. Here it should be recalled that some 90 per cent of global trade is transported by shipping. Therefore, major dilemmas are involved and delicate balances – related to global maritime trade, regional environmental status, and individual ship safety – must be taken into consideration.

In developing international standards for responding to such challenges, several principles are of paramount importance:

- due to the global nature of shipping, standards must be globally acceptable
- unimpeded flow of maritime transport needs to be ensured
- ship safety shall not be affected
- technology development for the reduction and ultimate elimination of harmful impact of transfer of organisms should be sought
- the particular situation and needs of certain sea areas and regions should be accommodated, to avoid the proliferation of a variety of national and regional approaches.

On the basis of the above principles, scientists, experts and policy-makers have gradually developed ballast water management standards[4] now incorp-

[4] The first resolution that referred to transfer of aquatic organisms through ballast water was adopted in 1973 at the MARPOL diplomatic conference, then at IMCO (Inter-Governmental Maritime Consultative Organization). However, the problem of harmful aquatic organisms was not raised as a separate issue in IMO until 1988. In 1991, the Marine Environment Protection Committee of the IMO adopted the Guidelines for Preventing the Introduction of Unwanted Organisms and Pathogens from Ships' Ballast Water and Sediment Discharges: MEPC Resolution 50(31). Based on the Guidelines, IMO Assembly adopted in November 1993 the new Guidelines under the same title: Resolution A.774 (18). In November 1997, the IMO Assembly adopted the Guidelines for the Control and Management of Ships' Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens: Resolution A.868(20).

orated into a legal instrument: the International Convention for the Control and Management of Ships' Ballast Water and Sediments (hereinafter: the Ballast Water Convention).[5] It has been noted that the Ballast Water Convention can be considered to be a result of the application of the precautionary approach, since the Convention was 'achieved through the collaboration with the scientific community and in spite of the lack of detailed knowledge of the relationship between risk for ecosystems and human health and concentration of organisms in ballast water'.[6]

The objectives of the Ballast Water Convention are to prevent, minimise and *ultimately eliminate* the transfer of harmful aquatic organisms via ship ballast water and sediments.[7] This ultimate objective is to be met through gradual introduction of technology for on-board *treatment* of ballast water, involving the implementation of a 'Ballast Water Performance Standard' with which ships will have to comply. Ballast water *exchange*, as currently still practised by various operators, is accepted as an *interim* measure only. However, some time still remains until ballast water exchange as a method is entirely phased out – under the Convention, that must be by the year 2016.

For many marine regions, and especially for enclosed or semi-enclosed seas,[8] ballast water exchange poses difficult questions, often different from those for the areas facing the open ocean. European waters as a whole are largely characterised by ship-lanes being relatively close to shore: such is the situation in the North Sea and in the Baltic Sea, as well as in most of the Mediterranean Sea.[9] In some enclosed or semi-enclosed seas, like the narrow and shallow Adriatic Sea, which is deeply incised into the European mainland (and is, in fact, a semi-enclosed basin within a larger semi-enclosed sea), the difficulties are strongly pronounced.

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[5] Text reprinted in *Ballast Water Management Convention*, IMO Publication 1620M (London: IMO, 2005).

[6] M. Tsimplis, 'Alien Species Stay Home: The International Convention for the Management of Ships' Ballast Water and Sediments 2004', IJMCL, Vol. 19, 2005, pp. 411–445, at p. 445.

[7] Art. 2 of the Ballast Water Convention. The Convention (Art. 1.8) defines as 'harmful' those aquatic organisms and pathogens which, if introduced into the sea (including estuaries) or into fresh watercourses, 'may create hazards to the environment, human health, property or resources, impair biological diversity or interfere with other legitimate uses of the sea'. The term used in the Convention is 'harmful aquatic organisms and pathogens', and not 'alien species' or 'invasive alien species'.

[8] For the definition of an 'enclosed or semi-enclosed sea', see Art. 122 of the United Nations Convention on the Law of the Sea (LOS Convention).

[9] For an overview see M. David and S. Gollasch, 'EU Shipping in the Dawn of Managing the Ballast Water Issue', *Marine Pollution Bulletin*, Vol. 56, 2008, pp. 1966–1972, especially at pp. 1968–1971.

This chapter first briefly discusses some key features of the Ballast Water Convention.[10] Thereafter, an overview of ballast-water management standards under the Convention is provided. Only some basic elements, particularly those relevant for the enclosed or semi-enclosed sea areas, will be briefly analysed. Finally, in view of the particular situation of some enclosed or semi-enclosed seas, aspects of measures adjusted to respond to their special needs are examined.

BALLAST WATER CONVENTION: KEY ELEMENTS

The Ballast Water Convention was adopted on 13 February 2004, at the International Conference on Ballast Water Management for Ships held at IMO in London.[11] Adoption of the Convention marked an important milestone in efforts aimed at reducing the risks arising from the transfer and introduction of harmful aquatic organisms and pathogens through ship ballast water.

However, the Ballast Water Convention has not yet entered into force, due to rather stringent requirements.[12] What is required is the ratification (or equivalent) of 30 states, the combined merchant fleet of which constitutes not less than 35 per cent of the gross tonnage of the world's merchant shipping.[13] To date, seven years after the Convention was adopted, 27 states have ratified it, representing altogether only 25.32 per cent of the world gross tonnage of merchant fleet.[14]

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[10] For a comprehensive review and analysis of the Ballast Water Convention, see M.H. Fonseca de Souza Rolim, *The International Law on Ballast Water: Preventing Biopollution* (Leiden: Martinus Nijhoff, 2008). For a useful brief overview of the Convention, see 'New Convention on Ballast Water – Preventing Alien Invaders', *Environmental Policy and Law*, Vol. 34, 2004, pp. 120–123.

[11] For the text of the Convention, as adopted by the Conference, see IMO doc. BWM/CONF/36 of 16 February 2004. For the Final Act of the Conference, see IMO doc. BWM/CONF/37 of 16 February 2004; four Resolutions adopted by the Conference are attached to the Final Act.

[12] See Art. 18.1 of the Ballast Water Convention.

[13] The Conference debated several alternative proposals for requirements for the entry into force of the Convention. The final decision, of increasing the number of states in comparison with some other recently adopted IMO conventions, may be said to reflect the (then forthcoming) marked expansion of EU membership, and the concern that the EU could become a bloc controlling international ratification processes at the IMO. The tonnage percentage requirement, however, is not considered particularly strict in comparison with earlier IMO practice. On the distribution of world gross tonnage of merchant fleet, see Leemans and Rammelt, chapter 16 in this book.

[14] For the status of the Ballast Water Convention, see the document *Status of Multilateral Conventions and Instruments in Respect of which the International Maritime Organization or its Secretary-General Performs Depositary or Other Functions*, updated monthly, and available at the IMO website, <www.imo.org>; information included in this chapter is as of 31 March 2011.

Like several other IMO conventions, the Ballast Water Convention consists of a main body, containing provisions stipulating the basic rights and duties of the parties, and an Annex with more detailed regulations. The Annex forms an integral part of the Convention and contains five sections with actual Regulations. There are also two Appendices presenting certain standard formats.[15] To facilitate global and uniform application of various requirements under the Convention, several Guidelines have been developed by the IMO Marine Environment Protection Committee (MEPC). These are of key importance for the uniform interpretation and harmonised implementation of the Convention, and currently include the following:

- Guidelines for sediment reception facilities (G 1)
- Guidelines for ballast water sampling (G 2)
- Guidelines for ballast water management equivalent compliance (G 3)
- Guidelines for ballast water management and development of ballast water management plans (G 4)
- Guidelines for ballast water reception facilities (G 5)
- Guidelines for ballast water exchange (G 6)
- Guidelines for risk assessment under Regulation A-4 of the Convention (G 7)
- Guidelines for approval of ballast water management systems (G 8)
- Procedure for approval of ballast water management systems that make use of active substances (G 9)
- Guidelines for approval and oversight of prototype ballast water treatment technology programmes (G 10)
- Guidelines for ballast water exchange design and construction standards (G 11)
- Guidelines on design and construction to facilitate sediment control on ships (G 12)
- Guidelines for additional measures regarding ballast water management, including emergency situations (G 13)
- Guidelines on designation of areas for ballast water exchange (G 14)

MEPC has also adopted Guidelines for ballast water exchange in the Antarctic Treaty area. While Guidelines 1 to 14 were developed by MEPC in the years from 2005 to 2008, the remaining Guidelines (G 15) for port-state

[15] The forms in the appendices relate to: 1) the issuance of the International Ballast Water Management Certificate, and 2) operational recording for reporting and verification (to be controlled by inspections) of a Ballast Water Record Book.

control are under development by the relevant IMO bodies.[16] As observed by one commentator, 'the role of the guidelines is debatable… their name indicates that they are not mandatory but examples that need to be followed in the general sense'.[17]

The Ballast Water Convention applies to 'ships entitled to fly the flag of a Party' and 'ships not entitled to fly the flag of a Party, but which operate under the authority of the Party' (Article 3.1(a) and (b)). The provisions of the Convention, including its Annex and Guidelines, represent a 'cookery book' for establishing the regime necessary for implementing the objectives of the Convention. Their 'recipes' provide room for national or regional 'flavouring' to take account of specific local and regional circumstances. However, the Convention also emphasises the need for general consistency and predictability.

In respect of the rights, duties and obligations of the parties, the Convention has retained the division between flag state and port state, as in other IMO instruments. Coastal-state obligations relate mostly to the development of national ballast water strategies, policies and measures, monitoring, regional cooperation, and law enforcement in accordance with international law.

Rights and Duties in Implementing the Convention

The key objective of the Convention – of ultimately eliminating the transfer of harmful aquatic organisms via ship ballast water and sediments – is to be achieved through gradual implementation of a Ballast Water Performance Standard (Regulation D-2), discussed in further detail below. To meet this standard, it is anticipated that ships will conduct ballast water treatment, or have the opportunity to make use of ballast-water reception facilities.

The Ballast Water Convention requires that any ship of 400 gross tonnage and above carries a valid International Ballast Water Management Certificate (hereinafter: Certificate), an approved Ballast Water Management Plan and a Ballast Water Record Book. Technologies applied for meeting the standard under Regulation D-2 of the Convention must be approved (type approval).

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[16] The Guidelines G 1–G 14, and Guidelines related to the Antarctic Treaty area, have been adopted by the following MEPC resolutions: G 1: MEPC.152(55); G 2: MEPC.173(58); G 3: MEPC.123(53); G 4: MEPC.127(53); G 5: MEPC.153(55); G 6: MEPC.124(53); G 7: MEPC.162(56); G 8: MEPC.174(58); G 9: MEPC.169(57); G 10: MEPC.140(54); G 11: MEPC.149(55); G 12: MEPC.150(55); G 13: MEPC.161(56); G 14: MEPC.151(55); and Guidelines for ballast water exchange in the Antarctic Treaty area: resolution MEPC.163(56).

[17] Tsimplis, 'Alien Species Stay Home', p. 445.

Parties are to ensure that ballast water management does not cause greater harm to their environment, human health, property or resources, or those of other states, than that which is thereby prevented.

To implement the objectives of the Convention, parties 'shall endeavour', beyond cooperation, to establish or support continued development and research work in relation to ballast water management; and to report to the IMO as well as to inform other parties on matters and aspects related to ballast water management.

The Convention does not prevent any party from taking, individually or jointly with other parties, more stringent measures in order to establish a more appropriate level of protection – provided that such measures are consistent with international law (Article 2.3). The procedures for introducing those 'more stringent measures' are elaborated under Regulation C-1, there termed 'Additional measures'. The combined effect of the general obligations under the Convention (Article 2) with Annex, Section C ('Special requirements in certain areas') may prove to be of special importance for enclosed or semi-enclosed seas.

Facilitating Implementation of the Convention

Several interaction issues are addressed by the Ballast Water Convention regarding 'administrations'[18] and ships. Interference with the voyage of a ship is to be avoided to the highest degree possible, while satisfying the required level of protection to the marine environment against the introduction of harmful aquatic organisms through ship ballast water. The Convention operates with careful balances to this end; some of the outstanding issues are briefly reviewed here.

Reception facilities

The Convention requires parties to provide facilities for sediment reception in ports and terminals where cleaning or repair of ballast tanks takes place.[19] The Convention's balance between requiring, on the one hand, the avoidance of undue delay to ships, while still ensuring the prevention of damage to the environment, human health and resources, is evident also in the provision on sediment reception facilities (Article 5).

However, the Convention contains no mandatory requirements for a party to facilitate the reception of ballast water. Facilities for ballast water recep-

[18] 'Administration' is defined in Art. 1.1 of the Ballast Water Convention as 'the Government of the State under whose authority the ship is operating'.

[19] Guidelines for sediment reception facilities (G 1) specify the requirements associated to such a facility.

tion may be considered by those parties that find the protective level against unwanted transfers offered by the performance requirements of the Convention insufficient, a point thus also related to the implementation of additional (more stringent) measures.[20]

Survey and certification, inspection of ships, and 'undue delay'

In order to implement requirements and to enable monitoring of compliance, parties are obliged to establish regimes for survey (normally by or on behalf of the flag state), certification (by or on behalf of the flag state) and inspection (normally by or on behalf of a port state). The Convention contains provisions defining procedures for survey and the issuance of certificates (Article 7) as well as procedures concerning inspection (Article 9). These procedures are well consistent with generally established practices.

The port state has both the right and duty to perform inspections for the purpose of detecting violations of the provisions of the Convention. These are, however, limited to:

- verifying that the ship is carrying a valid Certificate;
- undertaking inspection of the Ballast Water Record Book; and
- sampling of the ship's ballast water, carried in accordance with the relevant guidelines (Guidelines for ballast water sampling, G 2).

Regarding sampling, the time required to analyse the samples is not to be used as a basis for *unduly delaying* the ship (its operation, movement or departure). 'Undue delay' and undue detention are important considerations under the Ballast Water Convention (Article 12), and relate also to verification of additional measures for survey and certification (Article 7.2), inspection (Article 9) and detection of violations and control of ships (Articles 8 and 10). Parties shall undertake all efforts to avoid undue delay to ships; and if a ship has been unduly delayed, it is entitled to compensation for the loss or damage suffered.

This right, however, is not an absolute one, and this is where the Ballast Water Convention operates with another important balance: safeguarding ship operations, on the one hand, and providing safeguards to the environment, human health, property or resources, on the other. If a ship is found to have violated the Convention, the port state may warn, detain or exclude the ship; that does not constitute 'undue delay'. The port state can in such cases grant the ship permission to leave the port or terminal for the purpose of discharging ballast water or proceeding to a repair yard or reception facility, *but it is under duty not to do so* if that would present *a threat of* harm to the

[20] Measures as provided for in Section C and its associated Guideline (G 13).

environment, human health, property or resources. Moreover, if sampling indicates that a ship poses such a threat, the party 'in whose waters the ship is operating' shall prohibit it from discharging ballast water until the threat is removed (Article 10.3); also that is not considered 'undue delay' to the ship.[21]

Finally, there is one more set of situations in which the party is obliged to ensure that the ship does not discharge ballast water until it can do so without threat of harm to the environment, human health, property or resources; and where thus there may arise an actual delay to a ship, without this being regarded as 'undue'. This relates to the situations that may give rise to a *detailed inspection* (Article 9, paragraphs 2 and 3). Detailed inspection may be carried out in several cases, as follows:

- if a ship does not carry a valid Certificate;
- if there are clear grounds for believing that the condition of the ship or its equipment does not correspond substantially with the Certificate; and
- if there are clear grounds for believing that the master or the crew are not familiar with essential shipboard procedures relating to Ballast Water Management, or have not implemented such procedures.

In those circumstances, the inspecting party shall ensure that the ship does not discharge ballast water until it can do so without presenting a threat of harm to the environment, human health, property or resources.

However, no additional procedural rules for such detailed inspections are provided for by the Convention. In order to facilitate uniform implementation, it should be recommended that efforts be made in order to establish mechanisms for triggering such detailed inspections, as well as details of what such an inspection should encompass. While recognising the right of each party to develop national policies in its ports (Article 4), detailed inspection requirements could be optimally harmonised through regional coordination, preferably through regional memoranda on port-state control.

Violations

In relation to circumstances where violation of the Convention has been revealed, the rights and duties of the parties involve several key considerations. First, the 'administration' is authorised under the Convention to establish, through its legislation, sanctions against violations, and such sanctions shall be adequately severe to discourage violations. Second, when inspection

[21] The term 'in whose waters the ship is operating', in the lack of any definition under the Ballast Water Convention, must be understood in accordance with customary international law, as reflected in the LOS Convention. See, in general, Art. 16 of the Ballast Water Convention.

indicates violation of the Convention, the ship and its administration should be notified; such notification is to include any evidence of the violation. And third, administration which has detected the violation shall investigate the matter and institute proceedings or provide the flag state in question with information and evidence of the violation in order for it to consider sanctions against the ship.

The flag state or the port state that detected the violation may take steps to warn, detain or exclude the ship. These actions represent both sanctions (detention and exclusion) as well as cooperation with other states (warning). A regional plan could include uniform responses to violations when these are detected. This may be considered through regional cooperation in conjunction with dealing with the concept of detailed inspections.

Technical assistance, cooperation and regional cooperation

Under the Ballast Water Convention, the parties undertake to provide support for other parties requesting technical assistance in several specifically enumerated aspects related to the control and management of ship ballast water (Article 13). Requested assistance and support includes training of personnel, assistance to ensure the availability of technology, equipment and facilities, and assistance to initiate joint research and development programmes. This may be arranged directly or through the IMO.

As to the transfer of technology regarding the control and management of ship ballast water and sediments, the parties undertake to cooperate, subject to their national laws, regulations and policies.

According to the Convention, parties with a common interest in protection against the unwanted transfer of harmful aquatic organisms and its potential effects in a given geographical area, in particular those bordering enclosed or semi-enclosed sea areas, shall endeavour – taking into account characteristic regional features – to enhance regional cooperation (Article 13.3). This relates to information exchange, but also to the conclusion of regional agreements, as well as the development of harmonised procedures. It may be anticipated that the encouragement offered by the Convention in this sphere will provide further stimulation for expanded involvement on ballast water issues, including regional cooperative participation.

STANDARDS FOR BALLAST WATER MANAGEMENT

The objectives of the Ballast Water Convention are to be achieved through implementing the management of ship ballast water and sediments, in accordance with the standards defined by the Convention. 'Ballast Water Management' is defined as:

> mechanical, physical, chemical and biological processes, either singularly or in combination, to remove, render harmless, or avoid the uptake or discharge of Harmful Aquatic Organisms and Pathogens within Ballast Water and Sediments.[22]

This definition predominantly reflects the precautionary approach, although the Convention combines both preventive and reactive approaches. The basic principle contained in Regulation A–2 of the Convention requires that any and all discharge of ship ballast water shall take place through ballast water management in accordance with the provisions of the Annex to the Convention.[23] Therefore, standards for ballast water management can be considered an essential part of the Convention. There are two groups of standards defined by the Convention: 'ballast water exchange standard' (Regulations D-1 and B-4) and 'ballast water performance standard' (Regulation D-2).

Ballast Water Exchange Standard

The Ballast Water Exchange Standard is derived from the earlier Guidelines,[24] and defines *how* and *where* exchange of ballast water must be conducted. Regulation D-1 relates to the question of 'how': in line with this standard, ships should exchange at least 95 per cent of the volume of their ballast water (for sequential exchange); or, if the pumping-through method is used, pumping through three times the volume of each ballast water tank is required. Regulation B-4.1 relates to 'where': ballast water exchange is to be conducted at least 200 nautical miles[25] from the nearest land[26] and at sea-depths of at least 200 meters. In cases where exchange at such a distance is not possible, exchange can still be conducted, but then as far from the nearest land as possible, and in all cases at least 50 miles from the nearest land; in any case, the water depth requirement remains at least 200 meters (Regulation B-4.1.2). This standard, therefore, relies on the difference in content and species characteristics between the oceanic and coastal waters, as well as deep and shallow waters.

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[22] Art. 1.3 of the Ballast Water Convention.

[23] Annex 'Regulations for the Control and Management of Ships' Ballast Water and Sediments' contains Regulations A–E, and forms an integral part of the Ballast Water Convention (Art. 2.2 of the Convention).

[24] The 1997 Guidelines for the Control and Management of Ships' Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens; see footnote 4 above.

[25] All references to 'miles' hereinafter are nautical miles.

[26] The term 'from the nearest land' means, in accordance with Regulation A-1.6, from the baseline from which the territorial sea is established in accordance with international law (with an exception regarding the north-eastern coast of Australia, as detailed in Regulation A-1.6).

However, the exchange standard stops short of defining the desirable outcome – the quality or content of ballast water that would not impose harm once discharged into the marine environment. Under this standard, a ship has fulfilled its obligations if the ballast water on board has been exchanged in accordance with the standard, irrespective of the actual biological content of the water discharged. This is thus a procedural standard, consisting of two criteria: 1) volume percentage of ballast water exchanged; and 2) distance/depth where this is done. Compliance with the standard is not measured by the actual end-result, but only by the fact of it being successfully performed.

Indeed, this can be considered a practical measure that reduces the chances of invasion from living organisms in ballast tanks in a recipient port.[27] However, studies have shown that the degree of efficiency is uncertain.[28] The actual outcome depends on several factors, including the conditions on uptake, duration of voyage, characteristics of route, weather conditions, type of ship, quantity of ballast water and various other circumstances. Moreover, as will be discussed further below, in some sea areas this standard cannot be applied, due to geographic and hydrographic circumstances.

Ballast Water Performance Standard

In contrast to the exchange standard discussed above, the Ballast Water Performance Standard is a water-quality standard. It defines water quality – the content acceptable for discharge into a marine environment – by detailing the maximum content of organisms in ballast water as the requirement for satisfying the standard.[29] When it was adopted in the 2004 Ballast Water Convention, there were in fact no technologies available enabling its implementation. Therefore, the standard was at that time conceived as a *goal* for

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[27] On invasions see J.M. Drake and D.M. Lodge, 'Global Hot Spots of Biological Invasions: Evaluating Options for Ballast-Water Management', *Proceedings of the Royal Society of London – B*, Vol. 271, 2004, pp. 575–580; available at <http://aquacon.nd.edu/research/invasive-species/documents/DrakeandLodgeHotspots.pdf>. As to the Mediterranean, see A. Occhipinti-Ambrogi and D. Savini, 'Biological Invasions as a Component of Global Change in Stressed Marine Ecosystems', *Marine Pollution Bulletin*, Vol. 46, 2003, pp. 542–551.

[28] Especially regarding regional seas, see T. McCollin, E.M. Macdonald, J. Dunn, C. Hall and S. Ware, 'Investigations into Ballast Water Exchange in European Regional Seas', in *Proceedings of the Second International Conference on Marine Bioinvasions*, New Orleans, 9–11 April 2001 (abstract available at <http://massbay.mit.edu/publications/marinebioinvasions/mbi2_abstracts.pdf>, pp. 100–101); and T. McCollin, A.M. Shanks and J. Dunn, 'Changes in Zooplankton Abundance and Diversity After Ballast Water Exchange in Regional Seas', *Marine Pollution Bulletin*, Vol. 56, 2008, pp. 834–844.

[29] For specifications, see Regulation D-2 of the Annex to the Ballast Water Convention.

technology developers rather than an available and applicable technical standard.[30]

The corrective for uncertainty involved in the development of such a standard can be found in two elements of the Ballast Water Convention: 1) the phasing-in period for the ballast water performance standard; and 2) the provision for the review of standard.

Phasing-in period

'Phasing-in' or 'phasing-out' provisions are very common in IMO technical instruments, particularly those relating to ship design and equipment. They are necessary for many different reasons, including ship construction costs, building capacities, the need to allow stability in the shipping market (which directly influences the global economy), ensuring ship safety, as well as management and operational procedures.

In the case of Ballast Water Convention, the reason for defining a phasing-in period was the need to ensure sufficient time for the development of technology that could ensure the compliance with the performance standard envisaged by the Convention. The phasing-in period is from 2009 to 2016, depending on the date of a ship's construction and its ballast water capacity.[31]

The first implementation date, 2009, only five years after the adoption of the Ballast Water Convention, seems to have been too ambitious, and created some legal ambiguity. The time required to develop guidelines for accomplishing the Convention, the relatively lengthy processes of technology testing and approval, as well as the rather slow Convention ratification process all resulted in a need to postpone the deadlines defined by Regulation B-3.

Review of Standards

The described circumstances in which the Convention D-2 standard was developed required a specific 'adjustment mechanism' that could ensure adequate reaction, should the defined standard prove unrealistic or inadequate. What was sought was flexibility to ensure that the basic principles of the Convention would be maintained, even under changed circumstances.

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[30] The latest MEPC session (in October 2010) gave final approval to six ballast water management systems that make use of active substances, bringing the current number of systems with final approval to 18 altogether. For an overview of ballast water management systems that make use of active substances, which received (either basic or final) approval from IMO (as of October 2010), see <www.imo.org/OurWork/Environment/BallastWaterManagement/Documents/table%20updated%20in%20October%202010.pdf>. Also, ten ballast water management systems which, as of October 2010, received type approval certification by their respective administrations are listed therein.

[31] See Regulation B-3 of the Annex to the Ballast Water Convention.

This is provided by Regulation D-5, whereby MEPC is authorised to undertake a review of available technologies appropriate for achieving the defined standard, as well as an assessment of the socio-economic effects in relation to the developmental needs of developing countries. The Convention defined the latest date for this review: no later than three years before the earliest effective date of the standard set forth in Regulation D-2. Since that date was in 2009, the review was due in 2006.[32]

Based on its assessment, the Committee (or a review group formed by it) may propose amendments to the Annex of the Ballast Water Convention for consideration by the parties to the Convention; indeed, only parties may participate in formulating recommendations and amendment decisions taken by the Committee. If the parties decide to adopt the amendments to the Annex, the procedure for adoption and entry into the force is as set out in Article 19 of the Convention. Thus, we see that MEPC serves the parties of the Ballast Water Convention as a technical advisory body mandated to assess, discuss, propose – but not itself amend – the standards of the Convention. That role is, also under general treaty law, reserved strictly for the parties.[33]

The provisions of Regulation D-5 were designed to address the situation that arose during the assessment procedure from 2005 to 2007.[34] Another aspect to bear in mind is the fact that the Convention did not enter into the force by the first application date (2009) as set forth in Regulation B-3, which gives rise to the question of the principle of non-retroactivity under the law of international treaties.[35] The most appropriate legal option here could have been to adopt a Protocol to the Convention.[36] However, that was deemed impracticable. Instead, the IMO Assembly adopted a Resolution[37]

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[32] See also Resolution 4, 'Review of the Annex to the International Convention for the Control and Management of Ships' Ballast Water and Sediments', adopted by the International Conference on Ballast Water Management for Ships, IMO doc. BWM/CONF/37, of 16 February 2004, p. 10.

[33] See Art. 39 of the Convention on the Law of the Treaties (done in Vienna, 22 August 1969, entered into force on 27 January 1980); published in UNTS, Vol. 1155, pp. 331ff; text reprinted in ILM, Vol. 8, 1969, pp. 645ff. Currently, since the Ballast Water Convention is not in force, and given its Art. 18, states that so far on the international plane established their consent to be bound by the Convention are 'contracting states'; see Art. 2(1)(f) of the Vienna Convention on the Law of Treaties.

[34] The first assessment took place during the 53rd session of MEPC in July 2005; it was followed by another, during the 55th session of MEPC in October 2006, and then during the 56th MEPC session in July 2007.

[35] See Art. 28 of the Vienna Convention on the Law of Treaties.

[36] See doc. BLG 11/4/3 submitted by the IMO Secretariat for the 11th session of the IMO Bulk Liquids and Gases Sub-Committee, held 16–20 April 2007. The document contains legal opinion provided by the IMO Legal Office.

[37] Resolution A.1005(25) adopted by the IMO Assembly at its 25 session, on 29 November 2007.

recommending that states, when establishing their consent to be bound by the Ballast Water Convention (by ratification, acceptance, approval or accession) accompany the relevant instrument with a declaration or other communication to the IMO Secretary-General, stating their intention to apply the Convention on the basis of the understanding that:

> A ship subject to regulation B-3.3 constructed in 2009 will not be required to comply with regulation D-2 until its second annual survey, but no later than 31 December 2011.[38]

The Resolution also calls for declaration to be submitted by the current contracting states to the Convention.[39] It could be expected that similar approach would be applied for further delay, if and when required. The Resolution requested MEPC to review, by its 58th session, the issue of a ship subject to Regulation B-3.3 constructed in 2010 and the immediate availability of type-approved technology to meet the D-2 standard.[40]

Although there could be understanding for political and practical reasons behind this solution, from the legal point of view it seems an unusual practice, and one that may create additional uncertainty and reluctance towards ratification of the Ballast Water Convention.

Ballast Water Exchange Standard: Shortcomings and Options Available

Currently, and in the forthcoming period which may take some additional years, ballast water exchange is the most frequently used management tool. Its positive attributes are relative biological effectiveness, availability and, above all, the low costs involved. Open-ocean ballast water exchange can reduce the risk of ballast-water mediated invasion.

However, some aspects of ballast water exchange are particularly challenging for enclosed and semi-enclosed sea areas. Firstly, ballast water exchange is not 100 per cent effective in removing all harmful organisms from ballast tanks.[41] Secondly, implementation of this method may, under various circumstances, endanger the stability and integrity of the vessel, particularly during severe weather conditions of the type frequently present on the open-ocean high seas. In such a situation, shipmasters would hesitate to exercise the risky operation of exchanging ballast water on the high seas, preferring

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[38] Ibid., pt. 2.

[39] Ibid., pt. 4.

[40] Ibid., pt. 6.3. At the 59th session of MEPC (July 2009), it was confirmed that sufficient ballast water management systems would be available to ships constructed in 2010.

[41] See, e.g., G.M. Ruiz and G. Smith, *Biological Study of Container Vessels at the Port of Oakland. Final Report*, 22 March 2005, available at: <www.serc.si.edu/labs/marine_invasions/publications/PortOakfinalrep.pdf>.

to conduct it in sheltered waters. That, however, means a greater probability of secondary introduction. Exchange of ballast water not undertaken in an open ocean environment significantly reduces its biological efficiency. Further, the more sheltered waters of semi-enclosed and enclosed seas are often sensitive marine environments, and thus more vulnerable to additional pressures.

Another shortcoming of the ballast water exchange standard lies in its limited applicability for shipping within an enclosed or semi-enclosed sea, where neither the distance from the shore nor the sea-depth can fulfil the requirements of the Convention. Matters are further complicated by the provision of Regulation B-4.3, stipulating that a ship shall not be required to deviate from its intended voyage or delay the voyage in order to comply with the ballast water exchange standard.

Ballast Water Exchange Area

The possibility of designating specific areas for the exchange of ballast water was meant as a relaxation provision for enclosed or semi-enclosed sea areas. In fact, however, this would hardly overcome the difficulties involved. The feasibility of designating an area for exchange of ballast water gives rise to many concerns, regarding several enclosed or semi-enclosed sea areas in particular. In addition to bio-geographical considerations and trading patterns, the development of such an exchange area will most likely affect its efficiency, due to deteriorating it over time. Another concern is that such areas may themselves become a source of secondary transfers of harmful aquatic organisms within a region. Increase in trade, as anticipated in most such sea-areas, may undermine the quality of the exchange area over time.

According to the Guidelines developed by the IMO,[42] a potential ballast water exchange area should be assessed in order to ensure that its designation will minimise any threat of harm to the environment, human health, property or resources.[43] Consideration must be given to various oceanographic, physic-chemical, biological, and environmental parameters, as well as to the information on important resources in the area. It is equally important to take into account the navigational characteristics in the area in question. The designated area should be on or near usual navigational routes.[44] However, the area designation should not have an adverse impact to the safety of navigation: therefore, when selecting the area, location and size

[42] Resolution MEPC 151(55) adopted on 13 October 2006: Guidelines on designation of areas for ballast water exchange (G 14); see also footnote 16 above and the accompanying text.
[43] Ibid., pt. 8.2.
[44] Ibid., pt. 7.2.4.

should be considered, as well as issues relating to the concentration of traffic in a limited area. The foreseen ballast water operations, proximity of other vessel traffic (like small crafts), traffic separation schemes and other routing measures in place, are all relevant factors here.

Moreover, related legal and political issues are inevitable. Regulation B-4.2 authorises the port state to designate an area for ballast water exchange, in consultation with adjacent or other states, in sea areas where the distance from the nearest land or the depth do not meet the parameters for ballast water exchange. In such a consultation process, the comments of adjacent or other states should be taken into account 'as far as practicable',[45] and no party should designate an area in the waters under the jurisdiction of another state without its explicit agreement.[46] It could be anticipated that the views and interests of a port state and those of adjacent or other coastal state(s) may differ, creating a potential source of conflict. In addition, although the discharge of ballast water is considered as operational discharge, intentional discharge in a zone designated for such a purpose could be considered as dumping, with all the legal consequences involved.

Several enclosed or semi-enclosed seas have relatively small surface areas and are narrow, highly ecologically sensitive, and of utmost importance for the coastal population. In most cases, these seas are highly integrated ecosystems that could be severely affected by the secondary introduction of invasive species. Moreover, due to the limited space within some semi-enclosed seas, fulfilling the exchange standard[47] within the exchange area of a limited size could entail significant delay for a ship. And traffic congestion could affect the safety of navigation.

All these elements need to be assessed in accordance with the Guidelines (G 14) against the main purpose of designating an area: minimising potential harm to the environment. Designation of an area where large quantities of ballast water are to be discharged and exchanged is a rather controversial issue, involving complex ecological, legal and political questions concerning some enclosed and semi-enclosed seas while offering only limited benefits for their sensitive marine environments.

Pending technology development enabling implementation of the ballast water performance standard in commercial shipping, and in the absence of an area designation, a further question arises: of the legality of a discharge of

[45] Ibid., pt. 6.1.

[46] The term 'waters under jurisdiction' of a state, as used in the Ballast Water Convention, must be understood in accordance with customary international law, as reflected in the LOS Convention; see Art. 56(1)(b) of the LOS Convention, on jurisdiction in the EEZ.

[47] That is, exchange of at least 95 per cent of ballast water volume, or pumping three times the volume of each ballast water tank.

ballast water *not* conducted in accordance with Convention standards (B-4.1 or B-4.2). This may happen due to the character of the navigational route, since a ship is not required to deviate from its intended voyage. Regulation A-2 stipulates that the discharge of ballast water shall be conducted only through ballast water management in accordance with the provision of the Annex to the Convention, except where expressly provided otherwise. Therefore, the general rule is – no discharge if the ballast water has not been managed. Exceptions from that rule should be explicit. These are prescribed in Regulation A-3 and relate to safety and anti-pollution purposes, or to a discharge that is environmentally harmless. According to Regulation A-3:

> The requirements of regulation B-3, or any measures adopted by a Party pursuant to Article 2.3 and Section C, shall not apply to:
>
> 1. the uptake or discharge of Ballast Water and Sediments necessary for the purpose of ensuring the safety of a ship in emergency situations or saving life at sea; or
>
> 2. the accidental discharge or ingress of Ballast Water and Sediments resulting from damage to a ship or its equipment:
>
> .1 provided that all reasonable precautions have been taken before and after the occurrence of the damage or discovery of the damage or discharge for the purpose of preventing or minimizing the discharge; and
>
> .2 unless the owner, Company or officer in charge wilfully or recklessly caused damage; or
>
> 3. the uptake and discharge of Ballast Water and Sediments when being used for the purpose of avoiding or minimizing pollution incidents from the ship; or
>
> 4. the uptake and subsequent discharge on the high seas of the same Ballast Water and Sediments; or
>
> 5. the discharge of Ballast Water and Sediments from a ship at the same location where the whole of that Ballast Water and those Sediments originated and provided that no mixing with unmanaged Ballast Water and Sediments from other areas has occurred. If mixing has occurred, the Ballast Water taken from other areas is subject to Ballast Water Management in accordance with this Annex.

In addition, parties are authorised to grant exemptions, but these are related to the implementation dates of D-1 (exchange) or D-2 (performance) standard, or to additional measures – and are thus not relevant for the above question.

It can be therefore concluded that, apart from the exceptions provided for in Regulation A-3, ships are not allowed to discharge ballast water unless treated or exchanged in accordance with the standards under the Ballast Water Convention. However, the Convention does not provide clear directions regarding the relationship of the dispensation given in Regulation B-4.2 and discharge admissibility. A relevant regional arrangement or, in some cases, national provisions could fill this gap.

Additional Measures

For several enclosed or semi-enclosed seas, better solutions than the designation of specific areas for ballast water exchange – particularly in the transitional period while ballast water exchange standard prevails – could be to develop additional/more stringent measures as provided in Article 2.3 of the Ballast Water Convention and in Regulation C-1. This regulation contains provisions for parties that do not find the level of protection offered by Section B of the Annex to the Convention sufficient to prevent, reduce, or eliminate the transfer of harmful aquatic organisms and pathogens through ship ballast water and sediments. Such party or parties may, consistent with international law, require ships to meet a specified standard or requirement. The need for such additional (more stringent) measures may rest on geographical characteristics or on circumstantial situation; hence, the measure may be permanent, or time-limited. However, a party whose view is that additional/more stringent measures are therefore needed should, prior to establishing these, consult with adjacent or other states that may be affected by such standards or requirements.

Parties intending to introduce additional measures are subject to several obligations and/or considerations, including in particular:

- communication of their intention to establish additional measure to IMO at least six months prior to the projected date of implementation of the measure (except in emergency or epidemic situations);
- obtaining approval by the IMO, yet only to the extent required by customary international law as reflected in the LOS Convention;
- to endeavour to make available all appropriate services, as far as practicable, in order to ease the burden on ships, including notification to mariners of areas, and available and alternative routes or ports; and
- no additional measure is to compromise the safety and security of the ship, nor conflict with any other convention with which the ship must comply.

Although the additional measures may be imposed by a single state, it is preferable for measures to be defined through regional cooperation. Article 13.3 of the Convention deals specifically with regional cooperation in enclosed and semi-enclosed seas. It invites parties with common interests to protect the environment, human health, property and resources to endeavour, taking into account characteristic regional features, to enhance regional cooperation, including through the conclusion of regional agreements.

The Convention does not specify the substance of the measures, leaving to the interested parties the freedom to develop measures appropriate to the needs of a particular area. However, as regards the principles and procedures

to ensure a transparent and harmonised approach, the relevant Guidelines for additional measures[48] should be followed.

ENCLOSED AND SEMI-ENCLOSED SEAS SURROUNDING EUROPE: ANTICIPATING THE ENTRY INTO FORCE OF THE CONVENTION

As noted initially, European waters are characterised by ship-lanes being relatively close to shore: such is the situation in the North Sea and in the Baltic Sea, as well as in most of the Mediterranean Sea. In some enclosed or semi-enclosed seas, like the narrow and shallow Adriatic Sea, the difficulties are strongly pronounced.

The problem for those seas arises, at the outset, because the Ballast Water Convention is not yet in force; and once in force, it will be binding for its parties only. There is, moreover, no common policy on ballast-water issues at the EU level so far;[49] only recently have the EU bodies taken the first steps towards a coordinated approach to this issue.[50] Also, there are no legal mandatory requirements at various European enclosed and semi-enclosed sea levels; some countries have, however, adopted national regulations.[51]

Two approaches have emerged through regional cooperation in recent years, in anticipation of the entry into force of the Ballast Water Convention. One approach is the introduction of certain *voluntary* ballast-water management requirements in accordance with the Convention, until its entry into force. In 2008, such voluntary interim application of aspects of the Ballast Water Convention, in particular the ballast-water exchange standard in accordance with Regulation D-1, was introduced by HELCOM and OSPAR countries for shipping in the north-east Atlantic and the Baltic Sea.[52] These

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[48] Resolution MEPC.161(56) adopted on 13 July 2007: Guidelines for additional measures regarding ballast water management including emergency situations (G 13).

[49] Indeed, so far (31 March 2011) only four EU member states have at all ratified, approved or acceded to the Ballast Water Convention: France, the Netherlands, Spain and Sweden. Regarding semi-enclosed seas discussed, two Adriatic coastal states have acceded to the Convention: Albania and Croatia – while the two EU-member coastal states (Italy and Slovenia) have not as yet. Among the Baltic Sea coastal states, only Sweden has acceded to the Convention. Only one additional European coastal state acceded to the Convention so far: Norway. Finland signed the Convention, subject to acceptance. Among the Mediterranean coastal states, in addition to the four already mentioned (Albania, Croatia, France and Spain), there are only two more contracting states to the Convention: Egypt and Syria.

[50] See Ringbom, chapter 20 in this book, on recent activity by the European Maritime Safety Agency.

[51] See Gollasch, chapter 17 in this book. See also an overview of developments in several semi-enclosed seas surrounding Europe in David and Gollasch, 'EU Shipping in the Dawn of Managing the Ballast Water Issue', pp. 1969–1971.

[52] See further in Gollasch, chapter 17 in this book, at pp. 302–303.

requirements apply to extra-regional traffic, i.e., to vessels entering the north-east Atlantic on trans-Atlantic voyages and on routes passing the West African coast.

Another approach, aiming at *legally binding* measures, has emerged in the Adriatic Sea regional cooperation, and has been discussed between Adriatic countries since 2006, in the context of an initiative towards PSSA designation for the Adriatic Sea.[53] That approach involves introducing regionally-adjusted ballast water measures, upon joint regional initiative brought to the IMO through *ad hoc* procedures. Among the measures considered are the designation of the Adriatic Sea as a 'no ballast water exchange area', thus requiring ships to undertake ballast water exchange prior to entry to the Adriatic Sea area (which, once the Convention is in force, would become the situation on both legal and factual grounds);[54] and mandatory ship reporting on ballast water entering the Adriatic Sea. While these two measures may stand independently, they would create an optimal effect in tandem; and both measures should be regarded as temporary, pending entry into force of the Ballast Water Convention and actual implementation of ballast water performance standard under the Convention. In the current situation, both measures would be subject to approval by the IMO to gain legally binding force at the global level – even though the Convention itself is not in force, and might not enter into force for some time (and even then will not become binding for third states, including many IMO member states).[55] One procedural possibility considered among the Adriatic states is the inclusion of such measures as associated protective measures in the proposal for PSSA designation. Whether such measures may be proposed already in advance of the entry into force of the Ballast Water Convention is a legal issue,[56] while it

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[53] For a comprehensive overview and discussion on the Adriatic PSSA initiative see D. Vidas, 'Particularly Sensitive Sea Areas: The Need for Regional Cooperation in the Adriatic Sea', in K. Ott (ed.), *Croatian Accession to the European Union: The Challenges of Participation* (Zagreb: Institute of Public Finance and Friedrich Ebert Stiftung, 2006), pp. 347–380; available at <www.ijf.hr/eng/EU4/vidas.pdf>. As to the related ballast-water measures proposed, see ibid., at pp. 368–369. These measures were initially elaborated in *Ballast Water Issues for Croatia – Adriatic PSSA*, Report prepared for the Croatian Ministry of the Sea, Transport and Infrastructre, February 2006 (Lysaker: The Fridtjof Nansen Institute and Det norske Veritas, 2006), unpublished, on file with the authors.

[54] There are indeed certain management and practical by-products to consider, in terms of possible effect on inter-Adriatic traffic, on the ports within the Adriatic Sea, and on the modalities of traffic arriving to the Adriatic Sea – that all would need to be taken into account when designing the proposed measure. Similarly to HELCOM/OSPAR practice, the main target of such a measure would be traffic of extra-regional origin.

[55] The latter measure (mandatory reporting), in order to gain legal effect on third states, should in any case (with the Ballast Water Convention in force or not) be approved by the IMO.

[56] As to the legal basis related to the associated protective measures in the PSSA context, see dis-

is a matter of policy whether the measures so proposed would thereupon be adopted at the IMO.

It has been observed that 'the HELCOM/OSPAR and Adriatic approaches may be taken as a starting point for the development of a European-wide concerted approach'.[57] Once the Ballast Water Convention is in force and the ballast-water performance standard in place, these regional approaches will no longer be needed. In the interim, however, it is difficult to see what other options are left to the coastal and port states of the enclosed and semi-enclosed seas concerned.

CONCLUSION

The Ballast Water Convention is a comprehensive legal instrument, and one that in the long term could ensure the reduction and, ultimately, elimination of the serious environmental challenge caused by the transfer of aquatic organisms via ship ballast water. However, in the transitional period, while ballast water exchange remains the most frequently used management tool, additional and more stringent measures, based on regional cooperation, will be the best solution for the highly sensitive marine ecosystems of enclosed and semi-enclosed sea areas. Instruments of regional cooperation can fill the gap until the Convention enters into force, as well as deal with its identified shortages in the transitional period. Also in the later stage, regional cooperation will remain the instrument through which implementation of global standards can be ensured, taking into account the specific needs of certain regions – a consideration of particular importance for highly environmentally sensitive enclosed and semi-enclosed sea areas. Bearing in mind the global character of shipping, also regional cooperation should take into account globally defined standards. As for national legislation, its predominant role must be to ensure implementation and enforcement in accordance with international law.

cussion in IMO doc. 53/8/2 of 15 April 2005, especially para. 12, pp. 4–5. Approval of the IMO is required for additional measures proposed only to the extent required under customary international law, as reflected in the LOS Convention (Regulation C-1, para. 3.3 of the Annex to the Ballast Water Convention). See further in Vidas, 'Particularly Sensitive Sea Areas', p. 368.

[57] David and Gollasch, 'EU Shipping in the Dawn of Managing the Ballast Water Issue', p. 1971.