Shipping and the atmosphere
An analysis of the international regulation of air pollution from ships

Master’s Thesis
LLM in Natural Resources Law and International Environmental Law
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Abstract
The shipping industry has experienced a massive growth since the mid-90s onward but the addressing of the environmental impact of its atmospheric emissions has not had such a speedy development. The shipping industry emits substances that are harmful in a cumulative way. These substances affect the marine and terrestrial environment as well as populations across the globe. Sulphur and nitrogen oxides, carbon dioxide and other substances are responsible for, among other effects, ocean acidification and climate change.
This thesis explains how the IMO came to regulate the atmospheric emissions from shipping, what is the current framework for its regulation and what are the difficulties and complexities associated with it in order to evaluate the regulatory efforts made to date. The analysis of the role of the Law of the Sea Convention and the International Maritime Organization’s instruments in addressing air pollution from international shipping constitutes the core of this thesis. The instruments are analyzed with regard to their context, the effectiveness of the regime they create and the interactions with other international regimes regarding environmental protection.
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<tr>
<td>BDN</td>
<td>Bunker Delivery Note</td>
</tr>
<tr>
<td>BWM</td>
<td>Convention for the Control and Management of Ships’ Ballast Water and Sediments</td>
</tr>
<tr>
<td>CBD</td>
<td>Convention on Biological Diversity</td>
</tr>
<tr>
<td>CBDR</td>
<td>Common But Differentiated Responsibilities</td>
</tr>
<tr>
<td>CDEM</td>
<td>Construction, design, equipment and manning</td>
</tr>
<tr>
<td>CH₄</td>
<td>Methane</td>
</tr>
<tr>
<td>CITES</td>
<td>Convention on International Trade in Endangered Species of Wild Fauna and Flora</td>
</tr>
<tr>
<td>CO₂</td>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>DOALOS</td>
<td>UN Division for Ocean Affairs and the Law of the Sea</td>
</tr>
<tr>
<td>dwt</td>
<td>Deadweight tonnage</td>
</tr>
<tr>
<td>ECA</td>
<td>Emission Control Area</td>
</tr>
<tr>
<td>ECOSOC</td>
<td>UN Economic and Social Council</td>
</tr>
<tr>
<td>EEDI</td>
<td>Energy-Efficiency Design Index</td>
</tr>
<tr>
<td>EEZ</td>
<td>Exclusive economic zone</td>
</tr>
<tr>
<td>EIT</td>
<td>Economies in transition</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization</td>
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<tr>
<td>FOC</td>
<td>Flag of convenience</td>
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<tr>
<td>FOEI</td>
<td>Friends of the Earth International</td>
</tr>
<tr>
<td>GHG</td>
<td>Greenhouse gas</td>
</tr>
<tr>
<td>HFCs</td>
<td>Hydro fluorocarbons</td>
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<tr>
<td>IACS</td>
<td>International Association of Classification Societies</td>
</tr>
<tr>
<td>IAEA</td>
<td>International Atomic Energy Agency</td>
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<tr>
<td>ICJ</td>
<td>International Court of Justice</td>
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<tr>
<td>IEL</td>
<td>International environmental law</td>
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<tr>
<td>ILO</td>
<td>International Labour Organization</td>
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<tr>
<td>IMCO</td>
<td>Intergovernmental Maritime Consultative Organization</td>
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<td>IMO</td>
<td>International Maritime Organization</td>
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<tr>
<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
</tr>
<tr>
<td>ITLOS</td>
<td>International Tribunal for the Law of the Sea</td>
</tr>
<tr>
<td>IUCN</td>
<td>International Union for the Conservation of Nature</td>
</tr>
<tr>
<td>IUMI</td>
<td>International Union of Marine Insurance</td>
</tr>
<tr>
<td>LOS</td>
<td>Law of the sea</td>
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<tr>
<td>LOSC</td>
<td>UN Convention on the Law of the Sea</td>
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<tr>
<td>MARPOL</td>
<td>International Convention for the Prevention of Pollution from Ships</td>
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<tr>
<td>MEA</td>
<td>Multilateral environmental agreement</td>
</tr>
<tr>
<td>MEPC</td>
<td>Marine Environmental Protection Committee</td>
</tr>
<tr>
<td>MOU</td>
<td>Memorandum of Understanding</td>
</tr>
<tr>
<td>MSC</td>
<td>Maritime Safety Committee</td>
</tr>
<tr>
<td>N₂O</td>
<td>Nitrous oxide</td>
</tr>
<tr>
<td>Acronym</td>
<td>Full Form</td>
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<tr>
<td>---------</td>
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</tr>
<tr>
<td>NGO</td>
<td>Non-governmental organization</td>
</tr>
<tr>
<td>NO&lt;sub&gt;x&lt;/sub&gt;</td>
<td>Oxides of nitrogen</td>
</tr>
<tr>
<td>OCIMF</td>
<td>Oil Companies International Marine Forum</td>
</tr>
<tr>
<td>OECD</td>
<td>Organization for Economic Co-operation and Development</td>
</tr>
<tr>
<td>OILPOL</td>
<td>Convention for the Prevention of Pollution of the Sea by Oil</td>
</tr>
<tr>
<td>OPRC</td>
<td>International Convention on Oil Pollution Preparedness, Response and Co-operation</td>
</tr>
<tr>
<td>OSPAR</td>
<td>Convention for the Protection of the Marine Environment of the North-East Atlantic</td>
</tr>
<tr>
<td>P&amp;I</td>
<td>Protection and indemnity</td>
</tr>
<tr>
<td>PSSA</td>
<td>Particularly Sensitive Sea Area</td>
</tr>
<tr>
<td>SCMP</td>
<td>Sub-Committee on Marine Pollution</td>
</tr>
<tr>
<td>SCOP</td>
<td>Sub-Committee on Oil Pollution</td>
</tr>
<tr>
<td>SEEMP</td>
<td>Ships Energy Efficiency Management Plan</td>
</tr>
<tr>
<td>SF&lt;sub&gt;6&lt;/sub&gt;</td>
<td>Sulphur hexafluoride</td>
</tr>
<tr>
<td>SO&lt;sub&gt;x&lt;/sub&gt;</td>
<td>Oxides of sulphur</td>
</tr>
<tr>
<td>STCW</td>
<td>Convention on Standards of Training, Certification and Watchkeeping for Seafarers</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>UNCED</td>
<td>UN Conference on Environment and Development</td>
</tr>
<tr>
<td>UNCLOS</td>
<td>UN Conference on the Law of the Sea</td>
</tr>
<tr>
<td>UNCTAD</td>
<td>UN Conference on Trade and Development</td>
</tr>
<tr>
<td>UNEP</td>
<td>UN Environmental Programme</td>
</tr>
<tr>
<td>UNFCCC</td>
<td>UN Framework Convention on Climate Change</td>
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<tr>
<td>WMO</td>
<td>World Meteorological Organization</td>
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<tr>
<td>WWF</td>
<td>World Wide Fund for Nature</td>
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Introduction

Ships are a source of numerous types of pollution. While accidental discharges of oil and other dangerous substances from tankers cause the biggest alarms among the general public, these accidents are localized in their impacts and a major proportion of the initial pollution is biodegraded into the environment. The focus of this thesis is a type of pollution that occurs during the normal working of vessels or seafaring practices. This type of pollution is called operational pollution and while there are several types of operational pollution, this thesis is going to address airborne pollution from ships.

The shipping industry is responsible for the emission of substances that are harmful in a cumulative way. These substances affect the marine and terrestrial environment as well as populations across the globe. Sulphur and nitrogen oxides, carbon dioxide and other substances are responsible for, among other effects, ocean acidification and climate change.

The shipping industry plays a key role in global trade, the development of this industry with its consequent lowering of prices in shipping services have favored the globalization of production and consumption. The industry has experienced a massive growth since the mid-90s onward but the addressing of the environmental impact of its atmospheric emissions has not had such a speedy development. The United Nations Convention on the Law of the Sea (LOSC)\(^1\) calls on states to establish international rules and standards to prevent, reduce and control pollution of the marine environment from vessels through the competent international organization.\(^2\) Despite the difficulty in agreeing on a regulation of an international industry, a legal instrument that regulates pollution from ships was adopted under the auspices of the International Maritime Organization (IMO). This instrument is the International Convention for the Prevention of Pollution from Ships (MARPOL)\(^3\) and is the most important international instrument regulating all types of pollution from ships, including airborne pollution. The convention seeks to have emissions from ships such as sulphur and nitrogen oxides from the exhaust gas of ship engines minimized. It regulates shipboard incineration, prohibits deliberate ozone-depleting substances and establishes measures on the volatile organic compounds from tankers.\(^4\) The regulation of greenhouse gas (GHG) emissions was recently added to the Convention. This thesis attempts to explain how the IMO came to regulate air emissions from the shipping industry and what the current regulation is.

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2. LOSC, article 211.1
Objectives and outline

The objective of this thesis is to examine how the atmospheric emissions from shipping are internationally regulated and to provide a comprehensive view of the issue. It is also the objective of this thesis to highlight the difficulty and complexity associated with the regulation of air pollution in order to evaluate the regulatory efforts made to date. The analysis of the role of the Law of the Sea Convention and the International Maritime Organization’s instruments in addressing air pollution from international shipping constitutes the core of this thesis. The instruments are analyzed with regard to their context, the effectiveness of the regime they create and the interactions with other international regimes regarding environmental protection. The analysis is carried out as follows.

The first Chapter provides an overview of the shipping industry in relation to the environment and climate change. First, it characterizes the industry, then it considers how the sector is affected by changes in the environment and also to what extent the sector is a contributor to the degradation of the environment. This chapter also considers what measures have already been taken and what measures can be taken in the future to offset the environmental impact of the emissions. It also presents the legal method.

Chapter 2 discusses the context of the regulation of vessel-source marine pollution. It provides the historical development of the legal framework of vessel-source marine pollution. This historical development is explained by putting in parallel the development of two areas of international law that have had an impact on each other; the law of the sea and international environmental law. It also characterizes the actors that play a part in the development of the regulation of vessel-source marine pollution and the international fora in which it is carried out.

The role of the IMO in the regulation of vessel-source pollution is very important. For this reason Chapter 3 is dedicated to the analysis of the background and structure of the IMO. It also explains the law-making process in the IMO.

Chapter 4 explains the legal framework of vessel-source pollution in general and air pollution from ships in particular. It will analyze what kind of rules address vessel-source pollution and where they are found.

Chapter 5 analyzes the provisions on air pollution from ships in the international instruments. The analysis addresses separately the different substances emitted by ships.

Chapter 6 presents the final conclusions of this thesis.
1. International shipping and the environment

1.1. International shipping, an international business

Shipping carries about 90 per cent of global trade by weight.\(^5\) Over 80,000 merchant ships registered in over 150 states transport internationally every kind of cargo. Maritime transport is and has been through history the type of transport to carry the largest freight. This industry employs over a million seafarers.\(^6\) By its very nature, shipping is an international business and as such calls for international regulation. In fact, the shipping industry is amongst the first ones to adopt international standards that have been achieved through the creation of a global framework of regulations concerning safety and regulation of pollution.

The networks of maritime transport constitute the arteries of global trade.\(^7\) International shipping is efficient, low cost and widely available. It is also the safest and cleanest mode of transportation. Shipping is the most effective mode of transportation to safely move large quantities of cargo over long distances due to the low friction of water.\(^8\) There is a wide variety of merchant ships trading internationally that can be put into categories. Container ships carry most of the world’s manufactured goods and products, usually on scheduled lines services. Bulk carriers transport raw materials such as iron ore, coal or food. Tankers carry crude oil, chemicals and petroleum products. There are other types of merchant ships such as car carriers, gas carriers, heavy lift carriers and ships supporting the offshore oil industry. Other smaller types of merchant ships include ferries, which carry both passengers and cargo, and cruise ships.

In 2015 the world’s commercial fleet consisted of 89,464 vessels which constitutes a tonnage of 1,75 billion dwt.\(^9\) The world fleet is composed of different types of merchant ships. Bulk carriers amount to 43,5 per cent of the world fleet, followed by oil tankers, which amount to 28 per cent. Container ships represent 13 per cent of the world fleet and general cargo 4,4 per cent. The other 11,1 per cent of the world fleet represents other types of ships. Of these, offshore ships or platform supply vessels are the most numerous ones, they represent 4,2 per cent of the world fleet. They are followed by gas carriers (2,8 per cent) and chemical tankers (2,4 per cent). Ferries and passenger ships amount to 0,3 per cent of the world fleet.\(^10\)

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\(^7\) R. Martin Lees, “The impacts of a world in transformation on the prospects for maritime transport” in Regina Asariotis and Hassiba Benamara (eds), Maritime Transport and the Climate Change Challenge (Earthscan 2012)
\(^9\) UNCTAD, Review of Maritime Transport 2015, p. 30
\(^10\) Ibid, p. 31
From the beginning of the year 2014 to the beginning of the year 2015, the world fleet grew 3.5 per cent, which is a higher growth rate than that of the global GDP and trade growth. The growth of the world fleet is not homogeneous. It varies according to the type of vessel. The dry bulk fleet experienced a growth of 4.4 per cent. The container ship fleet grew of 5.2 per cent which, despite the economic slowdown, has had a consistent growth leading to oversupply and pushing the freight rates down. The expansion of trade in gas and new offshore exploration projects explain the growth in the offshore and gas tanker fleets (6.7 and 7.2 per cent respectively). Oil carriers have grown 1.4 per cent and ferries and passenger ships have grown 4.8 per cent in the period aforementioned.

About two-thirds of the world’s shipping tonnage is associated with the energy and metal industries. Trade in oil, iron ore, coal and grain is the largest part of international trade in terms of weight but in terms of value, two-thirds of the value of international trade in 2004 were manufactured goods. Sea travel for passengers has decreased greatly in favor of aviation but it is still relevant for short trips or recreational cruises.

Despite maritime shipping being a well consolidated industry, it is not immune to the challenges faced by the international community. The world is interconnected and so are its crises: financial and economic instability, energy and resources constraints, rising levels of unemployment and public debt are dealt with in a context of inequality, poverty and growing population. Another of these challenges is the degradation of the environment and climate change. These are the challenges that most directly affect maritime transport. The subsequent sections address the relationship of maritime transport and the environment.

As regards the situation of international shipping in respect of the global economy, there has been an increase in the world merchandise trade in the context of a slowly recovering world economy that has translated into an increase in the global seaborne shipments. The following data shows these developments. The world’s economy has showed a slow moving recovery that has been led by an uneven growth of the developed countries while developing countries have slowed down their growth. In 2014 the world gross domestic product increased marginally by 2.5 per cent up from 2.4 in 2013. The world merchandise trade increased in 2014 by 2.3 per cent, less than it did

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11 Ibid
12 Ibid, p. 34 “The continued high level of growth of container vessels indicates the industry’s persistent strategy to realize economies of scale as well as cost savings, for example through increased energy efficiency.”
13 Andreas Kopp, “Transport costs, trade and climate change” in Regina Asariotis and Hassiba Benamara (eds), Maritime Transport and the Climate Change Challenge (Earthscan 2012)
14 UNCTAD, Review of Maritime Transport 2015, p. 1
15 Ibid
in 2013. The most recent data on global seaborne shipments shows that they have increased by 3.4 per cent in 2014 which is the same as they did in 2013. UNCTAD’s Review of Maritime Transport predicts that the growth in the world gross domestic product, merchandise trade and seaborne shipments are expected to continue to grow at a moderate pace.

1.2. The impacts of climate change for maritime transport

The previous section noted the importance of the availability of maritime transport, and transport in general, to international trade. Malfunctions in transport translate into sizable losses of gain in trade. These malfunctions are frequently related to climate factors and they are expected to increase. Climate change will have direct and indirect effects on transport such as higher monetary costs, longer waiting time and less reliable shipment. An increase in transport costs by 10 per cent would decrease trade by 20 per cent. Climate change involves higher average temperatures and higher levels of precipitation and more frequent and intense extreme weather conditions. Changed sea levels will affect maritime transport and ports, it will reduce clearance under bridges near coasts and threaten port infrastructure. More intense storms will damage bridges, piers, terminal buildings, ships and cargoes.

A rising of sea level will inundate vast areas of coastal land. With a rise of one meter, productive agricultural land and cities are expected to disappear and groundwater become contaminated. In the short term, the threat to maritime transport is concentrated in developed cities and sixty per cent of the asset exposure is located in the US, Japan and the Netherlands. Adapting to those changes is not more costly than the likely losses due to the impact of climate change. Reducing the vulnerability of maritime transport would avoid major setbacks in trade but adaptation action is a case for a whole other study.

1.3. Maritime transport as a contributor to climate change

Although maritime transport is a minor contributor to marine pollution compared to land based industries, the normal operation of vessels and marine casualties introduce many pollutants to the environment. The normal operation of vessels releases different types of pollution: oil pollution, air pollution, noise, chemical pollution. Vessels can also be responsible for the introduction of invasive species. These types of pollution happen as a result of discharges of sewage, ballast water or fuel oil

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16 Ibid
17 Ibid
18 Kopp, “Transport costs, trade and climate change”, p.42
19 Ibid
from engine rooms, the burning of fossil fuels or waste resulting from the cleaning of cargo holds that carry substances in bulk. As regards air pollution, the emissions of the world’s commercial fleet contribute to environmental problems that include global warming, ocean acidification and eutrophication as well as adverse effects on public health.\textsuperscript{20} The gases emitted by the shipping industry are here separated into two categories for a clearer analysis. The categories are: greenhouse gas emissions and other atmospheric emissions.

In the category of other atmospheric emissions it is found that maritime transport is responsible for the emission of oxides of sulphur (SO\textsubscript{x}), oxides of nitrogen (NO\textsubscript{x}), volatile organic compounds (VOC), ozone and particulate matter. Sulphur oxides are generated during the combustion process, it is an acidic gas which substantially contributes to acid rain. Acid rain interferes with the growth of flora and fauna, as well as water life.\textsuperscript{21} Nitrogen oxides are also formed during the combustion process. Its precursors, nitrogen and oxygen, compose 99 per cent of an engine intake air. Oxygen is consumed during the combustion process and the nitrogen remains unreacted, however, a part of it will oxidize. The levels of NO\textsubscript{x} depend on the combustion temperature and the time the nitrogen is exposed to the high temperatures of the diesel engine. The higher the temperature and longer time of exposure, the higher the amount of NO\textsubscript{x}. The adverse effects of NO\textsubscript{x} on the environment are acidification, tropospheric ozone formation and nutrient enrichment as well as contributing to photochemical smog.\textsuperscript{22} VOC are emitted by tankers, especially during the loading and unloading operations and crude oil washing operations, but also during sea voyages as a result of incomplete combustion. They are a concern for public health as they cause eye irritation and respiratory problems as well as central nervous system problems in case of chronic inhalation. Particulate matter is generated during the combustion of marine fuel oil. It takes the form of soot and ash. It is believed to have carcinogenic effects.\textsuperscript{23}

There are 27 substances considered as greenhouse gases according to the Intergovernmental Panel on Climate Change (IPCC), of these, Carbon dioxide (CO\textsubscript{2}), methane (CH\textsubscript{4}), nitrous oxide (N\textsubscript{2}O), hydro fluorocarbons (HFCs), per fluorocarbons (PFCs) and sulphur hexafluoride (SF\textsubscript{6}) are the most important ones. The emissions of GHG in any industry are “highly correlated to the amount of fuel consumed”.\textsuperscript{24} It is difficult to determine the total fuel consumed by the shipping industry due to inconsistencies in the auditing methods.\textsuperscript{25} A study conducted by the IMO on the

\begin{footnotesize}
\begin{enumerate}
\item Cullinane K and Cullinane S, “Atmospheric Emissions from Shipping: The Need for Regulation and Approaches to Compliance” (2013) 33 Transport Reviews, p. 377
\item Ibid, p. 381
\item IMO, MARPOL: Annex VI and NTC 2008 with Guidelines for Implementation (2013), p. 69
\item Cullinane K and Cullinane S, “Atmospheric Emissions from Shipping”, p. 381
\item Ibid, p. 379
\item Ibid
\end{enumerate}
\end{footnotesize}
emissions from ships estimated that the shipping industry accounts for 2.2 per cent of the global CO₂ emissions.²⁶

It has been shown that maritime transport is not a great contributor to the CO₂ globally emitted²⁷ but because of the fuel used in this industry, “there are a range of pollutants which are of more concern in relation to the shipping industry than they are in other modes of transport and of greater immediate concern than the CO₂ produced by the industry”.²⁸ Maritime transport uses bunker oil as fuel, a by-product of the standard oil refining process that is dirtier than the fuel used in other modes of transport and also cheaper. Bunker fuel has over a 100 times more SOₓ than on-road diesel.²⁹ The non-GHG emissions from shipping contribute substantially to acid rain and photochemical smog and they also produce soot and ash.

International efforts to protect the environment have focused on the effects of CO₂ for climate change and consequently there is extensive research on the subject. The role of CO₂ as a greenhouse gas is no longer questioned. The research in this field has proved as long ago as 1896 that increased concentrations of CO₂ warm the planet.³⁰ Research has later proved a series of findings that constitute the core of climate research. These findings are considered facts and can be reduced to what follows: the concentration of atmospheric CO₂ has been successfully quantified. It has risen from 280 parts per million in 1850 to over 380 ppm in 2012.³¹ The causes of this rise are mainly the burning of fossil fuels and to a lesser extend deforestation. The anthropogenic character of the CO₂ is revealed by a different isotopic composition than that of non anthropogenic CO₂. Another aspect that proves that fact is that the amount of coal, oil and gas that has been extracted from the Earth (which has been documented) corresponds to the amount of CO₂ emitted. Half of this CO₂ emitted is in the atmosphere and the rest has been absorbed by the oceans and the biosphere. About 30 per cent of the anthropogenic CO₂ has been absorbed by the ocean which has resulted in ocean acidification.

Carbon dioxide is a greenhouse gas that changes the Earth’s radiation budget. A higher concentration of CO₂ provokes higher near-surface temperatures. The data on globally averaged temperature of land and ocean surface combined in the period between 1880 and 2012 shows a

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²⁶ IMO, “Third IMO GHG Study 2014, Reduction of GHG emissions from ships”, MEPC at its 67th session, p. 13
²⁷ For a comparison of CO₂ emissions between different modes of transport see the Second IMO GHG Study 2009 at p. 136
²⁹ Ibid
³⁰ Findings by Nobel laureate Svante Arrhenius
³¹ Stefan Rahmstorf, “Climate change. State of science” in Regina Asariotis and Hassiba Benamara (eds), Maritime Transport and the Climate Change Challenge (Earthscan 2012)
warming of 0.85 °C.\textsuperscript{32} If the concentration of CO\textsubscript{2} doubles, global average temperature will rise between 2 and 4 °C. As has been shown above, CO\textsubscript{2} is not the only gas with a greenhouse effect. Gases of anthropogenic origin that contribute to the greenhouse effect such as methane (CH\textsubscript{4}) and nitrous oxide (N\textsubscript{2}O) are not as relevant. This is due to the fact that their contribution to global warming is offset by the cooling effect of aerosol pollution.

To determine the pace of global warming it is necessary to look at long records as the global averaged temperature shows substantial decadal and interannual variability. Multi-decadal records show that the period between 1983 to 2012 was “likely the warmest 30-year period of the last 1400 years in the Northern Hemisphere”.\textsuperscript{33} The ocean accumulates 90 per cent of the energy stored in the climate system and about 1 per cent is stored in the atmosphere. The ocean has also taken up CO\textsubscript{2} which has increased its acidity about 26 per cent since the beginning of the industrial era.

The factors that lead to the rise of the sea level have their origin in global warming but they contribute in different degrees. Melting of glaciers and the thermal expansion of the oceans contribute to the rising of the sea level but the melting of the Greenland Ice Sheet alone would increase the sea level by 7 meters. Global warming also entails changes in ocean currents and weather patterns. Extreme weather conditions are expected to be a result of these changes. All of these effects would directly affect maritime transport, making it less reliable although the dramatically reduced ice in the North Atlantic and the Arctic could change navigation prospects in those areas. Greenhouse gas emissions have also an impact on marine life. The higher concentration of CO\textsubscript{2} contributes to the acidification of the oceans.

The CO\textsubscript{2} emissions from international shipping (as well as emissions from aviation) were left out of the Kyoto Protocol. Article 2.2 of the Protocol establishes that “the Parties included in Annex I shall pursue limitation or reduction of emissions of greenhouse gases not controlled by the Montreal Protocol from aviation and marine bunker fuels, working through the International Civil Aviation Organization and the International Maritime Organization, respectively.” Annex I parties “include the industrialized countries that were members of the OECD (Organization for Economic Co-operation and Development) in 1992, plus countries with economies in transition (the EIT Parties), including the Russian Federation, the Baltic States, and several Central and Eastern European States”.\textsuperscript{34} The Kyoto Protocol is the most influential instrument regulating CO\textsubscript{2} emissions, it establishes legally binding emission reduction targets for industrialized countries as

\textsuperscript{33} Ibid
\textsuperscript{34} As defined by the UNFCCC at http://unfccc.int/parties_and_observers/items/2704.php accessed October 13, 2015
they are believed to be principally responsible for the high concentrations of greenhouse gases in the atmosphere.\(^35\) The Protocol does not set any commitments for the aviation or shipping industry “because of the difficulties in attributing emissions from these industries to specific countries”.\(^36\) GHG emissions from shipping have been on the international agenda since the mid-2000s but as has been shown earlier, non GHG emissions from shipping pose a bigger threat to the environment.

### 1.4. Reducing fuel consumption from the shipping industry

Because of the close link between fuel consumption and emissions, the obvious response to reducing emissions is reducing fuel consumption. Reducing fuel consumption benefits the industry because it reduces costs, but adopting measures with that objective is not always considered by the industry. Cullinane provides a list of measures that the shipping sector can unilaterally adopt to reduce emissions.\(^37\) The measures are classified as technical and operational, and both aim at increasing fuel efficiency. Technical measures include improving engines for greater fuel efficiency, recovering waste heat from the engines to convert it into electric power and thus reducing the consumption of fuel for that purpose, improving the hull design to reduce friction with water and improving propellers and rudders. Operational measures concern the routine functioning and activities of the sector. Operational measures can improve fuel efficiency by developing better logistics, port efficiency and avoiding less than full back-hauls or ballast voyages. More specific measures include reducing the speed of vessels,\(^38\) improving the routing and planning of fleet deployment. As operational measures affect directly the productivity of fleets and thus profitability, the industry has already taken advantage of these. Consequently, there is little room left for further improvements in this sense.

The measures to reduce fuel consumption do not always entail cost reductions. Improving technology and operations requires research investments that the industry is not always willing to assume. The interest of the industry in unilaterally taking action is diminishing and in addition the “growth in the sheer volume of shipping has far outweighed any fuel efficiency savings”.\(^39\) Having seen that there are no further incentives for the industry to offset the environmental externalities of its activities, the last resort to reduce emissions and thus making environmental protection a priority over commercial interests is through regulation.

\(^{36}\) Cullinane K and Cullinane S, “Atmospheric Emissions from Shipping”, p. 378  
\(^{37}\) Ibid, p. 383  
\(^{38}\) According to Cullinane a reduction of speed by 20% reduces fuel consumption by 40% and CO\(_2\) emissions by 7%  
\(^{39}\) Ibid, p. 386
1.5. Legal method

The development of international law concerning international shipping is carried out by the International Maritime Organization, a specialized agency of the United Nations. Despite the IMO not having been attributed the power to adopt treaties itself, it is the most relevant organization in “developing aspects of the law of the sea relating to maritime safety and the protection of the marine environment”.\(^\text{40}\)

The IMO predates the Law of the Sea Convention (LOSC). At the time of its elaboration, the LOSC “did not seek to interfere with the formal role and functions of preexisting international organizations”\(^\text{41}\) but it had “major consequences for all international organizations involved in maritime affairs”\(^\text{42}\) as the LOSC redefined the legal framework of the law of the sea.

In the areas of the law of the sea relating to maritime safety and the protection of the marine environment, the LOSC calls upon the competent international organizations to develop them.\(^\text{43}\) The specialized international organization that responds to that call is the IMO. In the LOSC provisions relating to adoption of international shipping rules and standards in matters concerning maritime safety and the prevention of marine pollution from vessels, the expression “competent international organization” applies exclusively to IMO when used in the singular.\(^\text{44}\) Part XII of the LOSC entitled Protection and Preservation of the Marine Environment contains, among others, the provisions on vessel-source pollution and serves as the IMO’s main framework for action in the field.\(^\text{45}\) These provisions were directly influenced by MARPOL, in fact the practice of IMO members for vessel-source pollution was reduced to treaty obligations in the LOSC.\(^\text{46}\) These instruments form a regime for preventing marine pollution and protecting the marine environment that is very detailed and comprehensive.

The constituent instrument of the IMO attributes to the organization the mandate of providing a permanent intergovernmental forum to discuss matters of all kinds affecting ships engaged in international trade and “to encourage and facilitate the general adoption of the highest

\(^\text{41}\) Ibid, p. 154
\(^\text{42}\) Ibid
\(^\text{43}\) Part XII of the LOSC is dedicated to the Protection and Preservation of the Marine Environment. The provisions relating to the conservation and management of the living resources are found in the parts of the Convention that establish state jurisdiction in each maritime zones
\(^\text{44}\) *Implications of the United Nations Convention on the Law of the Sea for the International Maritime Organization*, Document LEG/MISC/8, January 30, 2014, 7 “the expression "competent international organization", when used in the singular in UNCLOS, applies exclusively to IMO, bearing in mind the global mandate of the Organization as a specialized agency within the United Nations system established by the Convention on the International Maritime Organization (the "IMO Convention").”
\(^\text{46}\) Ibid, p.159
practicable standards in matters concerning the maritime safety, efficiency of navigation and prevention and control of marine pollution from ships”.47

The importance of the IMO in developing standards for maritime safety and the protection of the marine environment is paramount. The organization provides its specialized committees and subcommittees for negotiating the standards that are later adopted in convened diplomatic conferences. The IMO has had an important role in developing the law of the sea, its international standards have been incorporated into the legal framework of the law of the sea by virtue of the rules of reference of the LOSC.

The LOSC establishes a comprehensive regime for the law of the sea, but the protection of the marine environment “lies in an area of overlap between the law of the sea and international environmental law, containing elements of each and belonging to both”.48 This overlap is present in the provisions that relate to pollution from vessels and pollution and it will be addressed in subsequent chapters.

The international law of the sea is an important part of public international law and so is international environmental law. Since this thesis is going to deal with those two areas of international law, it is necessary to briefly characterize public international law. International law is traditionally defined as the rules and norms that regulate the conduct of states and other entities whose legal personality is acknowledged at any given time.49 It differs from a municipal legal system. International law is a decentralized system. Its norms do not emanate from an international legislature, there is not a written constitution nor an identification of organs of government. Therefore, the main challenge presented by public international law is the identification of the sources.

International law stems from the practice of states and their entering into agreements. States, which are equally sovereign, are the primary subjects of international law. Consensus is the foundation of international law and usually states have to consent to assume obligations that limit their behavior. Rules of international law are imperative once they are established. These rules cannot be unilaterally modified by states.

There is an increased commitment to the rule of international law and reciprocity plays an important part in the observance of the rules. A proof of this commitment may be the creation of judicial and quasi-judicial bodies to which states can refer their disputes for a peaceful settlement. The increasing case load of the International Court of Justice (ICJ) reflects the commitment of

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47 IMO Convention, article 1(a)
48 de La Fayette, “The Marine Environment Protection Committee”, p. 158
49 Rebecca M. M. Wallace and Olga Martin-Ortega, International law (Sweet & Maxwell Thomson Reuters 2013), p. 2
states to international law. As its task is to decide disputes in accordance to international law, its statute provides the guidelines on where to find the sources of public international law when deciding the disputes that come before the ICJ. Article 38 of its statute\textsuperscript{50} is regarded by states as an authoritative statement on the sources of international law.\textsuperscript{51}

Article 38 of the ICJ Statute lists the material sources of international law. The list has been interpreted as a hierarchy, although it is not stated in the wording of the article. The first sources listed are the international conventions, second, the international custom, third, the general principles of law and lastly the judicial decisions and the teachings of the most qualified publicists of the various nations, as subsidiary means for determination of rules of law. There are sources of international law that have not been listed in this article, such as soft law and the acts of international organizations, which are “some of the most dynamic sources of international law that contemporary international law relies on”.\textsuperscript{52}

As has been stated earlier, consensus is the foundation of international law which implies that states are free to withstand rules that they feel are not in line with their sovereign interests. This translates into a difficulty to create a common set of rules for all states.\textsuperscript{53} Despite this difficulty, the law of the sea stands out as an international regime that has been widely accepted by states.\textsuperscript{54}

\textsuperscript{50} 1945 Statute of the International Court of Justice  
\textsuperscript{51} Wallace RMM and Martin-Ortega O, \textit{International law}, p. 8  
\textsuperscript{52} Ibid, p. 9  
\textsuperscript{53} Harrison J, \textit{Making the Law of the Sea}, p. 3  
\textsuperscript{54} The Law of the Sea Convention has 157 signatories and 167 parties
2. Context of the regulation of vessel-source marine pollution

2.1. Parallel developments of IEL and the LOS

This section describes the development of international environmental law and the law of the sea in relation to the protection of the marine environment and puts it in parallel. The protection of the marine environment is a shared objective of both areas of international law. In general, the regulation of marine pollution has had a slower development than that of international environmental law but, as the following sections will show, it has always been connected to that. The result is the existence of provisions in international environmental law instruments that have direct implications for the protection of the marine environment and that are implemented by institutions governed by the law of the sea such as the IMO. Despite the evident importance of those institutions, since the 1992 UN Conference on Environment and Development held in Rio de Janeiro, the instruments and fora created following the conference caught the attention of environmentalists while they overlooked the environmental work of older organizations such as the IMO.\(^55\)

This section will also show which has been the place of IMO with respect to the developments of both areas of international law to later explain its role in preventing and controlling pollution of the marine environment from vessels.

2.1.1. Early developments

The marine environment has been the object of protection in multilateral agreements as early as the early twentieth century. At that time, the concern was placed on conservation of living resources as a result of the international competition for them. The first multilateral treaties addressing those concerns were dedicated to fisheries, seals and whaling.\(^56\) In 1926, the Preliminary Conference on Oil Pollution of Navigable Waters held in Washington, D.C. prepared a draft convention on oil pollution from ships that was not signed by any government but it serves as evidence of the emergence of serious environmental problems.\(^57\) Problems related to oil pollution, over-exploitation of resources and the escalating effects of pollution from land and sea-borne activities became serious enough to cause an international response already by mid twentieth century.

With respect to shipping matters, a large number of bodies dealt with maritime problems before the Second World War, but during the war the need to create an authority to coordinate all

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\(^{55}\) de La Fayette, “The Marine Environment Protection Committee”, p. 159

\(^{56}\) On fisheries, the 1923 Convention for the Preservation of the Halibut Fishing of the Northern Pacific and the 1930 Convention Establishing an International Pacific Salmon Fisheries Commission. On seals, the 1911 Convention for the Preservation and Protection of Fur Seals. On whaling, the 1931 Convention on the Regulation of Whaling

aspects of Allied shipping arose. The Shipping Adjustment board was created and evolved into the United Maritime Authority in 1944. This Authority was succeeded in 1948 by the United Maritime Consultative Council, which was created as a temporary body with the sole purpose of reestablishing normal peacetime activities.\textsuperscript{58} The time demanded a permanent central organization in the shipping field and in 1948 the United Nations Maritime Conference was convened in Geneva to discuss the creation of such a body within the UN system.\textsuperscript{59} The Intergovernmental Maritime Consultative Organization (IMCO) was signed at the conference and it came into being a decade later. Its functions were consultative and advisory.

After the Second World War, instruments of international law dedicated to the protection of the environment emerged in great number. Despite no specific environmental mandate in the UN Charter of 1945, the United Nations took action on the question. The focus of this concern was the conservation of natural resources. In 1949, the Economic and Social Council (ECOSOC) convened the UN Scientific Conference on the Conservation and Utilization of Resources in Lake Success, New York. Discussions at the conference confronted for the first time the utilization of resources and the consequent depletion with their conservation. This tension would always be present in the elaboration of later agreements dealing with the law of the sea.

In 1958, the IMCO Convention entered into force in time to assume the management of the Convention for the Prevention of Pollution of the Sea by Oil (OILPOL),\textsuperscript{60} which entered into force a few months later and established several functions to be undertaken by IMCO. At the time of its creation, “no other global agency compared to IMCO in the formulation of international environmental conventions”\textsuperscript{61} despite vessel-source pollution not being a purpose of the organization. The year 1958 was also the year of the First United Nations Conference on the Law of the Sea (UNCLOS I). The conventions concluded at the conference were the Convention on the Territorial Sea and Contiguous Zone, the Convention on the Continental Shelf, the Convention on Fishing Conservation of the Living Resources of the High Seas and the Convention on the High Seas. The purpose of the Conference was to codify the customary international law of the sea but it also supposed an initial attempt to establish a rudimentary regime for the protection of the marine environment. Indeed, Articles 24 and 25 of the Convention on the High Seas required states to prevent oil pollution from ships, pipelines and sea-bed exploration and exploitation as well as

\textsuperscript{59} Ibid
\textsuperscript{60} International Convention for the Prevention of Pollution of the Sea by Oil, adopted in 1954 and later superseded by the International Convention for the Prevention of Pollution from Ships of 1973
\textsuperscript{61} McGonigle and Zacher, \textit{Pollution, Politics, and International Law: Tankers at Sea}, p. 39
pollution from radioactive substances. And the Convention on Fishing and Conservation of Living Resources of the High Seas was the first multilateral treaty to codify and develop international fisheries law.

Articles 24 and 25 of the Convention on the High Seas require that states take into account the existing treaty provisions. These provisions referred to the obligations arising from OILPOL which, without much success, had been addressing sea-based pollution since 1954. This is the origin of the concept of the rules of reference which will be dealt with later.

To this point, states had been giving *ad hoc* responses to specific environmental problems but by the late 1960s the impact of pollution in the marine environment called for comprehensive legal development. In 1967, in the *Torrey Canyon* disaster crude oil was spilled in a shipwreck not far from the cost of Cornwall becoming the largest vessel to ever be wrecked at that time. Studies\(^\text{62}\) conducted at that time had shown an increase in pollution of the sea by oil, chemicals, nuclear waste and sewage from urban industrialized societies.\(^\text{63}\) Some of the most important conventions concluded in the late 1960s were the 1969 International Convention on Civil Liability for Oil Pollution Damage, 1969 Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties and the 1971 International Convention on the Establishment of an International Fund for Compensation of Oil Pollution Damage.

### 2.1.2. The 1972 Stockholm Conference

In 1972 the ECOSOC held in Stockholm the United Nations Conference on the Human Environment.\(^\text{64}\) The preparation and convening of the conference was contemporaneous with the preparatory stage of the Third United Nations Convention on the Law of the Sea (UNCLOS III). The time witnessed an increase of the awareness for the protection of the environment and concern for the globalization of pollution. For the first time, environmental issues were receiving serious attention. The state of science had permitted to understand the risks, as well as the causes and effects, of environmental pollution which also made possible more efficient ways of tackling of the problem. The Stockholm Conference served as a forum for discussing coordinated solutions to environmental problems. The Conference called on states to accept and implement existing legal instruments for the control of marine pollution and better compliance of those instruments by vessels flying their flags or vessels operating in areas under their jurisdiction. The Conference also

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\(^{62}\) Studies conducted by the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP), an advisory body of the United Nations on the scientific aspects of marine environmental protection  
\(^{64}\) Convoked on the base of Resolution 2398(XXIII) of 3 December 1968 of the UN General Assembly
called for stronger national controls over land-based pollution. The International Convention for the Prevention of Pollution from Ships (MARPOL)\(^{65}\) which superseded OILPOL and the London Convention on the Prevention of Marine Pollution by Dumping of Wastes\(^{66}\) were proposed at the Conference. The Conference also made recommendations regarding research and monitoring programs using existing international institutions or agencies. The Stockholm Conference endorsed a set of general principles for the assessment and control of marine pollution. A definition of marine pollution was included and general obligations to protect the marine environment were formulated and later incorporated in the Law of the Sea Convention of 1982.

The Stockholm Conference resulted in two non-legally binding documents, the Stockholm Declaration and the Action Plan. The Action Plan contained recommendations on the marine environment and advice for the negotiation of the Law of the Sea Convention (LOSC)\(^{67}\) and identified the weaknesses of the early attempts at regulating the protection of the marine environment. The negotiations at the UNCLOS III took into account the recommendations. It can be established the symbiotic relationship between the development of international environmental law and the law of the sea. Since the adoption of the LOSC, the developments in international environmental law have had an impact on the convention especially in the implementation of the environmental provisions. The LOSC was signed in 1982 after nine years of negotiations. Part XII of the LOSC on Protection and Preservation of the Marine Environment opens with the following declaration: “States have the obligation to protect and preserve the marine environment”.\(^{68}\) This statement is a novelty in its straightforwardness and also a change in the paradigm, instead of focusing on establishing responsibility for damages to the environment, the Convention regulates the prevention of pollution. Part XII continues with the confirmation of principles of international environmental law that had been agreed to before in the Stockholm Declaration.\(^{69}\)

The Stockholm Declaration triggered the outburst of international environmental law. The first visible outcome was the establishment of United Nations Environmental Programme (UNEP) in 1972, the first entity within the United Nations system dedicated to the protection of the environment. The main role of the UNEP, which does not have legal personality, is to coordinate and lead the all environmental questions within the UN. Environmental questions within the UN

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\(^{66}\) London Convention on the Prevention of Marine Pollution by Dumping of Wastes of 1972


\(^{68}\) LOSC, article 192

\(^{69}\) Principles 21 and 24 of the Stockholm Declaration are reflected in Articles 193 and 197 of the LOSC
system are carried out by subsidiary organs and special agencies. The special agencies have become important actors in international relations. They address environmental matters at a subordinate level rather than as a primary responsibility, therefore their impact on the development of international environmental law primarily occurs on the basis of secondary acts, that bind solely the organization's members.

The impetus given by the Stockholm Conference to the development of international environmental law was also materialized by numerous new important bilateral and multilateral environmental agreements (MEAs). Among the most important ones are the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on the Conservation of Antarctic Marine Living Resources, the Vienna Convention for the Protection of the Ozone Layer, the Geneva Convention on Long-Range Transboundary Air Pollution, the International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) and Part XII of the LOSC containing its environmental provisions. In 1978 the IMO Conference on Tanker Safety and Pollution adopted a Protocol to the MARPOL Convention which had not yet entered into force. In 1983 the 1987 MARPOL Protocol absorbed the parent Convention and the combined instrument entered into force in 1983. In the late 1980s, the IMO started working in the regulation of air pollution from ships.

The number of MEAs both regional and global adopted after the Stockholm Conference were more than a hundred. Although the treaty practice covered a much wider range of environmental problems, the net of MEAs hardly constituted an “effective international legal order of environmental protection.” Some of the treaties still aimed at tackling transboundary environmental protection while some others aimed at solving global environmental problems. It is noteworthy that the increasing number of international environmental instruments responds not only to the initiatives of the states but also as a response to serious environmental disasters that grew in number.

72 Convention on the Conservation of Antarctic Marine Living Resources of 1980
74 UNECE Convention on Long-Range Transboundary Air Pollution of 1979
75 International Convention on Oil Pollution Preparedness, Response and Co-operation adopted in 1990 and entered into force in 1995
78 Ibid
2.1.3. Rio Conference

The United Nations Conference on Environment and Development (UNCED) was convened in Rio de Janeiro in 1992. The purpose of the conference was to “elaborate strategies and measures to halt the effects of environmental degradation in the context of increased national and international efforts to promote sustainable and environmentally sound development in all countries.” A committee was created to carry out the preparatory process of the UNCED and two Intergovernmental Negotiating Committees independent from the first one prepared drafts on treaties for climate change and biological diversity.

The focus of the Rio Conference was the newly coined term “sustainable development.” It refers to the close relationship between environment and development in the sense that development policies cannot disregard environmental protection because it should be an integral part of the policy goals of development.

The outcomes of the Rio Conference were the Rio Declaration, the Statement of Forest Principles, Agenda 21 and the two conventions mentioned above, the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD) that were signed at the Conference.

The decade that followed the Rio Conference brought new MEAs and already existing ones were further developed, but it did not free the international environmental legal order from being incomplete and not so effective. Some of the MEAs adopted after the Rio Conference are the 1995 Straddling Fish Stock Agreement, the 2001 Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, the Stockholm Convention on Persistent Organic Pollutants (POPs Convention) and the UNECE 1998 Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention). After the Rio Conference some instruments were amended. This is the case of the Convention on Long-Range Transboundary Air Pollution of 1979 which was complemented by four protocols, the Climate Change Convention was complemented by the Kyoto Protocol and the Biodiversity Convention by the Cartagena Protocol. MARPOL was also

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79 UN General Assembly Resolution 44/228 of 22 December 1989
80 United Nations Framework Convention on Climate Change, adopted in 1992
81 Convention on Biological Diversity adopted in 1992
84 Kyoto Protocol to the United Nations Framework Convention on Climate Change of 1997
85 Cartagena Protocol on Biosafety to the Convention on Biological Diversity of 2000
amended by the 1997 Protocol\textsuperscript{86} to include an Annex VI dedicated to the prevention of air pollution from ships. This annex prohibits deliberate emissions of ozone depleting substances and establishes limits for the emissions of sulphur oxides and nitrogen oxides.

\subsection*{2.1.4. The Johannesburg Summit}

In 2002, the United Nations convened the World Summit in Sustainable Development in Johannesburg. The objectives of this conference differed from the previous ones in that the Johannesburg Summit aimed at improving the implementation of already existing instruments rather than creating new ones. There were two types of outcomes of the Johannesburg Summit. The first type were soft law instruments and included the Johannesburg Declaration on Sustainable Development and the Johannesburg Plan of Implementation. The second type of outcome are the public-private partnerships contained on the Consolidated List of Partnerships for Sustainable Development that allow different stakeholders to combine efforts in achieving sustainable development. In the terrain of hard law, the Johannesburg Summit did not bring important developments.

In the Johannesburg Summit, the focus of the debate shifted from sustainability to development, prioritizing economic and social progress over the environment. The summit is regarded as a failure as it did not push forward the environmental agenda. The reason behind that shift was to find a way to deal with the North-South divide but no progress was made in that regard either. In the years that followed the Johannesburg Summit, environmental issues continued to be regarded as part of the development agenda. Nevertheless, a few legally binding instruments were adopted. The 2003 Framework Convention for the Protection of the Marine Environment of the Caspian Sea and the 2004 International Convention for the Control and Management of Ships’ Ballast Water and Sediments (BWM Convention) are an example of binding instruments that relate to the marine environment.

\subsection*{2.1.5. Recent developments}

In 2005, Annex VI to MARPOL entitled Regulations for the Prevention of Air Pollution from Ships entered into force. In a debate on ‘Energy, Security and Climate’ held by the UN Security Council in 2007, it was agreed that climate change needed to be treated in line with other major global threats. As regards climate change, the Kyoto Protocol entered into force in 2005 and opened a

\textsuperscript{86}1997 Protocol to amend the 1973 International Convention for the Prevention of Pollution from Ships, as modified by the 1978 Protocol. Entered into force in 2005
series of questions regarding its implementation that were addressed in the COP11 were rules for its implementation were agreed on in the Marrakech Accords. Subsequent conferences of the parties were centered in resolving the question of which states are bound to reduce their greenhouse gas emissions. An agreement had to be reached at the 2009 COP15 in Copenhagen but instead, a minimum political consensus was reached. In the post-2012 years, states had yet not been able to meet the problem of climate change. In the 2015 COP21 in Paris the question on which states are bound to reduce their greenhouse gas emissions and the inability to differentiate between developed and developing countries was replaced by a more nuanced approach. The outcome of the COP21 was an Agreement and a COP decision that contain a common framework to enhance the implementation of the UNFCCC in a way that reflects equity and the principle of common but differentiated responsibilities. The Agreement reaffirms the goal of “holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change”. This Agreement imposes commitments on the parties to make nationally determined contributions and report them. The Paris Agreement needs yet to show whether it will signify a push forward in the battle against climate change.

2.2. Actors

It has been mentioned earlier that international law stems from the practice of states and their entering into agreements. Vessel-source pollution is regulated through international instruments and while “multilateral agreements still commonly refer to states as the sole repositories of jurisdiction and competence” the positions they defend in international fora widely depend on the pressure of interest groups within them. Traditionally, states have been classified as being maritime or coastal depending on whether they defended freedom of navigation or the protection and security of their coasts. However, this classification falls short when presenting a picture of all the concurring interests that play in the elaboration of the regulation of vessel-source marine pollution.

The dualism between maritime and coastal states has shaped the regulation of vessel-source pollution. Maritime interests seek to maintain freedom of navigation and resist the costs associated

87 Paris Agreement of the Parties to the UN Framework Convention on Climate Change done on December 12 2015 and opened for signature from 22 April 2016 to 21 April 2017
88 Paris Agreement, article 2.1 (a)
89 Paris Agreement, article 3
90 Paris Agreement, article 4.2
to environmental regulations imposed on shipowners and operators. Coastal interests seek to regulate maritime traffic in order to protect the state’s environment or for security and economic reasons. As has been mentioned above, this classification is not sufficient to describe a much more complex reality of very diverse competing interests. A state is very likely to have both maritime and coastal interests. Also, this distinction cannot be equated to the distinction between developed and developing countries as some developed countries have coastal interests and some developing countries have maritime interests.

The states that traditionally have had maritime interests are the United States, many Western European countries and Japan. Canada and Australia have long stood as coastal states despite their large export-oriented economies, highly dependent on maritime transport. The pressure of domestic lobbies, whether environmental or commercial, on the governments of the states will finally define the position of the state in a specific matter. When regulating an aspect of vessel-source pollution, the nature of the pollutant being regulated has an impact on the impetus the environmental groups will put on advocating for its control. And the cost associated to mitigating the effects of the pollutant has an impact on how much shipowners and operators will resist its regulation. The position of the state will then depend on relative influence of the environmental groups and the industry as well as the relative influence exercised by the public opinion.

States with maritime interests are not necessarily developed states. Panama, Liberia, China and Brazil are developing states with maritime interests. Some states have found in having open registries a source of revenue. They have the freedom to establish the requirements they consider adequate to register a vessel in their national registries and fly their flag and shipowners have the right to choose where to register their vessels and thus, the flag their vessel sails under. Consequently, they align with maritime interests because they can take advantage of having an open registry.

The regulation of vessel-source marine pollution depends on the reconciling of maritime and coastal interests. In the context described above, this reconciliation of interests begins within the states and it is later transposed to the regional and global fora. It is necessary to characterize the maritime actors that play in the law-making process. The subsequent sections characterize the actors with maritime interests and the actors with coastal interests. Shipowners, cargo owners, protection and indemnity clubs, classification societies and maritime states are considered in the

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92 Ibid
93 Ibid
maritime interests section. Environmental NGOs, the media and states with coastal interests are considered in the coastal interests section.

2.2.1. Maritime interests
The actors with maritime interests are shipowners, cargo-owners, charterers and operators, protection and indemnity clubs and marine insurers and classification societies and maritime states themselves. The subsequent sections describe each of these actors and the role they play in the marine pollution decision-making process.

2.2.1.1. Shipowners and the world fleet
The term shipowner refers to those that own, manage or operate a vessel. Vessels can be owned by individuals or companies either private or public. Shipowners seek to maximize their profits in a highly competitive industry. The concept of ship-ownership here has to be understood as the beneficial ownership. The beneficial owners are the individuals or companies who derive the financial benefit from the ship operation. In that sense, Greece is the largest ship-owning nation with more than 16 per cent of the world fleet. It is followed by Japan (13.3 per cent), China (9.08 per cent), Germany (7.04 per cent) and Singapore (4.84 per cent). These five countries combined control more than half of the world tonnage. In the ten top ship-owning countries, five are Asian, four from Europe and one from America (the US). China, Hong Kong, the Republic of Korea and Singapore have moved up the ranking significantly over the last decade while Germany, Norway and the US have lost market share. In South America, the largest ship-owning country is Brazil, followed by Mexico, Chile and Argentina. In Africa, the largest ship-owning countries are Angola, Nigeria and Egypt. China, Indonesia and the Russian Federation lead the ranking on larger number of nationally flagged and owned ships. These ships are employed in coastal or inter-island shipping, where the market is protected from foreign competition and does not necessarily fall under global IMO environmental regulations.

Beneficial shipowners register, as owners of their vessels, companies that are constituted for the only purpose of owning the vessel (the so-called one-ship companies). In these cases, the beneficial owner of the ship can escape any recourse for liability to third parties in the event of

95 UNCTAD, Review of Maritime Transport 2015, p. 35
96 See Ibid for the complete ranking of ship-owning countries
97 Ibid
98 Ibid, p. 36
pollution damage. The beneficial owners are individuals, companies or mortgagees in the traditional maritime nations.\textsuperscript{99} To reduce costs, these shipowners choose open registries where the requirements established by the flag state are less onerous and even choose to operate sub-standard ships. This practice was initiated in the middle of the last century. The fleets of the main industrial and trading nations were flagged out to the open registries where they could compete at lower operating costs.\textsuperscript{100}

Ship-owning interests have also preferred flag state regulation rather than coastal state regulation of vessel-source marine pollution imposed on ships visiting their coasts. Nevertheless, to avoid the disadvantages for shipowners caused by differing flag state regulations, shipowners have come accept the regulation of vessel-source pollution through harmonized international agreements. Despite the cost that might represent to adapt to international standards imposed by those agreements, shipowners understand the value of the compliance with respect to their public relations.\textsuperscript{101} In any case, the industry will direct efforts to resist these regulations or at least making them less burdensome. These efforts are increasingly less effective because of the declining influence of shipowners lobbies in developed states. The international regulation of vessel-source pollution regards shipowners as the main polluters of the industry and therefore, the main cost of preventing marine pollution is placed on them, as will be explained later.\textsuperscript{102}

In 2002, a Conference on Maritime Security at the IMO addressed the issue of secrecy of ownership of vessels.\textsuperscript{103} The terrorist attacks of September 2001 in the US had led this country to seek the end of secrecy of the beneficial owners of ships. Their proposals encountered fierce opposition from the industry. Shipowners believed that revealing the beneficial owners was irrelevant as they have no control over the managing or operation of the ships. The beneficial owners tend to be investors in an intricate corporate structure with multiple owners as ship-ownership is divisible among large number of investors. Shares can also be hold on behalf of third parties which can be institutions or trusts. The ship-owning industry is regarded as having relatively easy access.\textsuperscript{104} In the Conference, consensus was reached on the desirability to focus on the

\textsuperscript{99} Tan AKJ, \textit{Vessel-Source Marine Pollution}, p. 34
\textsuperscript{101} Tan AKJ, \textit{Vessel-Source Marine Pollution}, p. 35
\textsuperscript{102} Ibid, p. 36
\textsuperscript{103} Conference of Contracting Governments to the International Convention for the Safety of Life at Sea, 1974 held in December 2002
effective management and operation of ships instead of beneficial ownership. Nevertheless, the willingness to end with the secrecy has not disappeared in the developed states.

In recent years, the ship-owning industry, traditionally very fragmented, has become more consolidated. Large companies are emerging through mergers and acquisitions. These large companies seek to augment their market share in order to defend their freight rates against the demands of shippers for cheaper transport. The largest ship-owning company is the Danish company A.P. Møller-Mærsk Group, followed by the Mediterranean Shipping Company (Switzerland) and CMA CGM (France) in the container ships sector. In this sector, the top ten companies operate over 61 per cent of the global container fleet in the beginning of 2015. In the tanker sector, Frontline (Hemen Holding, Norway) and K Line (Japan) are the largest companies.

Shipowners rely on international associations to represent their interests in international regulatory fora. The International Chamber of Shipping (ICS) represents over 80 per cent of the world merchant fleet. Its members are national shipowners’ associations from Asia, Europe and America, whose members are shipping companies. ICS was established in 1921 and is seated in London. Another important shipping association is Intertanko, an association for oil, chemical and gas tanker owners and operators. It is based in Oslo. Its members fleet combined amounts to 312,7 million dwt tonnage. Bimco, the Baltic and International Maritime Council, is the world’s largest international shipping association for shipowners, operators, managers, brokers and agents. It is based in Denmark. These associations are the most vocal representatives of the shipowners industry.

2.2.1.2. The cargo owners

This group of actors are owners or shippers of goods carried by ship. Their interests coincide with those of the shipowners as they oppose stringent pollution prevention regulations. In the decision-making process of vessel-source marine pollution, the cargo owners have had stronger influence than the shipowners interest group. Despite cargo owners having a direct role in the transportation of pollutants, they have been able to avoid being attributed the responsibility derived from that. The cargoes of vessels not only are a threat to the marine environment as a result of a casualty (for

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105 Tan AKJ, *Vessel-Source Marine Pollution*, p. 37
108 http://www.ics-shipping.org/
109 https://www.intertanko.com/About-Us/
110 https://www.bimco.org/About/About_BIMCO.aspx
111 Tan AKJ, *Vessel-Source Marine Pollution*, p. 37
example in an oil spill) but also in a normal voyage of a vessel. In the case of air pollution, the cargoes of tankers emit volatile organic compounds during sea voyages and more so during loading and discharging operations and crude oil washing operations. When the VOCs react in the sunlight they form ozone.

The reason for cargo owners to having been able to resist the costs of prevention as well as remedial action for the damage of polluting cargoes, is the higher influence of the cargo-owning industry, especially oil companies, but also the nature of the industry.\textsuperscript{112} Cargoes are diffused in number and locality. Cargoes are very diverse and can be shipped almost anywhere. This makes it difficult to establish responsibility for this group of actors.\textsuperscript{113}

Oil tankers make up the 28 per cent of the world fleet, only surpassed by bulk carriers that constitute 48 per cent of the world fleet. In the 1960s and 1970s many oil tankers were owned by the oil companies and these companies persuaded states to impose the regulatory cost of pollution prevention on them as tanker owners instead of as cargo owners. In the 1990s the oil companies stated to get rid of their tankers and shipped their cargoes through the so-called independent owners. Today, the majority of owners are independent owners that have been left alone in assuming the weight of pollution prevention measures of the polluting cargoes. These tanker owners have moved from the registries of traditional maritime states to cheaper open registries losing any influence they could have had in their former state.\textsuperscript{114}

Several institutions represent cargo owners at the IMO. As an example, the Oil Companies International Marine Forum (OCIMF) represents oil companies since 1970. Previous to that, they were represented by the ICS until the divergent interests of shipowners and cargo owners made it no longer possible to share a representative.\textsuperscript{115}

\textbf{2.2.1.3. Protection and indemnity clubs and other marine insurers}

Protection and indemnity clubs (P&I) and other marine insurers are active participants of the decision-making process of vessel-source marine pollution. These actors insure shipowners for their operations against risks to the vessel’s hull and machinery or third party liability. The difference between these two types of risks is that the insurance for the hull and machinery protects a shipowner against the losses of his own ship and the insurance for third party liability indemnifies the owner against claims by third parties for damage arising from the operation of the ship.\textsuperscript{116}

\begin{footnotes}
\item[112] Ibid, p. 38
\item[113] Ibid
\item[114] Ibid, p. 39
\item[115] Ibid, p.40
\item[116] Ibid
\end{footnotes}
third parties that may see their interests damaged by the operation of the ship range from other owners of ships, port authorities or victims of pollution damage caused by the ship.\textsuperscript{117}

Shipowners obtain their third party liability insurances at the P&I clubs. These clubs are “associations of shipowners that have banded together on a mutual basis to indemnify themselves against all forms of third party claims including those arising from vessel-source pollution”.\textsuperscript{118} The “clubs cover a wide range of liabilities, including loss of life and personal injury to crew, passengers and others on board, cargo loss and damage, pollution by oil and other hazardous substances, wreck removal, collision and damage to property”.\textsuperscript{119} The clubs enter reinsurance contracts with marine insurers to spread out the risks. These arrangements are usual in the case of oil pollution and nuclear risks. The marine insurance industry is dominated by Lloyd’s syndicates of insurance underwriters which control the setting of insurance rates for the global maritime industry.\textsuperscript{120}

The International Group of Protection and Indemnity Associations represents P&I clubs at IMO and other international fora. The Group comprises the thirteen principal underwriting associations which cover approximately 90% of the world’s ocean-going tonnage.\textsuperscript{121} The Group’s expertise in insurance matters is highly valued at IMO and it is always consulted on the adequacy of liability and compensation provisions.

The commercial insurance industry is represented at IMO by the International Union of Marine Insurance (IUMI). The Union represents national associations from all over the world. The interest of the marine insurers “in safe and clean shipping stems from the fact that their business entails the assessment of trading risks associated with the condition and operation of ships. Thus, insurance premia are typically structured to reflect the level of risk presented by a particular ship”.\textsuperscript{122} On their side, the efforts of P&I clubs have focused on resisting higher liability costs as they are constituted by shipowners.

\textbf{2.2.1.4. Classification societies}

Classification societies are dedicated to establish the seaworthiness of ships as early as the eighteenth century. Mainly marine insurers and cargo owners requested their services. The societies were of chief importance in determining the risks associated with a particular ship, the origin of

\textsuperscript{117} Ibid
\textsuperscript{118} Ibid, p. 41
\textsuperscript{119} http://www.igpandi.org/about accessed June 28, 2016
\textsuperscript{120} Tan AKJ, \textit{Vessel-Source Marine Pollution}, p. 41
\textsuperscript{121} http://www.igpandi.org/about accessed June 28, 2016
\textsuperscript{122} Tan AKJ, \textit{Vessel-Source Marine Pollution}, p. 41
their mission is to provide a class-rating service to facilitate maritime trade.\footnote{Ibid, p. 43} The classification society industry is dominated by those societies established in traditional maritime states. In the international fora, classification societies are represented by the International Association of Classification Societies (IACS). Today, the IACS is composed by twelve classification societies that together cover more than 90 per cent of the world’s carrying tonnage.\footnote{http://www.iacs.org.uk/default.aspx accessed June 29, 2016} The role of the IACS as an actor in the vessel-source pollution law-making process consists in promoting the development of standardized certification procedures.\footnote{Tan AKJ, \textit{Vessel-Source Marine Pollution}, p. 43} At the IMO, the IACS is the only NGO with observer status that also develops and applies technical rules of the IMO conventions. The link between the classification rule requirements for a ship’s hull, structure and engineering systems and the IMO rules is codified by the SOLAS Convention.

The function of classification societies has evolved from being purely a private commercial one to a public one. This new role consists in statutory certification.\footnote{Ibid, p. 44} Classification societies certify a ship’s compliance with safety and pollution control standards. Flag states have the obligation to inspect and certify ships flying their flag but it is a widely extended practice to delegate this duty onto classification societies, thus commercializing a function that was conceived as governmental. Consequently, classification societies certify a ship according to their own rules and also according to the compliance with standards established in national regulations and international conventions.

The duality of the role of classification societies does not come without problems. The ship-owning industry certifies their ships directly through classification societies which compete for market share. The result is “laxity in surveying ships for compliance with the relevant standards. (...) allegations have arisen of bias, lack of objectivity and outright neglect on the part of societies”.\footnote{Ibid} In the case of flag states contracting the services of classification societies, they delegate such functions due to their own lack of expertise. This is also the case when classification societies certify design and construction plans for shipyards. The problem of lack of impartiality entails that standards are not properly complied with. Shipowners prefer to contract the services of those societies that are less strict in their surveys.
2.2.1.5. States with maritime interests and flags of convenience

As mentioned above, there are no states that could be characterized as purely maritime, nevertheless, there are states where maritime interests have a stronger relevance than coastal interests and consequently, their position in international fora dedicated to the regulation of marine pollution can be identified as aligning with maritime interests.

Maritime transport is dominated by developed states as the most influential shipowners, cargo owners, marine insurers, classification societies and other interests linked to these industries are established in those states. The US, many Western European states (especially the UK and Norway) and Japan are maritime states. Because of the size of its economy, the US has been able to exercise great influence in the elaboration of vessel-source pollution control regulation. Particularly strong are the cargo owning interests of the US. Oil companies have extensively shaped the regulation of that subject but many other interests act through lobbies, be it oil producers, mining and manufacturing industries or environmental groups. To present, the US has been the only state capable of unilaterally impose on foreign ships visiting their waters laws without damaging its interests. An example of unilateral enactment of anti-pollution regulation is the Oil Pollution Act of 1990 enacted following the Exxon Valdez disaster in Alaska. The US ship-owning interests have lost their relevance as most of the fleet is now registered in open registries. Nevertheless, beneficial ship-ownership is still relevant.

The UK is a key actor as it hosts many companies that provide maritime services especially those related to marine insurance. London hosts the IMO and is the center of many operations related to the carriage of good, brokerage and dispute settlement. The relevance of UK ship-ownership has severely declined but the UK continues to lead many law-making initiatives at the IMO.

Norway is an important actor as it is home to many companies that provide marine services such as P&I clubs but also shipyards. Norway used to be at the top ten of the ship-owning states until the last decade Asian states have gained positions. Nevertheless, it maintains an influential position in the international fora when it combines its position with the other Nordic states.

Japan is an important actor due to the size of its economy. Japan is the second state in the ship-owning ranking. Its shipbuilding industry is also important. The influence of Japan at the

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128 Ibid, p. 65
129 Ibid
130 Ibid
131 Ibid, p. 66
132 UNCTAD, Review of Maritime Transport 2015, p. 36
IMO has been determined by its contribution to the international regime for oil pollution liability and compensation because of the large quantities of oil imported to the state.\(^{133}\)

It is worth mentioning here that military interests of states have also had an influence in the shaping of vessel-source pollution. The states with military interests have defended the freedom of navigation in the international fora. The negotiations at UNCLOS were strongly influenced by states with these interests to the point where article 236 of the LOSC establishes that “the provisions of this Convention regarding the protection and preservation of the marine environment do not apply to any warship, naval auxiliary, other vessels or aircraft owned or operated by a State and used, for the time being, only on government non-commercial service.” This article adds that the flag state shall ensure that these vessels act in a manner consistent with the Convention “as it is reasonable and practicable.” This provision leaves the compliance with pollution control measures to the will of the flag state.

As mentioned in this section, many of the traditional ship-owning states have seen their fleets diminished in favor of states with open registries where the owner of the ship does not need to be of the same nationality as the state where the ship is registered. According to article 91 of the LOSC on the nationality of ships, ships have the nationality of the state whose flag they are entitled to fly. The ship will have to comply with the laws of its flag state on all matters that refer to its operation, from taxation, to registration of mortgages to manning. Shipowners will then choose a registry in a country where they find these regulations more advantageous as international law grants total freedom to choose a registry. Boczek has described the open registries of flag of convenience (FOC) as the “flag of any country allowing the registration of foreign-owned and foreign-controlled vessels under conditions which, for whatever the reasons, are convenient and opportune for the persons who are registering the vessels”.\(^{134}\) As of January 2015, Panama, Liberia and the Marshall Islands have in their registers 41,8 per cent share of the world tonnage.\(^{135}\) More than three quarters of the world fleet is registered in developing countries and 71 per cent of the world tonnage is registered under a foreign flag.\(^{136}\)

Shipowners started to flag their vessels in foreign registries in the 1970s and even earlier with the objective of being subject to less stringent safety and environmental regulation. The registries of developed states have traditionally required that the vessels registered in their registries be owned and flagged by the flag state nationals, these are closed registries which traditionally,

\(^{133}\) Tan AKJ, *Vessel-Source Marine Pollution*, p. 66

\(^{134}\) Boleslaw Adam Boczek, *Flags of Convenience: An International Legal Study* (Harvard University Press 1962)

\(^{135}\) UNCTAD, *Review of Maritime Transport 2015*, p. 41

\(^{136}\) Ibid
require vessels to comply with stricter regulations that entail an added cost to the operation of the ship. The LOSC, as it did the High Seas Convention, imposes a genuine link between the ship and the flag state.\textsuperscript{137} The concept ‘genuine link’ is left undefined in the Convention. The question with the lack of definition is whether the mere administrative act of registration of a ship in a register constitutes a genuine link. A ruling by ITLOS concluded that “the purpose of the provisions of the Convention on the need for a genuine link between a ship and its flag State is to secure more effective implementation of the duties of the flag State, and not to establish criteria by reference to which the validity of the registration of ships in a flag State may be challenged by other States”.\textsuperscript{138}

The problem with registering a ship in an open registry rather than in the national one for the issue of vessel-source pollution is an important one in what regards the ratification and implementation of relevant conventions dealing with vessel-source pollution. Liberal open registries entail “weak safety records, poor pollution control, unsatisfactory training and crewing conditions and low wages”.\textsuperscript{139}

In 2011, 69.7 per cent of the total global merchant fleet operates under alleged FOCs.\textsuperscript{140}

2.2.2. Coastal interests

The actors with coastal interests are coastal states and environmental NGOs. The public opinion and the media can also be determinant to influence a particular regulation. This section is dedicated to characterize these actors and explain the influence they have in the process of decision-making for vessel-source marine pollution.

2.2.2.1. Environmental NGOs

The Rio Conference of 1992 supposed a turning point in the relevance of NGOs in the global environmental decision-making process. In developed countries the influence of these actors has grown stronger as the ship-owning industry’s relevance decreased due to its reputation as a polluter and also to the decline in the registration of ships. States that have moved from representing the industry’s interests to adopting a position in line with environmental states are the Western European countries, Japan and the US. These states, together with traditional coastal states such as Australia and Canada, have helped introducing environmental considerations into the regulation of maritime transport and it has been with the help of the expertise of the NGOs in “translating new

\textsuperscript{137} LOSC, article 91.1
\textsuperscript{138} M/V "SAIGA" (No. 2) Case (Saint Vincent and the Grenadines v. Guinea) ITLOS (1999), para. 83
\textsuperscript{139} Tan AKJ, \textit{Vessel-Source Marine Pollution}, p. 49
environmental protection concepts into laws and policies”\textsuperscript{141}. The impetus of the environmental NGOs at IMO has made possible that the organization has moved from the initial concern for oil and chemical spills to other issues such as air pollution, ballast water, dumping, anti-fouling systems or ship recycling\textsuperscript{142}.

At IMO, international NGOs have consultative status. Of the seventy-seven NGOs with that status, a great deal are dedicated to marine environmental issues. The biggest of these environmental NGOs at IMO are the World Wide Fund for Nature (WWF), Greenpeace, Friends of the Earth International (FOEI) and the International Union for the Conservation of Nature (IUCN).

Environmental NGOs have been particularly active at MEPC. Their biggest success has been to push the principles of environmental law into the law-making process at IMO. The precautionary approach established at Principle 15 of the Rio Declaration has been decisive to introduce new regulations so that “lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation”\textsuperscript{143}. Sustainable development and the polluter pays principle have been also important principles of international environmental law that have had an impact in the regulation of pollution from ships.

\begin{verbatim}
2.2.2.2. The media and the public opinion
The public opinion and the media have been important forces in the shaping of the regulation of pollution from ships. The influence of these forces has been most relevant when oil or chemical spills have occurred. The public opinion outrage and the media’s portrait of the accidents have had a profound impact within the states that have moved them to take action at the international fora, particularly the IMO, against this kind of pollution. The states and the shipping industry want to appear as environmentally responsible before the public opinion and because of that they have pushed forward initiatives for the regulation of the accidents.

In 1967, the Torrey Canyon accident\textsuperscript{144} was the first accident of a tanker to cause public alarm due to the media treatment of the case\textsuperscript{145}. A great deal of the claims from the victims of the pollution were left uncompensated and thus, many believed that an international compensatory scheme needed to be created\textsuperscript{146}. The Legal Committee was created at IMO and the 1969 International Convention relating to Intervention on the High Seas in Cases of Oil Pollution
\end{verbatim}

\textsuperscript{141} Tan AKJ, \textit{Vessel-Source Marine Pollution}, p. 68
\textsuperscript{142} Ibid
\textsuperscript{144} See section 2.1.1
\textsuperscript{145} Tan AKJ, \textit{Vessel-Source Marine Pollution}, p. 70
\textsuperscript{146} Ibid
Causalities was adopted as well as a related protocol.\textsuperscript{147} The \textit{Amoco Cadiz} accident in 1978 and the \textit{Tanio} accident in 1980 further the regulation for the response to tanker casualties. The 1989 International Convention on Salvage, the 1892 Paris Memorandum of Understanding on Port State Control and the development of port state jurisdiction in the LOSC meant a step forward in the creation of regime for tackling these situations. These accidents and others in the US coast also facilitated the adoption of MARPOL. In 1989, the \textit{Exxon Valdez} spill in the US coast brought the USA to enact the Oil Pollution Act of 1990 and also triggered the adoption of the 1990 Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC). The \textit{Erika} disaster in 1999 and the Prestige sinking gave impulse at IMO to further IMO regulations and also encouraged the EU to consider unilateral action to regulate pollution from ships.\textsuperscript{148}

2.2.2.3. States with coastal interests

States with coastal or environmental interests are those states that prioritize the protection of the coastal resources or the coastal environment. These states have bountiful marine resources or delicate marine ecosystems that they wish to protect. Traditional coastal states are Canada and Australia. They have been strong advocates for stringent environmental preservation regulations at diverse international fora.

Canada’s coastal interests have been focused on furthering jurisdiction over the adjacent waters for an enhanced control over the marine resources, especially fisheries. Canada has long had an interest to secure its position in the Arctic Ocean. This has been the stance of the state since the 1960s and it is opposed to that of its neighbor the US, that has defended freedom of navigation. Canada enacted the Arctic Waters Pollution Prevention Act of 1970 to control foreign vessels navigating off the Canadian Arctic coast because its discontent with the oil pollution compensatory regime established by IMO. The coastal interests of Canada also played an important role in the negotiations at UNCLOS in the 1970s. It claimed exclusive jurisdiction over wide ocean areas for natural resources exploitation and marine environmental protection and in doing so it led a coastal state coalition, mostly integrated by developing countries.\textsuperscript{149}

Australia’s coastal interests have revolved around protecting the extensive marine ecosystem. As an exporter, its ports are busy with foreign vessels carrying bulk commodities but it has negligible ship-owning interests. The focus of Australia’s action in the international regulation of shipping has been in promoting stringent pollution prevention regulations on foreign vessels.

\textsuperscript{147} 1973 Protocol Relating the Intervention on the High Seas in Cases of Marine Pollution by Substances Other than Oil
\textsuperscript{148} Tan AKJ, \textit{Vessel-Source Marine Pollution}, p. 71
\textsuperscript{149} Ibid, p. 72
navigating its waters. Australia’s action has been decisive for the regulation of ballast waters to avoid the introduction of invasive species.\textsuperscript{150}

A number of factors have influenced a shift in the tendencies at IMO. The influence of coastal states such as Canada and Australia have facilitated that the organization would evolve from being an institution dominated by maritime or pro-shipping interests to having a more favorable climate for environmental initiatives. Ireland and New Zealand have also contributed to this in a lesser extent. What has been decisive for this change, has been the shift that powerful developed states, particularly in the US and Western European countries, have experienced within them. The reason for this shift is that they have seen their maritime interests decline but also they have wanted to prevent unilateral, non-uniform coastal state regulation of vessel-source pollution and its consequent competitive distortions.\textsuperscript{151}

2.2.3. The developed, developing and least developed divide

Despite some authors’ opinions that the divide between developed and developing countries is dissipating in the decision-making processes relating to the regulation of vessel-source pollution,\textsuperscript{152} some other authors,\textsuperscript{153} argue that the divide is still present. At IMO, discussions about air pollution and climate change reveal this situation.

For the issue of air pollution, states group together according to whether they are developed or developing at the MEPC. The two groups disagree on whether the principle of Common but Differentiated Responsibilities and other principles of international environmental law such as technology transfer, should inform IMO’s regulation of vessel-source pollution.\textsuperscript{154}

Despite this clear divide between developed and developing states, the differences among developing states are also important. In the 1970s, developing states barely had any maritime interests. Because of that, at the UNCLOS negotiations they defended environmental positions to secure better control over the coastal resources. Developing states that have open registries, have advocated for freedom of navigation. Today, developing states like China, Brazil, Argentina and India have conflicting interests because now they have ship-related interests as well.

A group of state actors called least developed states have interests at stake in the decision-making process for vessel-source pollution. They are states that are specially vulnerable to climate change.

\textsuperscript{150} Ibid, p. 72  
\textsuperscript{151} Ibid, p. 73  
\textsuperscript{152} Ibid, p. 74 “Today, the deliberations at international regulatory fora are no longer as polemical. Indeed, the developed-developing state dynamics underlying much of international discourse in the 1970s have largely dissipated.”  
\textsuperscript{153} Karim MS, \textit{Prevention of Pollution of the Marine Environment from Vessels}, p. 18  
\textsuperscript{154} Ibid
change and the impacts of the ship-breaking industry.\footnote{Ibid} Despite these interests, they are not active actors at IMO’s decision-making processes but they are a group at the intergovernmental negotiations under the UNFCCC.

2.3. International fora

The previous sections have explained that a wide diversity of actors have an impact on the regulation of vessel-source pollution. The States’ positions at the international arenas result from the influence that those actors have exercised on them through domestic pressure groups and but they also depend on the media agitation in the event of pollution. The IMO is the primary global decision-making arena for vessel-source pollution where states will defend their maritime or coastal inclinations, but there are other fora that also help shape the regulation of vessel-source pollution. The following sections introduce the IMO as a forum for decision-making in vessel source pollution as well as UN bodies and agencies that also have an impact in this matter.

2.3.1. The International Maritime Organization

The IMO is the “international regulatory body entrusted with overseeing and coordinating matters related to maritime safety and the prevention of vessel-source pollution”.\footnote{Tan AKJ, \textit{Vessel-Source Marine Pollution}, p. 75} As such, the IMO is responsible for more than 50 international conventions and protocols that are legally binding.\footnote{See a list of the conventions at http://www.imo.org/en/About/Conventions/ListOfConventions/Documents/Convention\%20titles\%202016.pdf accessed July 8, 2016} Other instruments adopted by the IMO organs have an important role in the regulation of vessel-source pollution. Codes, guidelines, resolutions and recommendations are non-binding but they can be good examples of soft law. An analysis of the IMO is carried out in Chapter 3.

2.3.2. UN bodies and specialized agencies

In the international arena, there are other fora that can have an impact on the regulation of pollution from the shipping industry. Tan lists the UN bodies and specialized agencies that contribute to the elaboration of the regulation of pollution from ships.\footnote{See Tan AKJ, \textit{Vessel-Source Marine Pollution}, p. 80} These bodies and specialized agencies of the UN are the UN Conference on Trade and Development (UNCTAD), the International Labour Organization (ILO), the UN Environmental Programme (UNEP) and to a lesser extent, the Food and Agriculture Organization (FAO) and the World Meteorological Organization (WMO). The
Conferences on the Law of the Sea convened by the UN have had a very important role in the regulation of vessel-source pollution.

UNCTAD “is the United Nations body responsible for dealing with development issues, particularly international trade”.\(^{159}\) It aims at helping policymakers to “take informed decisions and promote the macroeconomic policies best suited to ending global economic inequalities and to generating people-centered sustainable development”.\(^{160}\) The first UN Conference on Trade and Development was held in Geneva in 1964 when developing countries were looking for a conference where they could addressed their concerns relating to international trade. In 1965 a permanent Committee of Shipping was created to deal with the shipping aspects of trade. In this Committee, the developing states could discuss their needs in this area without their initiatives being curtailed by developed states, as it happened at IMO. In the 1980s, changes in the economic and political environment and in this context, developing states preferred to defend their national interests rather than doing it within groups of developing states. These changes led the developing countries to lose interest in the Committee to the extent that it disappeared in 1992. Since 1968 until today, the Division on Technology and Logistics of the UNCTAD has issued an annual Review of Maritime Transport that provides “an analysis of structural and cyclical changes affecting seaborne trade, ports and shipping, as well as an extensive collection of statistical information”.\(^{161}\)

The ILO is now a UN agency. It was founded already in 1919 to set labour standards, develop policies and programs to promote decent work for everyone.\(^{162}\) It is a very unique institution because its constituent organs are tripartite to represent states, employers’ associations and workers’ unions. The improvement of the working conditions for seafarers by the ILO is important to the marine environment as accidents can be caused by “fatigue, carelessness or lack of training among seafarers”.\(^{163}\) “In 2006, the 94th Maritime Session of the International Labour Conference adopted the 2006 Maritime Labour Convention (MLC). The Convention consolidated nearly all earlier ILO standards for seafarers into a single Convention. The 2006 MLC, entered into force on 20 August 2013, establishing minimum working and living standards for all seafarers on those ships”.\(^{164}\) The IMO in co-operation with the ILO adopted the 1978 Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) which sets the standards of competence for seafarers internationally.

\(^{159}\) http://unctad.org/en/Pages/AboutUs.aspx accessed July 9, 2016

\(^{160}\) Ibid


\(^{163}\) Tan AKJ, *Vessel-Source Marine Pollution*, p. 82

The UNEP is the UN authority that co-ordinates UN agencies in the exercise of activities relating to the protection of the environment. The UNEP was established following the celebration of the 1972 Stockholm Conference on the Human Environment. The UNEP “sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system and serves as an authoritative advocate for the global environment”.165 The UNEP has, from its early years, promoted its Regional Seas Programme, which encouraged the adoption of regional pollution agreements for the protection of the marine environment. These agreements stipulate obligations already established in the LOSC and they further them by formulating detailed provisions. A few of these regional pollution agreements are the 1976 Barcelona Convention for the Protection of the Marine Environment against Pollution for the Mediterranean Sea, the 1978 Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution for the Persian Gulf and the Gulf of Oman, the 1983 Cartagena Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region, the 1981 Abidjan Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region, the 1981 Lima Convention for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific, 1982 Jeddah Regional Convention for the Conservation of the Red Sea and the Gulf of Aden Environment, the 1985 Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region, and the 1986 Noumea Convention for the Protection and Development of the Natural Resources and Environment of the South Pacific Region.

The Conferences on the Law of the Sea have been key to the development of vessel-source pollution regulation. “The UNCLOS process has been instrumental in laying down agreement over the jurisdiction of states to prescribe and enforce pollution control rules over foreign ships”.166 At the Third United Nations Conference on the Law of the Sea, the 1982 Law of the Sea Convention was adopted and with it, a framework for jurisdiction. As it will be explained in subsequent chapters, the Convention defines the legislative jurisdiction of flag states and coastal states as well as the enforcement jurisdiction and imposes a duty on them to regulate vessel-source pollution. The LOSC does not prescribe specific measures for its control. In the chapter dedicated to the legal framework, the instruments that regulate vessel-source pollution, and more specifically air pollution

165 http://www.unep.org/about/ accessed July 9, 2016
166 Tan AKJ, Vessel-Source Marine Pollution, p. 83
from ships, will be explained. The LOSC has established as well, a framework for the use and exploitation of the oceans. This last issue is though, not a part of the scope of this paper.

2.4. Regional fora
The UNEP has been a catalyst for the development of regional agreements for the protection of the marine environment as it was shown in the previous section. Regional initiatives have not only been very important for the region they affect but also for the development of global regulation of vessel-source pollution. Those developments in Western Europe have been especially influential for the development of regulation of this issue at IMO. In the domain of enforcement, the elaboration of Memoranda of Understanding (MOUs) on Port State Control have had an influence in the establishment of legal obligations to carry out port state control in the context of the European Union. The following section show how those developments have impacted the IMO.

2.4.1. European initiatives in the development of vessel-source pollution regulation
The development of initiatives in Europe for the regulation of vessel-source pollution has served as a model for furthering the development of the regulation of this issue at IMO. The initiatives in Europe have had the form of conventions which have established dynamic commissions and also, political fora such as the International Conference on the Protection of the North Sea and of course, the European Union, have given an important impulse to the regulation of pollution from shipping.167 The impulse that these regional initiatives have had at the international level have been accompanied by the desire of the regional decision-makers to expand regulations beyond their region. They are aware that keeping “stringent regional regimes tend to disadvantage their own industries, ports and other maritime interests”168 and also of the transboundary nature of marine pollution which entails that “regional standards can be severely compromised if actors outside the region continue to ignore the problem”.169

Again, the Torrey Canyon accident is an example of regulatory response to an oil spill, this time at a regional level. In the aftermath of the accident, the North Sea states adopted the 1969 Bonn Agreement for Co-operation in Dealing with Pollution of the North Sea by Oil. At a sub-regional level, the Nordic states adopted the 1971 Nordic Agreement Concerning Co-operation in Measures to Deal with Pollution of the Sea by Oil.

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167 Ibid, p. 84
168 Ibid, p. 86
169 Ibid
To the Bonn Agreement, several others conventions dealing with specific sources of marine pollution followed. The 1972 Oslo Convention for the Prevention of Marine Pollution by Dumping by Ships and Aircraft and the 1974 Paris Convention for the Prevention of Marine Pollution from Land-based Sources covered the same geographical area (the North Sea, the Arctic Ocean and the North-East Atlantic) and are administered by a Commission. The Commissions supervised the implementation of the respective conventions. “The Oslo Convention pioneered the use ‘black’ and ‘grey’ substances (...) which were later adopted by instruments such as IMO’s 1972 London Convention on Dumping”.170 Both the Oslo and Paris Conventions were replaced by the 1992 Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), an instrument that addressed all kinds of marine pollution. Approaching pollution globally started in Europe with the 1974 Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea. “The 1974 Helsinki Convention was extremely influential in laying out the framework for the subsequent adoption of the UNEP Regional Seas conventions. In addition, it provided a useful basis for the negotiations at UNCLOS III”.171 The 1974 Helsinki Convention “was substantially based upon the provisions of MARPOL 73 but contained several improvements to the latter”.172

As mentioned above, apart from the conventions enacted at a regional level, there are political fora in Europe that have been key for the development of the regulation of vessel-source pollution at a global level. The International Conferences on the Protection of the North Sea are regional intergovernmental conferences that have been convened every few years (the first one was convened in 1984 in Bremen). They issue declarations that “although not formally binding as a matter of international law, such declarations or recommendations have influenced the subsequent development of international law by treaty or resolution of international organization”173 and also have driven national and regional action.174 In the Second North Sea Conference, held in 1987, it was agreed that the North Sea states would initiate actions raise the issue of air pollution at IMO. They were concerned with acid rain and wanted to improve the quality standards of heavy fuels and reduce marine and atmospheric pollution.

The European Union (EU) has regulated many aspects related to shipping and in this area, it is the most relevant organization in Europe. The EU has enacted all kinds of instruments for the regulation of shipping and despite the contradictory interests within it, it has balanced

170 Ibid, p. 84
171 Ibid, p. 85
172 Ibid
174 Tan AKJ, *Vessel-Source Marine Pollution*, p. 86
environmental demands and maritime interests of EU member states such as Greece, Cyprus, Malta, the UK and Norway. Unilateral action of European Union has a strong impact on the shipping industry. The EU has regulated matters such as tanker reporting requirements, rules for vessel traffic monitoring, rules governing the conduct of classification societies, a common policy on safe shipping, seafarer training, reception facilities and port state control. The reason for this activism in the EU is the impatience with the IMO system.

The European Maritime Safety Agency has since 2003 assisted the European Commission, who is a member of IMO, in developing and implementing EU legislation on maritime safety, pollution by ships and maritime security. In the area of air pollution from ships, an example of how the EU action accelerate processes at IMO can be found. “In 2008, the Commission called for further action at the IMO which resulted in an amended Annex VI lowering the maximum permissible sulphur content of marine fuels inside and outside (SOx Emission Control Areas) SECAs”.

2.4.2. Memoranda of Understanding on Port State Control

The LOSC framework for jurisdiction relating to vessel-source pollution prevention heavily relies on flag states for enforcement. Having established flag states as the main enforcer of marine environmental legal instruments is the major cause for enforcement deficiency. As mentioned above, shipowners from developed countries have moved their fleets to countries with open registries where they can easily elude compliance with costly environmental standards. To ensure compliance by ships, port states take advantage of the jurisdiction given to them to board vessels and inspect documentation and even detain the vessel in case of serious breaches. A MOU on port state control seeks to ensure uniform port state control of the provisions on vessel-source pollution of the LOSC, IMO instruments, and other conventions.

The first MOU on port state control was signed in 1978 at The Hague and it unified enforcement of an ILO convention on working conditions on board. That same year, the *Amoco Cadiz* accident in the coasts of France caused an outraged public reaction that led policy-makers to enact more stringent port state control for maritime safety and pollution prevention. In 1982,
fourteen European countries\textsuperscript{183} signed a Memorandum of Understanding on Port State Control in a Ministerial Conference in Paris. The Paris MOU is an administrative agreement among European maritime authorities to harmonize port state control activities. “Since that date, the Paris Memorandum has been amended several times to accommodate new safety and marine environment requirements stemming from the International Maritime Organization (IMO) and requirements related to working and living conditions of seafarers”.\textsuperscript{184} The Paris MOU also ensures that EU directives relating to maritime safety and vessel-source pollution are enforced in the ports of the states parties to the MOU.\textsuperscript{185}

\textsuperscript{183} The current member States of the Paris MoU are: Belgium, Bulgaria, Canada, Croatia, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, the Netherlands, Norway, Poland, Portugal, Romania, the Russian Federation, Slovenia, Spain, Sweden and the United Kingdom. See https://www.parismou.org/about-us/organisation accessed July 13, 2016

\textsuperscript{184} https://www.parismou.org/about-us/history accessed July 13, 2013

\textsuperscript{185} Tan AKJ, \textit{Vessel-Source Marine Pollution}, p. 92
3. The International Maritime Organization

It has been earlier explained that the IMO is “the international regulatory body entrusted with overseeing and coordinating matters related to maritime safety and the prevention of vessel-source pollution”.\(^\text{186}\) The IMO has issued a statement in which it establishes that “while the (LOSC) defines flag, coastal and port State jurisdiction, IMO instruments specify how jurisdiction should be exercised so as to ensure compliance with safety and shipping anti-pollution regulations”.\(^\text{187}\) The IMO assumes a key role in the law-making process on marine pollution, therefore, shipping regulations cannot be analyzed without taking a look at the work of IMO and how the organization carries it out.

3.1. Background

On March 6th 1948, a UN Maritime Conference held in Geneva adopted the IMO Convention which created the Inter-Governmental Maritime Consultative Organization (IMCO) to later on have the name changed to International Maritime Organization.\(^\text{188}\) The IMO’s headquarters are located in London. The IMO Convention did not receive the required ratifications for entry into force until 1958. Maritime interests disliked the provisions in the IMO Convention that allowed “for the Organization to exercise jurisdiction not only with respect to technical matters but also commercial matters such as the discriminatory practices of shipping firms.”\(^\text{189}\) The economic role was eventually accepted by maritime states but has never been formally used.\(^\text{190}\) There is a tacit understanding that IMO’s role is limited to technical matters.\(^\text{191}\)

In the early years of IMO, there existed the believe that the organization only represented the interests of shipowners, which at the time were also the industrialized countries. The process of decolonization and globalization meant that developing states started to outnumber the developed ones at the Organization, this rendered that view unjustifiable.\(^\text{192}\) Despite the numbers, it does not seem that the influence of the two groups of countries has been balanced at the IMO as “developed maritime states continue to maintain their dominance (...) through their influence in the governing IMO Council”\(^\text{193}\) as well as in committees, subcommittees and other organs of IMO.

\(^{186}\) Tan AKJ, *Vessel-Source Marine Pollution*, p. 75


\(^{188}\) Changed by IMO Assembly resolutions A.358(IX) and A.371(X)

\(^{189}\) Tan AKJ, *Vessel-Source Marine Pollution*, p. 75

\(^{190}\) Ibid

\(^{191}\) Ibid

\(^{192}\) Ibid

\(^{193}\) Ibid
3.2. The scope of the IMO

The global scope of IMO is defined in article 1 of the 1948 Convention on the International Maritime Organization (IMO Convention). The purposes of the Organization concern technical matters of all kinds affecting shipping engaged in international trade. In relation to these matters, the IMO shall provide machinery for co-operation among governments in the field of governmental regulation and practices. The IMO is the forum that encourages and facilitates the adoption of the highest practicable standards in matters concerning the maritime safety, efficiency of navigation and the prevention and control of marine pollution from ships.\footnote{IMO Convention, article 1(a)} Article 1 mentions the marine environment again in paragraph (d) when it establishes that the Organization’s purpose is to provide for the consideration of any matters concerning shipping and the effect of shipping on the marine environment that may be referred to it by any organ or specialized agency of the United Nations. The IMO shall encourage the removal of discriminatory action and unnecessary restrictions by governments affecting shipping engaged in international trade to promote the availability of shipping services to the commerce of the world without discrimination.\footnote{IMO Convention, article 1(b)} In relation to this purpose, the IMO shall provide for the consideration of matters concerning unfair restrictive practices by shipping concerns in accordance with part II of the IMO Convention.\footnote{IMO Convention, article 1(c)} The Organization shall deal with administrative and legal matters related to the purposes of the IMO as well as provide for the exchange of information among governments on matters under consideration by the IMO.\footnote{IMO Convention, article 1(a) and (e)} Article 59 of the IMO Convention establishes that, in accordance with article 57 of the Charter of the UN, the IMO shall be the UN specialized agency in the field of shipping and the effect of shipping on the environment.

The role of the IMO as the international organization in charge of technical matters of all kinds affecting shipping engaged in international trade is widely accepted and the legitimacy of this role in accordance with international law is uncontested.\footnote{Implications of the United Nations Convention on the Law of the Sea for the International Maritime Organization, Document LEG/MISC/8, January 30, 2014, p.8} There are 171 member states to IMO\footnote{http://www.imo.org/en/About/Membership/Pages/Default.aspx accessed May 19, 2016} and all members may participate in the meetings of the IMO bodies that draft and adopt recommendations containing safety and anti-pollution rules and standards. Moreover, all states, whether or not members of the IMO, may participate in the IMO conferences responsible for adopting IMO conventions.\footnote{Implications of the United Nations Convention on the Law of the Sea for the International Maritime Organization, Document LEG/MISC/8, January 30, 2014, p. 8} There 77 international non-governmental organizations (NGOs) that...
have consultative status with IMO and 65 intergovernmental organizations which have signed agreements of cooperation with IMO. The interests of many actors are brought to the IMO through these organizations. Among these actors, there are a large number of organizations representing commercial and industrial interests as well as regional organizations and UN agencies representing political and environmental interests. The participation of environmental and industry NGOs in the IMO through their observer status predates the promotion by the UNCED of such feature as well as the inclusion of NGOs in international environmental organizations. Article 62 of the IMO Convention establishes that “the Organization may, on matters within its scope, make suitable arrangements for consultation and cooperation with non-governmental international organizations.”

3.3. Structure

The IMO is composed of an Assembly, a Council and a few committees and sub-committees. At its origin, the Maritime Safety Committee (MSC) was the only committee in IMO but as the work of the organization broadened its scope, more committees were created. Several sub-committees assist the MSC and the Marine Environmental Protection Committee (MEPC), which are the main technical committees. A Secretariat oversees the administrative activities of IMO.

3.3.1. The Assembly

The Assembly is the highest governing body of the IMO in which all member states participate. It meets every two years. Article 15 of the IMO Convention lists the functions of the Assembly, the most important ones are approving the work program, voting the budget and election the members of the Council of the IMO. Paragraph (j) of this same article establishes that the Assembly shall “recommend to Members for adoption regulations and guidelines concerning maritime safety, the prevention and control of marine pollution from ships and other matters concerning the effect of shipping on the marine environment assigned to the Organization by or under international instruments, or amendments to such regulations and guidelines which have been referred to it.”

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202 For a list of NGOs in consultative status with IMO see http://www.imo.org/en/About/Membership/Pages/NGOsInConsultativeStatus.aspx. For a list of intergovernmental organizations that have signed agreements of cooperation with IMO see http://www.imo.org/en/About/Membership/Pages/IGOsWithObserverStatus.aspx.
203 de La Fayette, “The Marine Environment Protection Committee”, p. 166
204 The Sub-Committees are: Sub-Committee on Human Element, Training and Watchkeeping (HTW); Sub-Committee on Implementation of IMO Instruments (III); Sub-Committee on Navigation, Communications and Search and Rescue (NCSR); Sub-Committee on Pollution Prevention and Response (PPR); Sub-Committee on Ship Design and Construction (SDC); Sub-Committee on Ship Systems and Equipment (SSE); and Sub-Committee on Carriage of Cargoes and Containers (CCC)
Assembly’s recommendations are not legally binding, nevertheless “it is common that these recommendations are incorporated in national law as they are treated as international standards”.  

3.3.2. The Council

The Council is composed by 40 member states elected by the Assembly for two-year terms. The Council assumes governing functions in the Organization, it supervises the work of IMO, which includes the following functions: “(a) coordinate the activities of the organs of the Organization; (b) consider the draft work program and budget estimates of the Organization and submit them to the Assembly; (c) receive reports and proposals of the Committees and other organs and submit them to the Assembly and Member States, with comments and recommendations as appropriate; (d) appoint the Secretary-General, subject to the approval of the Assembly; (e) enter into agreements or arrangements concerning the relationship of the Organization with other organizations, subject to approval by the Assembly”.  

Between sessions of the Assembly, the Council assumes all of the Assembly’s functions except for those in article 15(j) of the IMO Convention.

In the Council, states represent their different interests on the Organization. Because of this, the assignation of places in the Council by the Assembly is organized according to three different categories. Category (a) is composed of ten states with the largest interest in providing international shipping services. Category (b) is composed of ten states with the largest interest in international seaborne trade and category (c) is composed of twenty states not elected under the other two categories and that have special interests in maritime transport or navigation. They are elected as to represent all major geographic areas of the world. Despite this distribution, the Council is dominated by developed maritime states. The interests of coastal states and developing states, albeit greater in number, are underrepresented.

3.3.3. The Committees

The Committees at IMO conduct much of the work in the organization. The MSC and the MEPC are in charge of drafting new technical standards. The Legal Committee is entrusted with any legal matters within the scope of the IMO. The Technical Cooperation Committee is in charge with the

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206 Karim MS, *Prevention of Pollution of the Marine Environment from Vessels*, p. 21
208 The Council members for the 2016-2017 biennium are China, Greece, Italy, Japan, Norway, Panama, Republic of Korea, Russian Federation, United Kingdom, United States in category (a). In category (b) Argentina, Bangladesh, Brazil, Canada, France, Germany, India, Netherlands, Spain and Sweden. In category (c) Australia, Bahamas, Belgium, Chile, Cyprus, Denmark, Egypt, Indonesia, Kenya, Liberia, Malaysia, Malta, Mexico, Morocco, Peru, Philippines, Singapore, South Africa, Thailand, Turkey. List available at http://www.imo.org/en/About/Pages/Structure.aspx accessed May 23, 2016
209 Karim MS, *Prevention of Pollution of the Marine Environment from Vessels*, p. 23
implementation of technical cooperation projects in which IMO is the executing agency. The Facilitation Committee is a subsidiary organ of the Council, it harmonizes shipping procedures to simplify bureaucratic work related to international shipping. The Committees consist of all member states. The Committees are introduced in more detail below.

3.3.3.1. The Maritime Safety Committee

The MSC’s work is dedicated to maritime safety and it “shall consider any matter within the scope of the Organization concerned with aids to navigation, construction and equipment of vessels, manning from a safety standpoint, rules for the prevention of collisions, handling of dangerous cargoes, maritime safety procedures and requirements, hydrographic information, log-books and navigational records, marine casualty investigation, salvage and rescue, and any other matters directly affecting maritime safety”.

The scope of the committee’s work affects directly and indirectly the preservation of the marine environment, because of that, the Sub-Committee on Oil Pollution (SCOP), the first organ of the IMO dedicated to marine pollution, was established in 1965 as a sub-committee of the MSC. In 1973, the SCOP was renamed Sub-Committee on Marine Pollution (SCMP) and with the establishment of the MEPC, all marine environment related works were transferred to it.

The MSC consists of all members since 1974, when the Assembly amended the IMO Convention. Up to that time, the MSC consisted of 14 members elected by the Assembly, 8 of which need to be the largest ship-owning nations. The first meeting of the Assembly elected as largest ship-owning nations the United Kingdom, the United States, Norway, the Netherlands, Italy, Japan, France and Germany. Liberia and Panama considered themselves to have bigger ship-owning interests than France and Germany and objected. Following this objection, the Assembly asked for an advisory opinion to the ICJ. The ICJ gave an advisory opinion on the question whether the Assembly, in not electing Liberia and Panama to the MSC, exercised its electoral power in a manner in accordance with the provisions of article 28(a) of the IMCO Convention. The ICJ

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210 IMO Convention, article 28
211 Karim MS, Prevention of Pollution of the Marine Environment from Vessels, p. 24
212 IMO Convention, article 27
213 IMCO Convention, article 28(a) established that “The Maritime Safety Committee shall consist of fourteen Members elected by the Assembly from the Members, governments of those nations having an important interest in maritime safety, of which not less than eight shall be the largest ship-owning nations, and the remainder shall be elected so as to ensure adequate representation of Members, governments of other nations with an important interest in maritime safety, such as nations interested in the supply of large numbers of crews or in the carriage of large numbers of berthed and unberthed passengers, and of major geographical areas.”
214 Karim MS, Prevention of Pollution of the Marine Environment from Vessels, p. 24
responded that the electoral power of the Assembly had not been exercised in accordance with the IMCO Convention. The countries that opposed the election of Liberia and Panama argued that the ships flying their flags did not have a genuine link with them and therefore are FOC nations, but the ICJ concluded that “the Assembly failed to comply with Article 28(a) of the Convention which, as the Court has established, must be interpreted as requiring the determination of the largest ship-owning nations to be made solely on the basis of registered tonnage”.216 Karim considers that this dispute reflects the tension between the North and the South in the IMO, nevertheless this author considers that representation of FOC nations in the IMO does not grant participation to developing countries or least developed countries.217

3.3.3.2. The Marine Environmental Protection Committee

The MEPC is dedicated to the prevention and control of marine pollution from ships. It was established by the Assembly in 1973. At the time, it was created as a subsidiary body of the Assembly but an amendment of the IMO Convention in 1975 granted the Committee with full constitutional status which meant that the prevention and control of marine pollution from ships equated in status the maritime safety. This amendment came into force in 1982.

Article 38 of the IMO Convention defines the functions of the Committee. The MEPC shall consider any matter within the scope of the IMO concerned with the prevention of marine pollution from ships. For that purpose, the MEPC shall perform such functions as they are conferred upon IMO by or under international conventions, particularly with respect to the adoption and amendment of regulations or other provisions, as provided for in such conventions as well as consider appropriate measures to facilitate the enforcement of those.218 The MEPC is entrusted with the acquisition of scientific, technical and other practical information on the prevention and control of marine pollution from ships and making recommendations and developing guidelines.219 The MEPC shall promote co-operation with regional organizations concerned with the prevention and control of marine pollution from ships.220

With respect to the last mentioned function of the MEPC, it is a fact that the IMO “has long been co-operating with a number of other intergovernmental organizations having an interest in shipping and ocean affairs. These include “the Food and Agricultural Organization (FAO), the International Labour Organization (ILO), the International Atomic Energy Agency (IAEA), the

216 Ibid, p. 171
217 Karim MS, Prevention of Pollution of the Marine Environment from Vessels, p. 25
218 IMO Convention, article 38(a) and (b)
219 IMO Convention, article 38(c)
220 IMO Convention, article 38(d)
UNEP, the Secretariat of the Basel Convention, the Secretariat of the UNFCCC, the OSPAR Commission, and (...) the UN Division for Ocean Affairs and the Law of the Sea (DOALOS)”. Especially important to the work of the MEPC on the conservation of the marine biodiversity is the CBD. The issues pointed out as threats to the marine biodiversity by the CBD COP have all been in the IMO agenda and particularly relevant when addressing the prohibition of toxic anti-fouling systems, management of ships’ ballast waters and the designation of Particular Sensitive Areas is the CBD.

“The workload of the MEPC is growing enormously”. The number of issues relating to the preservation of the marine environment dealt with in the Committee are increasingly more diverse. As mentioned in Chapter 2, the IMO began working on air pollution from vessels in the late 1980s. This issue has grown to become one of the main concerns of the MEPC in the present as reflected by the 69th session of the Committee. The MEPC approved in this session mandatory requirements for ships to record and report data on their fuel consumption, welcomed the Paris Agreement under the UNFCCC and discussed how to address GHG emissions from ships in accordance with the role attributed to the IMO by the UNFCCC in mitigating the impact of the GHG emissions from ships. For that purpose, the MEPC agreed to establish a working group in the next session to debate In the session, several amendments to MARPOL and the NOX Technical Code 2008 were adopted and considered a report evaluating the technological developments relevant to implementing the second phase of the Energy-Efficiency Design Index (EEDI) regulations. The Committee considered a report by a correspondent group on fuel oil quality and the establishment of quality-control measures prior to the fuel being delivered to a ship. Agreement to make a decision on the sulphur cap for fuel oil in the 70th session was reached in the 69th session. The session also established the effective dates for the application of the Baltic Sea Special Area under MARPOL Annex IV on Prevention of Pollution by Sewage from Ships were approved and new areas were designated as Particularly Sensitive Sea Area (PSSA). The BWM Convention, not yet into force, was amended.

221 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal of 1989
222 de La Fayette, “The Marine Environment Protection Committee”, p. 166
223 Ibid
224 Karim MS, Prevention of Pollution of the Marine Environment from Vessels, p. 25
225 Marine Environment Protection Committee, 69th session, held in April 18-22, 2016
226 The amendments include: amendments to MARPOL Annex II, appendix I, related to the revised GESAMP hazard evaluation procedure; amendments to MARPOL Annex IV relating to the dates for implementation of the discharge requirements for passenger ships while in a special area, i.e. not before 1 June 2019 for new passenger ships and not before 1 June 2021 for existing passenger ships; amendments to MARPOL Annex VI regarding record requirements for operational compliance with NOX Tier III emission control areas; and amendments to the NOX Technical Code 2008 to facilitate the testing of gas-fuelled engines and dual fuel engines. Information available at http://www.imo.org/en/MediaCentre/MeetingSummaries/MEPC/Pages/MEPC-69th-session.aspx accessed June 3, 2016
Although indirectly, some environmental issues are dealt with by the MSC and the Legal Committee (the MSC works to promote safe navigation and that entails less accidents resulting in marine pollution and the Legal Committee elaborates treaties on liability and compensation), the MEPC carries out “virtually all negotiations for the legal instruments and amendments of existing legal instruments concerning the marine environment and within the competence of the IMO are facilitated through the MEPC”.  

3.3.3.3. The Legal Committee

The Legal Committee was established in 1967 as a temporary organ subsidiary to the Council. It was created in the aftermath of the Torrey Canyon oil spill to deal with the legal issues related to the accident. In 1975, the IMO Convention was amended to make the Committee a permanent organ of the Organization. The Legal Committee shall consider any legal matters within the scope of IMO, including marine environmental matters. Its role has been key to establish a comprehensive legal framework for compensation for vessel-source marine pollution damage in the adoption of IMO legal instruments. The Legal Committee consists of all members. 

3.3.3.4. The Technical Co-operation Committee

The Technical Co-operation Committee was established in 1969 as a subsidiary body of the Council. It became a permanent body of the IMO in 1984 when an amendment institutionalizing the Committee adopted by the Assembly came into force. The Committee consists of all members. The function of the Committee is to consider any matter within the scope of the IMO dealing with the implementation of technical co-operation projects “funded by the relevant United Nations program for which the Organization acts as the executing or co-operating agency or by funds-in-trust voluntarily provided to the Organization, and any other matters related to the Organization's activities in the technical co-operation field”. 

3.3.3.5. The Facilitation Committee

An ad hoc working group on facilitation created in 1968 was the predecessor of the Facilitation Committee. The Council considered that the work done by the working group need to be continued in a permanent body. For that reason, the Council created the Committee as a subsidiary body of the

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227 Karim MS, *Prevention of Pollution of the Marine Environment from Vessels*, p. 25
228 IMO Convention, article 33(a)
229 Karim MS, *Prevention of Pollution of the Marine Environment from Vessels*, p. 26
230 IMO Convention, article 43(a)
Council. In 1991, an amendment to the IMO Convention which entered into force in 2008, fully institutionalized the Committee. The Facilitation Committee works to eliminate the unnecessary formalities and reducing documentary requirements in international shipping. The Committee’s work consists also of implementing the Convention on Facilitation of International Maritime Traffic (FAL Convention) adopted by the International Conference on Facilitation of Maritime Travel and Transport of 1965. The purpose of the Convention is to “facilitate maritime transport by reducing paper work, simplifying formalities, documentary requirements and procedures associated with the arrival, stay and departure of ships engaged on international voyages”. The Facilitation Committee consists of all members.

3.3.4. The Secretariat
The Secretariat of IMO is composed by the Secretary-General and about 300 international personnel and they oversee the administrative activities of the Organization. The background of the Secretary-General is always related to some segment of the maritime industry, usually they are former heads of the states’ departments of merchant shipping, state policy for maritime transport or they are former port or marine industry authorities. Mr. Kitack Lim, from the Republic of Korea, is the Secretary-General, appointed on 1 January for an initial four-year term. Before his appointment, he was the President of Busan Port Authority.

3.4. Law-making process at IMO
The IMO is the competent organization for the prevention of marine pollution from ships under the LOSC. When the LOSC refers to the ‘competent international organization’ it refers exclusively to IMO. The LOSC calls upon the IMO to develop standards on vessel-source pollution prevention. To achieve its purposes, the IMO shall “provide for the drafting of conventions, agreements, or other suitable instruments, and recommend these to Governments and to intergovernmental organizations, and convene such conferences as may be necessary”. Thus, the IMO needs to convene conferences so the treaties that it has drafted can be adopted as it has not the power to adopt them itself.

232 Convention on Facilitation of International Maritime Traffic, adopted April 1965, entered into force in March 1967
235 See section 1.5
237 IMO Convention, article 2(b)
The IMO is the main organization for the preparation of shipping standards. These standards are technical in nature and annexed to an international treaty. The treaties address maritime safety and the protection of the marine environment. More than forty international conventions and agreements have been adopted under the auspices of IMO. The most important treaty for the protection of the marine environment is the MARPOL Convention.

The process for adopting new shipping standards begins in the committees and subcommittees where standards are negotiated. Then, a diplomatic conference is convened for last-minute negotiations and formal adoption. The role of the IMO goes beyond the adoption of regulatory treaties, article 211.1 of the LOSC obliges states to establish international rules and standards for the prevention of marine pollution through the competent international organization and it adds that “such rules and standards shall, in the same manner, be re-examined from time to time as necessary”. Thus, it is also the IMO’s duty to ensure that its instruments are adapted to new circumstances and take into account technological and scientific developments. In fact, the IMO has been re-examining its instruments on a regular basis from the beginning, before the LOSC was adopted. The IMO is considered to be a pioneer in the continuous revision of instruments. This role is reinforced by provisions in IMO’s instruments that recognize the organization as a forum for drafting and adopting technical amendments to the treaty standards.

The MEPC and the MSC are the organs responsible for the adoption of amendments to most regulatory treaties and they are assisted by the subcommittees. The amendment of a regulatory treaty requires that “a compelling need for such amendments should be demonstrated by the proponent(s)”. States make proposals for amendments while NGOs, which can only enjoy observer status, may find a state who is willing to sponsor their interest for a particular amendment. The procedure for the amendment of a regulatory treaty is established in the same treaty. In most cases, when a proposal for amendment is submitted, its considered by a subcommittee. The discussions of the broader policy implications of an amendment are carried out at the MEPC or MSC and these will provisionally approve the amendment. In fact, for the environmental work at IMO, “the MEPC acts as the Conference of the Parties for both MARPOL and the OPRC

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238 Harrison J, Making the Law of the Sea, p. 159
239 Ibid
240 LOSC, article 211.1
241 de La Fayette, “The Marine Environment Protection Committee”, p. 200
242 Ibid
243 MARPOL Convention, article 16 establishes a procedure for its amendment
244 Guidelines on the Organization and Method of Work of the Maritime Safety Committee and the Marine Environment Protection Committee and Their Subsidiary bodies MSC-MEPC.1/Circ.2 27 May 2008, para. 2.4 “The Committees should regularly review the status of all conventions, protocols and other major instruments under their purview.
245 Ibid, para. 2.11.2
The amendment is then circulated to the states for final adoption at a meeting. An amendment is adopted with two-thirds majority of the parties present at the meeting. Finally, the amendment is communicated to the parties for acceptance. This procedure, however, only applies to the amendments of technical standards that are found in the main body of the treaty. When an amendment is made to a technical standard that is found in an annex to a treaty, the tacit acceptance procedure applies.

“The amendment procedures contained in the first Conventions to be developed under the auspices of IMO were so slow that some amendments adopted have never entered into force. This changed with the introduction of the tacit acceptance procedure”. The tacit acceptance procedure was incorporated to most technical conventions adopted under the auspices of IMO since 1972. Technical standards need to keep up with technological advancements and adapt to new threats to the marine environment. This justifies the introduction of a speedier procedure to amend the standards. The MARPOL Convention establishes the tacit acceptance procedure in its article 16.2(f). By this procedure, “once an amendment to a technical standard has been adopted by the IMO committees, the emphasis is on states to object to the provisions in order to prevent amendments from entering into force”. The MARPOL Convention establishes a tacit procedure to amend technical standards in which these are considered accepted by all Parties unless objections are made “by not less than one third of the Parties or by the Parties the combined merchant fleets of which constitute not less than 50 per cent of the gross tonnage of the world’s merchant fleet whichever condition is fulfilled” in a period that shall be not less than ten months.

Very few objections to amendments have been made by states. Objections have been made by states to gain additional time for implementing the amended regulation in national law. Then, when national law has been implemented, the objection is withdrawn.

The tacit acceptance procedure expedites the amendment of technical standards, in particular their entry into force, whose date, through this procedure, becomes easily predictable. These conditions allow the industry to anticipate the changes they need to make in order to comply with the new standards. But while amending technical standards contained in the annexes of MARPOL is an agile process, incorporating a new annex to the Convention is not. Each annex to MARPOL regulates a different type of pollution, adding a new one requires, according to article 16.5 of the
MARPOL Convention, the acceptance of two thirds of the parties, the combined merchant fleets of which constitute not less than 50 per cent of the world’s tonnage. This is the same procedure required to amend an article of the Convention. This procedure is considered an “insuperable barrier to early entry into force”. An example of this is the adoption of Annex VI to MARPOL relating to air pollution from ships, which was adopted by the parties in 1997 but it did not enter into force until May 2005.

3.5. IMO’s soft law

Non-binding instruments play an important part at complementing treaties that regulate pollution from ships. The committees at IMO adopt non-binding instruments in a variety of situations. Those that could be considered most relevant are the non-binding instruments adopted by the committees to introduce temporary pollution control measures before they are incorporated into a mandatory legal instrument. As an example, the IMO’s Assembly adopted guidelines for the treatment of ballast waters. More recently and in the field of air pollution and energy efficiency of ships, MEPC 59 developed technical and operational measures for the reduction of CO₂ and other atmospheric pollutants in July 2009. These measures included provisional guidelines for the Energy Efficiency Design Index (EEDI) and the Ships Energy Efficiency Management Plan (SEEMP). MEPC 62 made these measures mandatory in July 2011 by adding a new chapter 4 to MARPOL Annex VI.

Non-binding instruments can also be given relevance when a treaty references guidelines or recommendations. Treaties may reference those for the implementation of the technical standards that they establish. Sometimes, the resolutions aim at promoting the uniform interpretation of a technical regulation. There are several resolutions in relation to the technical annexes to MARPOL with that objective. But the guidelines or recommendations are not only relevant because a treaty so establishes, article 31.3(a) of the Vienna Convention on the Law of Treaties in Part III Section 3 on the interpretation of treaties establishes that “any agreement relating to the treaty which was made between the parties in connection with the conclusion of the treaty” shall be comprised in the context for the purpose of the interpretation of the treaty. Thus, despite the instrument’s non-binding

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253 de La Fayette, “The Marine Environment Protection Committee”, p. 172
254 For the status of amendments to IMO’s instruments see IMO, Status of multilateral Conventions and instruments in respect of which the International Maritime Organization or its Secretary-General performs depositary or other functions. As at 7 July 2016
255 IMO Assembly Resolution A.774(18) (1993) on Guidelines for Preventing the Introduction of Unwanted Pathogens from Ships’ Ballast Waters and Sediment Discharges

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nature, the relevance of these should not be underestimated when the parties adopt authoritative interpretations.\textsuperscript{257} Moreover, these “decisions of IMO organs concerning the interpretation of regulatory treaties could be taken into account by dispute settlement bodies when interpreting and applying the treaties”.\textsuperscript{258}

\begin{flushleft}
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\textsuperscript{257} Harrison J, \textit{Making the Law of the Sea}, p. 165
\textsuperscript{258} Ibid
\end{footnotesize}
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4. Legal framework

4.1. International regulation of vessel-source air pollution

Chapter 2 introduced the context of the regulation of vessel-source pollution, it showed how the regulation for the protection of the marine environment originated and how it was developed through international environmental law and the law of the sea. It also provided an overview of all the interests that have shaped the regulation of pollution from ships as well as the international arenas where it has been adopted. Chapter 3 has characterized the IMO as it is the main international organization for the regulation of shipping, and has among its purposes to facilitate the adoption of the highest practicable standards for the prevention and control of marine pollution from ships.259 This chapter is dedicated to the rules that regulate airborne pollution from ships. For that purpose, it is necessary to start with an analysis of the rules for vessel-source pollution set up by the Law of the Sea Convention as it establishes the legal framework to which the instruments adopted under the auspices of the IMO respond to. While vessel-source pollution is regulated primarily by global legal instruments, the key global instruments being MARPOL and the LOSC,260 it is necessary to analyze whether there are rules of customary international law relating to the prevention of marine pollution from ships. After this, the focus will be on the provisions on vessel-source pollution contained in the LOSC. The LOSC calls on states to establish international rules and standards to prevent, reduce and control pollution of the marine environment from vessels.261 These standards (mostly adopted under the auspices of the IMO) are incorporated into the LOSC by the means of rules of reference. This chapter will address where the standards are found and how they are incorporated into the LOSC. Lastly, it will address the IMO’s instruments on the matter. The approach of this chapter is to start with the description of the general framework for the regulation of vessel-source pollution in order to later explain the rules of airborne pollution from ships in detail.

As was shown in chapter 2, the regulation of vessel-source pollution is the product of the efforts of different actors to reflect their interests in the legal texts. The global nature of shipping entails that there is a wide variety of actors that interact in this field and in addition to this, the structure of IMO allows for the contribution on non-state actors to the configuration of the regulation.262

259 IMO Convention, article 1(a)
261 LOSC, article 211.2
262 Joseph E. Vorbach, 'The Vital Role of Non-Flag State Actors in the Pursuit of Safer Shipping' (2001) 32 Ocean Development & International Law 27, p. 34
4.2. Customary international law

Rules of customary international law that relate to marine pollution have been evidenced by international courts and arbitral tribunals although this source of law does not provide many relevant rules for the prevention of marine pollution. In the Corfu Channel case the ICJ ruled that states were obliged to “not allow knowingly its territory to be used for acts contrary to the rights of other states”. In a similar way, the arbitral tribunal in the Trail Smelter case ruled that “no state has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another”. This is the most important rule of customary international law relevant to marine pollution. According to Churchill and Lowe, this rule of customary law can be reformulated as follows in order to apply it to marine pollution: states must “not permit their nationals to discharge into the sea matter that could cause harm to the nationals of other states”. While customary law can define the extent of states’ legislative and enforcement jurisdiction it is not adequate to provide “sufficient or extensive development to sustain effective action against pollution” or detailed standards. Proof of the existence of rules of customary law relating to the marine environment can be found in Principle 21 of the Stockholm Declaration of 1972 and Principle 2 of the Rio Declaration. With Principle 2 of the Rio Declaration, the obligation not to cause environmental damage to another state was furthered to include the obligation not to cause environmental damage in areas beyond the limit of national jurisdiction. In the OSPAR Convention states have recognize in its Preamble that Part XII of the LOSC is a reflection of the provisions of customary international law. In a similar way, states have reflected this view in Agenda 21 where in paragraph 17.1 they establish that the provisions in Part XII reflect international law.

Because of the limitations that come with the nature of customary law, the development of the regime that regulates marine pollution has been conducted through treaty practice. Many of these instruments predate UNCLOS III. Churchill and Lowe classify these instruments in four categories: general multilateral treaties, regional treaties, bilateral treaties and the LOSC. There are several multilateral treaties dedicated to pollution from ships but none to pollution from land-

263 Corfu Channel (United Kingdom v Albania) (1949) ICJ, p. 22
264 Trail Smelter (Canada/United States) (1938 and 1941) III RIAA, p. 1965
266 Ibid
267 Rio Declaration, Principle 2 establishes that states have “the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.”
268 Convention for the Protection of the Marine Environment of the North-East Atlantic adopted 22 September 1992 together with a Final Declaration and an Action Plan
269 Churchill RR and Lowe AV, The Law of the Sea, p. 332
based sources. A large number of regional treaties deal with all types of marine pollution and the 
bilateral treaties deal with a more local or specific type of pollution. The next section addresses the 
LOSCon as an instrument to deal with marine pollution.

4.3. The Law of the Sea Convention

The Law of the Sea Convention establishes a comprehensive legal framework for the protection of 
the marine environment. Part XII of the Law of the Sea Convention is entitled Protection and 
Preservation of the Marine Environment. There was general accord on the need to include a wide 
range of rules on environmental matters during the negotiations of the Convention in UNCLOS III 
and therefore the negotiation of Part XII took an important place in the Conference. As a result, 
Part XII constitutes a substantial component of the LOSC. The goal of the negotiating parts was to 
join efforts to create an international legal framework for the protection and preservation of the 
marine environment. The Preamble of the Convention emphasizes that environmental problems are 
part of the legal regime of the oceans. The Preamble of the Convention fixes as an objective “the 
desirability of establishing through this Convention, (...) a legal order for the seas and oceans which 
will (...) promote the peaceful uses of the seas and oceans, the equitable and efficient utilization of 
their resources, the conservation of their living resources, and the study, protection and preservation 
of the marine environment”.

Prior to the adoption of the LOSC, there was no general duty on states to regulate marine 
pollution, the international law of the sea “merely empowered (states) to do so”. Coastal states 
had no prescriptive power beyond the territorial sea to regulate operations of ships. Beyond that 
area, flag states were the only ones with prescriptive jurisdiction over marine pollution, but the duty 
imposed on them was “too imperfectly defined and observed”. The High Seas Convention 
established in its article 24 that “every State shall draw up regulations to prevent pollution of the 
seas by the discharge of oil from ships or pipelines or resulting from the exploitation and 
exploration of the seabed and its subsoil, taking account of existing treaty provisions on the 
subject”. The provision did not state the content of the prescriptive jurisdiction and the 
requirement of taking into account existing provisions leaves a great margin for discretion. The

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Nijhoff 1991), p. 3
271 Ibid
272 LOSC, Preamble
International Law 347, p. 347
274 Ibid
275 High Seas Convention, article 24
framework for prescriptive jurisdiction in international law was not protective enough of the interests of coastal states as there was no requirement to comply with international standards. A number of important flag states were not a part of MARPOL and other international instruments relating to marine pollution, thus they adopted national regulations that usually prescribed lower standards, and the states that were a part of the international conventions would not ensure effective enforcement of the standards.

The LOSC tries to solve those shortcomings by establishing a general duty to regulate all sources of marine pollution and redefining the framework for prescriptive jurisdiction. The content of the regulations is no longer left to the discretion of states but to internationally agreed rules.

Before analyzing the rules that refer to the regulation of marine pollution and more specifically to air pollution from shipping, it is necessary to address the general traits of Part XII of the Convention in which those rules are contained. According to Tanaka, Part XII of the LOSC is characterized by three elements; generality and comprehensiveness, uniformity of rules and obligation to cooperate.\(^{276}\)

The codification of the law of the sea resulted in a general and comprehensive convention. In this Convention, the protection and preservation of the marine environment assumes an essential role in the law of the sea and it is a matter for every maritime zone, from the territorial sea to the international seabed area. The rules on protection and preservation of the marine environment address all sources of pollution. The objective was to “establish general rules to serve as the legal framework for specific global or regional agreements”.\(^{277}\) The generality characteristic comes from the obligation to protect the marine environment being on all states, from treating the ocean as a whole and from a wide ratification.\(^{278}\)

Tanaka also considers that the Convention is characterized by the uniformity of rules. It was intended that the Convention would establish an international minimum harmonization of the rules on pollution prevention. To achieve that it was necessary to resort to the rules of reference. Part XII of the LOSC is the essence of the regime for the protection and preservation of the marine environment but not all the rules relating to that are found in that Part. Some rules are found in other parts of the Convention while some are found in other instruments. An example of a rule of reference there is article 211.2 of the LOSC that obliges flag states to adopt regulations preventing vessel-source pollution that “at least have the same effect as that of generally accepted international rules and standards established through the competent international organization or general

\(^{276}\) Tanaka Y, *The International Law of the Sea*, p. 275


\(^{278}\) LOSC, article 192 establishes that “states have the obligation to protect and preserve the marine environment”
diplomatic conference”.

Often, the rules and standards referred to are contained in the MARPOL Convention or other IMO instruments.

The third characteristic attributed by Tanaka to the LOSC is the obligation to cooperate. This obligation is explicit in the Convention and there is a clear reason for it. Because of the nature of marine pollution, it could barely be contained by a single state, it is required that states join efforts. Article 197 of the LOSC obliges states to cooperate at a regional or global basis in formulating international rules and standards for the protection and preservation of the marine environment. Article 226.2 of the LOSC obliges states to cooperate in the issue of investigation of foreign vessels. The duty to cooperate under the LOSC was confirmed by the International Tribunal for the Law of the Sea (ITLOS) as a fundamental principle in the prevention of pollution of the marine environment in the LOSC and general international law.

Nordquist, in his commentary on the Law of the Sea Convention, considers that Part XII of the Convention assumes a coordinating role for the protection and preservation of the marine environment. Part XII closes with an article that reflects this role in that it requires states to carry out the obligations assumed by them under special conventions with respect to the protection and preservation of the marine environment in a manner consistent with the general principles and objectives of the Convention. This article also states that the provisions in Part XII are without prejudice of the specific obligations that states have assumed under special conventions and agreements concluded previously and to agreements which may be concluded in furtherance of the general principles of the Convention.

As has been stated, the LOSC was intended as a “constitution of the oceans” but criticism arrived earlier than the Convention came into force. While it is generally agreed that no other instrument dealing with the environment is as far-reaching and influential as the LOSC, early on it was criticized for being incomplete and fragmented. Agenda 21 in paragraph 17.1 argued that the Convention “sets forth rights and obligations of States and provides the international basis upon which to pursue the protection and sustainable development of the marine and coastal environment and its resources” but “this requires new approaches to marine and coastal area management and development, at the national, subregional, regional and global levels, approaches that are integrated in content and are precautionary and anticipatory in ambit”. Before it came into force, the LOSC

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279 LOSC, article 211.2
281 See LOSC, article 237
282 Sands and others, Principles of International Environmental Law, p. 344
283 Agenda 21, para. 17.1
284 Ibid
was already considered insufficient to tackle threats to the marine environment from the perspective of the principles developed in the 1992 Rio Conference and subsequent conferences. Nevertheless, the regime established by the LOSC has proven to be flexible enough to accommodate to the evolution of the principles of international environmental law.\textsuperscript{285} Many instruments adopted after the adoption of the LOSC have incorporated these principles. Later agreements have also adopted more stringent measures to protect the marine environment and even created obligations not established in the LOSC. As an example, the 1992 OSPAR Convention prohibited dumping at sea, an activity not prohibited by the LOSC.

While elaborating Part XII of the LOSC, difficulties arose when it came to creating a regime for vessel source pollution.\textsuperscript{286} Maritime states had an interest on making the regime of flag state jurisdiction prevail over the jurisdiction regime of coastal states. They had a fear that unilateral regulation of vessel-source pollution from coastal states would hinder their navigation freedom and increase operating costs. A coalition of developed and developing coastal states with no shipping interests fought this position at UNCLOS III but maritime states were able to limit any effort of expanding coastal state jurisdiction over vessels.\textsuperscript{287} The resulting regulation of vessel-source pollution in the LOSC reflects the pressure displayed by maritime interests as flag states bear the primary responsibility of prescribing and enforcing rules on vessel-source pollution. In the provisions relating to vessel-source pollution in the exclusive economic zone (EEZ), coastal states have very limited jurisdiction over polluting vessels and during the negotiations of these provisions, the focus was on sovereignty rights over the natural resources and control of marine pollution was left aside.

The LOSC establishes a general duty on states to protect and preserve the marine environment in article 192. In article 194.3(b) the LOSC establishes that the marine environment shall be protected through measures that states must take, individually or jointly as appropriate, to address three aspects related to pollution of marine environment; its prevention, reduction and control. The definition of pollution of the marine environment can be found in article 1.4 of the Convention and it means “the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for

\begin{itemize}
\item \textsuperscript{285} Sands P and others, \textit{Principles of International Environmental Law}, p.344
\item \textsuperscript{286} Tan AKJ, \textit{Vessel-Source Marine Pollution}, p. 199
\item \textsuperscript{287} Ibid
\end{itemize}
use of sea water and reduction of amenities”. The measures that states shall take to prevent, reduce and control pollution of the marine environment must deal with all sources of pollution. Paragraph 3 of article 194 contains some of the measures that states shall take. With respect to pollution from vessels, the measures shall include, among others, “measures for preventing accidents and dealing with emergencies, ensuring the safety of operations at sea, preventing intentional and unintentional discharges, and regulating the design, construction, equipment, operation and manning of vessels”. The reference to the design, construction, equipment, operation and manning of vessels only applies to vessels in the national registry. As will be explained later, article 21 of the Convention on innocent passage does not allow coastal states to regulate on the design, construction, equipment, operation and manning of foreign ships. Pollution from vessels is regulated in greater detail in section 5 of Part XII. As regards air pollution from ships, the first mention of the atmosphere in the Convention appears in article 194.3(b). It establishes that the measures that states shall take to prevent, reduce and control pollution of the marine environment shall include, among others, “those designed to minimize to the fullest possible extent: (a) the release of toxic, harmful or noxious substances, especially those which are persistent, form land-based sources, from or through the atmosphere or by dumping”. The question whether the atmosphere is part of the marine environment and therefore included in the obligation to protect and preserve imposed on states by the LOSC has been discussed by Nordquist. Article 56.1(a) of the LOSC establishes that coastal states have sovereignty rights with regard to the economic exploitation and exploration of the EEZ, such as the production of energy from the water, currents and winds. To Nordquist, this is sufficient indication of a “link between the atmosphere in superjacent airspace and the natural qualities of the subjacent ocean space”. Other provisions in the Convention show “the link between the law relating to the marine environment and the law relating to the atmosphere as, whether or not over the oceans”. These other provisions are articles 212 and 222 of the LOSC. Article 212 obliges states to adopt laws and regulations to prevent, reduce and control pollution of the marine environment from or through the atmosphere which, according to article 222, states shall enforce.

288 LOSC, article 1.4
289 LOSC, article 194.3(b)
290 LOSC, article 21
291 Ibid
293 Ibid
294 Ibid
295 Ibid
4.3.1. Regulation of vessel-source pollution in the LOSC

The provisions relating to vessel-source pollution in the LOSC are found in Section 5 of Part XII dedicated to International Rules and National Legislation to Prevent, Reduce and Control Pollution of the Marine Environment. The provisions in this section of the LOSC are part of a framework for jurisdiction. The Convention defines the legislative jurisdiction of flag states and coastal states as well as the enforcement jurisdiction. It imposes a duty on the states to regulate vessel-source pollution instead of prescribing specific measures for its control. The LOSC does not contain standards, it “proclaims a general regime of powers and duties which builds upon the codification and development of existing and future pollution control conventions”. The regulation that states must adopt is therefore subject to these existing and future pollution control conventions. The existing and future pollution control conventions contain the rules and standards which the Convention refers to. This mechanism of referral is called rule of reference and by its means, the LOSC incorporates into its legal framework standards that are contained in regulatory treaties adopted under the auspices of the IMO. The rules of reference allow the LOSC to be always up to date as they automatically incorporate the standards and any amendments to these. The reference to internationally agreed rules has a limiting function for the prescriptive jurisdiction of states, they serve as a minimum standard to ensure effectiveness and as a maximum standard to prevent excessive impositions. These standards have implications for states that are not parties to the regulatory treaties that contain them despite the rule of pacta tertiis by which a treaty binds the parties and does not create obligations for third states. Nevertheless, the fact that the standards are referred to in the LOSC entails that they have pre-eminence over any national regulation. It has to be noted that the references to international standards is accompanied by the expression generally accepted. What constitutes a generally accepted international standard will also be addressed in the subsequent sections. The degree in which states are bound by these rules and standards varies depending on the phrasing of the rules of reference. Rules of reference prescribing a minimum standard take the strongest form. With phrasings such as “at least have the same effect as that of generally agreed international rules and standards” there is not much room for discretion left to the state. This is the case of the provisions on regulation of pollution of vessels for flag states, seabed operations and dumping. Rules of reference can have a less conditioning effect with phrasings

296 Tan AKJ, Vessel-Source Marine Pollution, p. 192
297 Ibid, p. 195
298 LOSC, article 211.2
299 LOSC, article 208.3
300 LOSC, article 210.6
such as “to take account of internationally agreed rules and standards,” this is the case of atmospheric and land-based pollution.

Coastal states and flag states do not have the same responsibilities regarding the prevention of vessel-source marine pollution. The next section is dedicated to examine how the jurisdiction of states is established under the LOSC to later discuss what are the duties of states on the issue of vessel-source pollution.

4.3.2. Allocation of state jurisdiction in the LOSC

Maritime states preferred to regulate vessel-source pollution through international agreement rather than leaving it to coastal states’ autonomy, thus the LOSC tightens the responsibility of flag states over regulation of vessel-source marine pollution. While negotiating the LOSC, maritime states had already begun negotiating pollution control at IMO proving that marine pollution was also a concern for maritime states. The LOSC assigns the primary responsibility for vessel-source pollution regulation and enforcement to flag states. Article 94 of the Convention, found in Part VII relating to the high seas, defines the obligations of flag states over the vessels flying their flag. Pursuant to this article, flag states shall maintain a register of the ships and assume jurisdiction under its internal law over each ship flying its flag in respect of administrative, technical and social matters concerning the ship. Then it lists a series of matters on which flag states shall adopt measures. These matters include, among others, the construction and manning of the ship and the use of signals,\(^\text{301}\) the surveillance of the ship, the qualifications of the masters and officers, the training of the crew and acquaintance of the crew with the applicable international regulations concerning the safety of life at sea and prevention of marine pollution.\(^\text{302}\) Paragraph 5 requires states that in taking measures to address those matters, they have to conform to generally accepted international regulations, procedures and practices. In the LOSC, “the jurisdiction of flag states over pollution and environmental protection is linked to international standards by a rule of reference”.\(^\text{303}\) The LOSC makes the international standards compulsory for all ships through the rule of reference in article 94 and “makes clear that a flag state does not have total discretion over the standards that it prescribes for ships flying its flag”.\(^\text{304}\)

The question of coastal state jurisdiction was subject to the doctrine of the freedom of the high seas before the adoption of the Law of the Sea Convention. Coastal states had jurisdiction over

\(^{301}\) LOSC, article 94.3
\(^{302}\) LOSC, article 94.4
\(^{303}\) Harrison J, Making the Law of the Sea, p. 168
\(^{304}\) Ibid, p. 167
a narrow strip of water along their coasts and the exercise of this jurisdiction over ships passing through was restricted by the right of innocent passage. Treaties predating the LOSC left the question of jurisdiction of coastal states over ships passing their waters to the definition provided by actual international law.\textsuperscript{305} A great debate emerged at UNCLOS III around the scope of coastal state jurisdiction over technical shipping standards.\textsuperscript{306} Coastal states interests favored greater rights to regulate growing maritime traffic in their waters but the interests of shipping nations overpowered their demands. Once the LOSC was in force, the question of jurisdiction of coastal states was to be answered by its provisions.

In accordance with article 21 of the LOSC on the jurisdiction of coastal states relating to innocent passage, coastal states are allowed to adopt laws and regulations in respect to innocent passage through the territorial sea on matters such as safety of navigation or preservation of the environment as long as they are in conformity with the provisions of the Convention and other rules of international law. These laws and regulations shall not apply to the design construction, manning or equipment of foreign ships unless they are giving effect to generally accepted international rules and standards.\textsuperscript{307} This provision limits the prescriptive jurisdiction of coastal states and the underlying reason is the prevention of proliferation of technical standards that would hinder international shipping and consequently, international trade.\textsuperscript{308} In the EEZ, the prescriptive jurisdiction of coastal states over shipping matters is also limited by internationally accepted rules and regulations.

4.3.2.1. Flag state jurisdiction over vessel-source marine pollution

The LOSC regulates in article 211 the pollution from vessels. This article obliges states to establish international rules and standards to prevent, reduce and control pollution of the marine environment from vessels. They are obliged to do so through the competent international organization. As it has been explained above, it refers to the IMO. Article 211 distinguishes between the obligations imposed on flag states, costal states and port states.\textsuperscript{309} Flag states bear the main responsibility to

\textsuperscript{305} MARPOL Convention, article 9.3 establishes that jurisdiction “shall be construed in the light of international law in force at the time of application or interpretation of the present Convention” and the London Dumping Convention, article XIII establishes that “Nothing in this Convention shall prejudice the codification and development of the law of the sea by the United Nations Conference on the Law of the Sea (...) nor the present or future claims and legal views of any State concerning the law of the sea and the nature and extent of coastal and flag State jurisdiction. The Contracting Parties agree to consult at a meeting to be convened by the Organization after the Law of the Sea Conference, (...), with a view to defining the nature and extent of the right and the responsibility of a coastal State to apply the Convention in a zone adjacent to its coast.”

\textsuperscript{306} Harrison J, Making the Law of the Sea, p. 169

\textsuperscript{307} LOSC, article 21.2

\textsuperscript{308} Harrison J, Making the Law of the Sea, p. 170

\textsuperscript{309} Tanaka Y, The International Law of the Sea, p. 292
regulate marine pollution from ships.\textsuperscript{310} Flag states have to adopt laws and regulations which at least have the same effect as that of generally accepted international rules and standards for the prevention, reduction and control of the pollution of the marine environment from vessels flying their flag through the competent international organization.\textsuperscript{311} The question of what constitutes a generally accepted rule will be dealt with later, however, it is worth mentioning here that article 211.2 presumably refers to Annex I and II of the MARPOL Convention as they are widely ratified.\textsuperscript{312}

Concerning the enforcement jurisdiction of flag states, article 217.1 of the LOSC establishes that flag states shall ensure compliance by vessels flying their flags with applicable international rules and standards and with their laws concerning the regulation of vessel-source pollution. Flag states shall also provide for the effective enforcement of such rules, standards, laws and regulations, irrespective of where the violation occurs. Paragraph 2 of article 217 obliges flag states to take appropriate measures in order to ensure that their vessels are prohibited from sailing, until they can proceed to sea in compliance with the requirements of the international rules and standards. For this purpose, article 217.3 obliges flag states to ensure that vessels flying their flag carry onboard certificates required and issued pursuant to international rules and standards, and that the vessels are periodically inspected in order to verify that such certificates are in conformity with the actual condition of the vessel. The penalties provided for by the laws and regulations of flag states shall be adequate in severity to discourage violations wherever they occur.\textsuperscript{313} Article 217.4 establishes that when a vessel commits a violation of rules and standards, the flag state shall provide for immediate investigation and where appropriate institute proceedings in respect of the alleged violation. Any state can request that the flag state investigates any violation alleged to have been committed by vessels flying their flag and institute proceedings if there is sufficient evidence is available.\textsuperscript{314}

Article 212 of the LOSC on pollution from or through the atmosphere establishes that “states shall adopt laws and regulations to prevent, reduce and control pollution of the marine environment from or through the atmosphere, applicable to the air space under their sovereignty and to vessels flying their flag or vessels or aircraft of their registry, taking into account internationally agreed rules, standards and recommended practices and procedures and the safety of air navigation”.\textsuperscript{315} This article references both flag jurisdiction and coastal jurisdiction. Therefore, flag

\begin{itemize}
\item \textsuperscript{310} Ibid
\item \textsuperscript{311} LOSC, article 211.2
\item \textsuperscript{312} Churchill RR and Lowe AV, \textit{The Law of the Sea}, p. 346
\item \textsuperscript{313} LOSC, article 217.8
\item \textsuperscript{314} LOSC, article 217.6
\item \textsuperscript{315} LOSC, article 212
\end{itemize}
states have the duty to regulate air pollution from ships but also coastal states in their territorial sea. In the next section, coastal state jurisdiction over vessel-source marine pollution will be discussed.

4.3.2.2. Coastal state jurisdiction over vessel-source marine pollution

Coastal state jurisdiction has to be defined in terms of the distinct zones of the ocean, but it is also necessary to distinguish between the types of measures that a coastal state can prescribe. These measures are: discharge standards; construction, design, equipment and manning (CDEM); and navigational standards such as ship’s routeing measures, reporting systems and vessel traffic services.

A foreign ship entering the ports or internal waters of a state is consenting to that state’s jurisdiction. In the coastal state’s internal waters, the LOSC establishes unlimited prescriptive and enforcement authority for the prevention, reduction and control of the marine environment. Coastal states can establish requirements for that purpose as a condition for the entry of foreign vessels into their ports or internal waters or for a call at their off-shore terminals. The Convention then goes on requiring states to give due publicity to the requirements established by them. The coastal states can require the compliance with national standards or international discharge and CDEM standards as well as navigational ones. However, a coastal state’s authority could be limited by bilateral treaties of friendship, commerce or navigation that guarantee port access. Also, since a coastal state cannot deny access to a ship in distress, such ship could enter internal waters without having consented to the coastal state’s jurisdiction. With respect to enforcement, coastal states are also allowed to institute proceedings against foreign vessels voluntarily in their ports of off-shore terminals that have violated their laws or applicable international rules and standards for the prevention, reduction and control of the pollution from vessels when the violation has occurred within their territorial sea or the EEZ. With regard to the seaworthiness of vessels, article 219 of the Convention establishes that coastal states may take administrative measures to prevent a vessel in its internal waters from sailing if it has ascertained that the vessel is in violation of applicable international rules and standards relating to the seaworthiness of vessels and because of that it threatens damage to the marine environment.

317 Ibid, p. 745
318 LOSC, article 211.3
319 LOSC, article 220.1
In their territorial sea, a coastal state is sovereign but its authority is circumscribed by the interest of maritime states in free navigation.\textsuperscript{320} It has been explained that the LOSC in its article 21 limits the prescriptive jurisdiction of coastal states in their territorial sea to adopting national laws and regulations on matters such as safety of navigation or preservation of the environment in respect to innocent passage as long as they are in conformity with the provisions of the Convention and other rules of international law. The national standards have to be given due publicity.\textsuperscript{321} Negotiators at UNCLOS III found a compromise between giving coastal states full jurisdiction over vessel-source pollution in the territorial sea and allowing it only to prescribe and enforce internationally agreed standards. The final wording of the provision was to satisfy the interests of maritime nations. The laws and regulations that the coastal states can adopt for vessels in their territorial sea shall not apply to the design construction, manning or equipment of foreign ships unless they are giving effect to generally accepted international rules and standards,\textsuperscript{322} therefore, coastal states can prescribe national discharge standards but not national CDEM standards. A coastal state can also establish national navigation standards.\textsuperscript{323} As regards enforcement in the territorial sea, article 220.2 of the Convention establishes that a state can undertake physical inspection of a vessel and institute proceedings against it, including its detention, if there are clear grounds for believing that the vessel navigating the territorial sea has violated laws and regulations of the state or international rules and standards for the prevention, reduction and control of pollution from vessels. The enforcement jurisdiction may be exercised against vessels even if they are in innocent passage. If the passage through the territorial sea were not innocent, article 25.1 of the Convention allows the coastal state to prevent that ship from passing. Article 19 defines what activities render the passage of a foreign ship non-innocent. Among them there is any act of willful and serious pollution contrary to the Convention. The requirement for a discharge to be willful and serious at the same time is rather difficult to fulfill. An accidental discharge does not fulfill the willful requirement but it can be serious, while operational discharges are willful but alone do not constitute a serious act of pollution. This requirement becomes limited when the pollution has not been yet materialized but is an evident threat. In this case the coastal state cannot exclude a foreign vessel from its territorial sea but it can resort to the measures available in article 220.2 of the LOSC if the vessel is in breach of national or international standards. In case of a marine casualty from which harmful consequences are expected, coastal states can take measures beyond their territorial

\textsuperscript{320} Bodansky D, 'Protecting the marine environment from vessel-source pollution’, p. 748  
\textsuperscript{321} LOSC, article 21.3  
\textsuperscript{322} LOSC, article 21.2  
\textsuperscript{323} LOSC, article 22.1
sea to protect their coastline or related interests. Accordingly, if measures can be taken beyond the territorial sea in relation to marine casualties, they can be taken in the territorial sea.324

Regarding the jurisdiction of coastal states in the straits used for international navigation, there is a specialized regime that applies to foreign vessels. In the cases where territorial seas are also straits for international navigation, the coastal states can prescribe laws and regulations relating to transit passage in respect of prevention, reduction and control of pollution but only to give effect to international regulations regarding the discharge of oil, oily wastes and other noxious substances in the strait.325 When it comes to enforcement jurisdiction, the coastal state may take appropriate measures that cannot affect the legal regime of the strait but only when major damage is a threat or being caused to the marine environment of the strait.326 What constitutes an appropriate measure is not defined by the LOSC but according to Tan they have to include at least the measures provided to coastal states in article 220 of the LOSC for violations in their territorial sea.327

Part XII of the LOSC does not mention archipelagic waters. Pursuant article 52.1 of the LOSC, all vessels enjoy the right of innocent passage through archipelagic waters. Nevertheless, “the full range of provisions and safeguards in Part XII relevant to vessel-source pollution in the territorial sea should be extended to archipelagic waters”.328 As regards enforcement jurisdiction of coastal states in archipelagic waters, the provisions on the regime of transit passage in the straits used for international navigation should be applied.329

In the EEZ, the coastal state’s jurisdiction is highly circumscribed. In the EEZ, coastal states can “adopt laws and regulations for the prevention, reduction and control of pollution from vessels conforming to and giving effect to generally accepted international rules and standards established through the competent international organization or general diplomatic conference”.330 This includes the contiguous zone, which extends twelve nautical miles beyond the territorial sea.331 The LOSC limits the competence of coastal states in the EEZ to deter them “from using environmental regulations as a means to restrict the navigational rights of foreign vessels”.332 Article 211.5 of the Convention allows coastal states to adopt laws and regulations for the prevention, reduction and control of marine pollution from foreign vessels. These laws and regulations must conform to and

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324 Tan AKJ, Vessel-Source Marine Pollution, p. 208
325 LOSC, article 42.1(b)
326 LOSC, article 233
327 Tan AKJ, Vessel-Source Marine Pollution, p. 210
328 Ibid, p. 211
329 Ibid
330 LOSC, article 211.5
331 LOSC, article 33 allows coastal states to prevent infringement of its customs, fiscal, immigration or sanitary laws and regulations within its territory or territorial sea and also to punish infringement of those laws and regulations within its territory or territorial sea
332 Harrison J, Making the Law of the Sea, p. 170
give effect to generally accepted international rules and standards. This provision leaves no room for states to adopt national discharge, CDEM or navigation standards unless they are prescribed for special or ice-covered areas. With regard to enforcement in the EEZ, coastal states are allowed to require a vessel to give information regarding its identity and port of registry, its last ant its next port of call and other relevant information if there are clear grounds for believing that it has committed a violation of applicable international rules and standards for the prevention, reduction and control of pollution from vessels or national laws and regulations giving effect to such rules and standards.\textsuperscript{333} Article 220.5 of the LOSC adds to this rule the physical inspection of the vessel if the violation committed results in a substantial discharge causing or threatening significant pollution of the marine environment and refuses to give the information or the information provided is clearly at variance with the factual situation. Article 220.6 of the LOSC establishes that where there is clear evidence of the violation of the international rules as it is described in article 220.3, the coastal state may institute proceedings, including the detention of the vessel. To sum up, coastal state enforcement of EEZ vessel source-pollution standards is only permitted when a vessel has committed a discharge violation that results in or threatens substantial damage to the coastal state. Otherwise, a coastal state can only relay information about a possible violation to the vessel’s flag state or its next port of call. Concerning special areas in the EEZ, states may designate an area of their EEZ as special area where they can adopt special mandatory measures for the prevention, reduction and control of the pollution from vessels that give effect to international rules and standards for special areas.\textsuperscript{334} To designate a special area as such, the competent international organization (IMO) shall determine if the area requires the special measures for recognized technical reasons in relation to its oceanographical and ecological conditions, as well as its utilization or the protection of its resources and the particular character of its traffic. Coastal states can adopt additional laws and regulations in the special area but these cannot relate to the design, construction, manning or equipment standards, they may relate however to discharges or navigational practices.\textsuperscript{335} In the case of ice-covered areas, the convention allows the coastal state to prescribe and enforce national rules and standards for the prevention, reduction and control of marine pollution from vessels. The rules cannot be discriminatory and need not the approval of the competent international organization.\textsuperscript{336}

\textsuperscript{333} LOSC, article 220.3
\textsuperscript{334} LOSC, article 211.6
\textsuperscript{335} LOSC, article 211.6(c)
\textsuperscript{336} LOSC, article 234
In the high seas, flag states have exclusive jurisdiction over vessel-source pollution. Nevertheless, in case of a marine casualty that is followed by pollution or a threat of it, the affected coastal state may take and enforce measures to protect the coastline or related interests from damages.\footnote{LOS, article 221.1}^{337}

The following table summarizes the jurisdiction of coastal states in each ocean zone:

<table>
<thead>
<tr>
<th></th>
<th>Internal Waters</th>
<th>Territorial Sea</th>
<th>EEZ</th>
<th>Special and ice-covered waters in the EEZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>National standards</td>
<td>discharge, CDEM and navigational standards, art. 211.3 LOSC</td>
<td>discharge and navigation standards, art. 21.1(f), 22.1 LOSC</td>
<td>discharge and navigation standards, art. 234 LOSC</td>
<td>in ice-covered areas, discharge standards, art. 234 LOSC</td>
</tr>
<tr>
<td>International standards</td>
<td>discharge, CDEM and navigational standards, art. 211.3 LOSC</td>
<td>CDEM standards art. 21.2, 220.5 and 220.6 LOSC</td>
<td>discharge standards, art. 211.5, 220.3 and 220.5 LOSC</td>
<td>in special areas, discharge and navigation standards, art. 211.6 LOSC</td>
</tr>
</tbody>
</table>

The table provides a more graphic description of how the LOSC grants jurisdiction to the coastal states. The further away from the coastline a maritime zone is, the less jurisdiction a coastal state has.

In the high seas, the LOSC establishes a basic regime of exclusive flag state jurisdiction. Coastal states have no prescriptive jurisdiction, but they may enforce rules or standards if a vessel has committed a violation in their internal waters, territorial sea or EEZ only in hot pursuit or if the pollution from the vessel seriously threatens their security.\footnote{LOS, article 221}^{338}
4.3.2.3. Port state jurisdiction

Port state jurisdiction was proposed at UNCLOS III to complement coastal state jurisdiction over marine pollution as an alternative to broadening coastal state jurisdiction. Port state jurisdiction was introduced into international law through article 218 of the LOSC and it did not have a customary law ground. Port state jurisdiction refers to enforcement jurisdiction as it recognizes the right of port states to prosecute foreign ships in their ports when a discharge from the vessel has occurred in the high seas in violation of international rules and standards established through the competent international organization regardless of direct damage. By virtue of this provision, a port state assumes the role of an organ of the international community in the protection of the marine environment and safety at sea.339 States exercise this dual role because the international legal order lacks of a centralized organ to perform the enforcement function. Enforcement by port states, however, presents a few problems in practice. First, exercising port state jurisdiction is optional and there is no mechanism in the LOSC to supervise its implementation. Maritime states considered that port states would not be as keen as coastal states in protecting the marine environment because their interest would be put on facilitating trade through their ports, there are not many incentives for port states to exercise this function. Second, it is very unlikely that a discharge violation would be detected in waters beyond the jurisdiction of states. And third, there are substantive and procedural restrictions to port state jurisdiction. The substantive restrictions refer to the scope of article 218 as it only deals with the violation of international rules with regard to vessel-source pollution. Breaches of international rules relating to CDEM standards and other vessel standards fall outside the scope of the article. Port states can only enforce international standards established through the competent international organization, that is, those in MARPOL. Thus, a port state cannot enact or enforce its own discharge rules and standards. Concerning the procedural restrictions, article 218 does not allow port states to institute proceedings if the discharge happened in the internal waters, territorial sea or EEZ of another state, unless that state, flag state or a state damaged or threatened by the discharge violation requests it or unless the discharge is likely to cause pollution in the internal waters, territorial sea or EEZ of the port state.340 Article 226 of the LOSC qualifies port state jurisdiction. In its first paragraph it establishes that a port state shall not delay a foreign vessel longer than it is essential for the purposes of the investigation and this shall be limited to the documentary examination. “Further physical inspection of the vessel may be undertaken only after such an examination and only when: (i) there are clear grounds for believing that the condition of

340 Ibid, p. 296
the vessel or its equipment does not correspond substantially with the particulars of those documents; (ii) the contents of such documents are not sufficient to confirm or verify a suspected violation; or (iii) the vessel is not carrying valid certificates and records”. 341

4.3.2.4. Port state control

Port state control is a mechanism for verifying whether a foreign vessel and its documentation comply with international rules and standards relating to the safety of vessels, living and working conditions onboard and protection of the marine environment regulated in the relevant treaties. 342 The lack of coordination among individual states in the regulation of vessel-source pollution has brought many IMO treaties to introduce port state control into the regulation. Port state control differs from port state jurisdiction in that it does not prosecute a vessel for an alleged breach of an international rule or standard, instead, a state takes administrative measures of verification, including the detention of the vessel. There are many examples of global treaties on marine pollution and safety at sea that include port state control. A few are; the 1974 SOLAS Convention, MARPOL Convention, the 1975 ILO Convention No. 174 concerning Minimum Standards in Merchant Ship, the 1966 International Convention on Load Lines, the 1978 STCW Convention and the 2006 Maritime Labour Convention.

In order to carry out port state control in an efficient manner, states have formulated regional institutions for port state control through MOUs. 343 The states parties to MOUs are enabled to carry out inspections of foreign vessels to verify compliance with the relevant treaties concerning safety at sea and the regulation of vessel-source pollution which are legally binding on them in a uniform manner. There are nine MOUs established to date, 344 and a EC Council Directive 95/21/EC on Port State Control.

4.3.3. Generally accepted international rules and standards

As was explained above, the LOSC establishes a regime of powers and duties for states to regulate pollution from ships, it does not prescribe standards for that purpose but it does reference generally accepted international rules and standards to which the states must accord the regulations that they

341 LOSC, article 226.1(a)
342 Tanaka Y, The International Law of the Sea, p. 297
343 See section 2.4.2
344 The 1982 Paris Memorandum of Understanding on Port State Control, the 1992 Viña del Mar, the 1993 Tokyo MOU on Port State Control, the 1996 Caribbean MOU, the 1997 Mediterranean MOU, the 1998 Indian Ocean MOU, the 1999 Abuja MOU, the 2000 Black Sea MOU, the 2004 Riyadh MOU.
adopt. The LOSC does not contain operative regulations that can be implemented in the way that IMO rules and standards can, except in a few cases.

“Part XII of (the Law of the Sea Convention) includes several references to generally accepted international rules and standards established through the competent international organization or general diplomatic conference. With regards to pollution from vessels and from dumping, such rules and standards are contained in IMO instruments”. The question that follows is what constitutes a generally accepted international rule.

The expression ‘generally accepted’ is used as a test to determine whether a standard has been incorporated to the LOSC by the means of the rule of reference. According to Harrison, there are IMO standards that are clearly ‘generally accepted.’ For instance, the SOLAS Convention is binding on 98,53 per cent of the world tonnage and therefore generally accepted. For this reason, the SOLAS Convention is incorporated to the LOSC through the rules of reference relating to maritime safety. There are other IMO instruments that have also high levels of acceptance, this is the case of the MARPOL Convention, whose compulsory annexes (I and II) have been accepted by 98,73 per cent of the world tonnage. However, the optional annexes of MARPOL do not enjoy the same levels of acceptance, Annex IV on the Prevention of Pollution by Sewage from Ships is binding on 90,96 per cent of the world tonnage and Annex VI on the Prevention of Air Pollution from Ships on 95,69 per cent of the world tonnage.

The difference in levels of acceptance of the IMO standards generates doubt on whether the standards are generally accepted and consequently, incorporated to the LOSC by the rules of reference. The fact that the LOSC establishes a duty to respect the standard does not imply that states will automatically accept it. The acceptance of a standard will most like “emerge from a combination of ratification or formal acceptance by some states of the treaty or instrument containing the standard, implementation of the standard by other states, and respect for the standard by individuals and companies whose activities are its ultimate object”.

See section 4.3.1

Implications of the United Nations Convention on the Law of the Sea for the International Maritime Organization, Document LEG/MISC/8, January 30, 2014, “One such example is to be found in the provisions on enforcement of port State jurisdiction, and another in the special mandatory measures adopted for certain areas in the EEZ.”


Harrison J, Making the Law of the Sea, p. 171


The 1966 Convention on Load Lines, the 1972 Convention on the International Regulations for Preventing Collisions at Sea (COLREG) or the 1978 Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW)

interpretation of which standards are ‘generally accepted’ is vital to delimiting the scope of flag state and coastal state jurisdiction under the Law of the Sea”.

Several interpretations have been made on what constitutes a generally accepted international standard. One interpretation suggests that standards become generally accepted when they have been ratified by enough states to enter into force. However, this view presents a few problems. In the first place, different treaties have different requirements for the entry into force. In the second place, it makes it easy for a small number of states to impose their will on other states and in the third place, when generally accepted standards are considered in the light of this interpretation, it renders meaningless the expression ‘applicable international standards’ also found in the LOSC. The latter refers to standards that may be binding on some states but not generally accepted. This interpretation also leaves out those standards established in non-binding instruments, that could become generally accepted.

A second interpretation suggests that an international standard has become generally accepted through state practice when they achieve the status of customary international law. The advantage it presents in respect of the previous interpretation is that in this case, those standards not contained in a treaty but in a binding instrument can also fall in the scope of the rule of reference. However, if the conditions for the creation of customary international law were to be applied to the test of general acceptance for the rule of reference, there would be no need for that rule of reference as the standards would already by binding on states because of their status of customary international law.

Oxman argues that there are “three possible sources to determine whether a standard has been accepted: events at the organization or conference that adopted the standard; the practice of governments, reflected in ratification of treaties, national laws and regulations, and authoritative statements of policy; and the practice of individuals and companies whose activities are the object of a particular standard”. Harrison argues that the decision-making procedures employed at IMO are highly significant to determine whether a standard is generally accepted, when there is consensus among IMO members to a standard, this is more likely to become generally accepted. But even if “the discussions and deliberations leading to the adoption of an international instrument may sometimes contribute to the crystallization of customary international law, particularly when

355 Ibid, p. 175
356 Ibid
357 Oxman BH, 'The Duty to Respect Generally Accepted International Standards', p. 149
they are supported by consensus”,\textsuperscript{358} this is not enough to establish that a standard is generally accepted. Harrison adds that “the nature of the technical standards means that it would be difficult to conclude that the standards had been generally accepted as legally binding if there were no additional evidence that states had actually implemented them in practice”.\textsuperscript{359} This is where the second source pointed out by Oxman comes into play.

The practice of governments in the form of implementation and enforcement of shipping standards serves as evidence for considering that a standard is generally accepted. The transposition of the standard into the domestic law reveals that the implementation of it is being carried out. The practice of governments, though, can also be examined at the international level. States take action through international organizations to monitor compliance. States have taken action at the UN General Assembly that it has turned into resolutions that call on states to comply with certain IMO instruments on the protection of the marine environment even if they are not a party to it.\textsuperscript{360} “These resolutions themselves provide evidence that the instruments that they address are generally accepted for the purposes of the rules of reference in the Law of the Sea Convention”.

In the field of air pollution from ships however, evidence that the standards established in Annex VI of the MARPOL Convention have become generally accepted is difficult to find. In 2006, the UN General Assembly adopted Resolution 61/222 in which it encouraged states that were not a party to the Protocol of 1997 (which added Annex VI to MARPOL) to become parties to it.\textsuperscript{362} This Resolution “falls short of calling states to comply with these instruments, suggesting that they are not yet generally accepted and therefore they do not fall within the scope of the rules of reference on environmental protection”.

With respect to the practice of individuals and companies, it is first necessary to remind that the goal of the standards is to restrain the conduct of the individuals and companies therefore, “it is the behavior of the individuals and companies concerned that will truly determine the degree to which that goal has been achieved”.\textsuperscript{364} When a standard is adopted, the states have a duty to adopt

\textsuperscript{358} Harrison J, \textit{Making the Law of the Sea}, p. 176
\textsuperscript{359} Ibid
\textsuperscript{360} Ibid, p. 177
\textsuperscript{361} Harrison J, \textit{Making the Law of the Sea}, p. 177 provides as an example the UNGA Resolution 60/30, November 29, 2005 which “calls upon all states to effectively implement the International Ship and Port Facility Security Code and related amendments to the International Convention for the Safety of Life at Sea”
\textsuperscript{362} UNGA Resolution 61/222 para. 81 “Encourages States that have not done so to become parties to the Protocol of 1997 (Annex VI-Regulations for the Prevention of Air Pollution from Ships) to the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, and furthermore to ratify or accede to the International Convention on the Control of Harmful Anti-Fouling Systems on Ships, 2001,43 as well as the International Convention for the Control and Management of Ships’ Ballast Water and Sediments, 2004,44 thereby facilitating their early entry into force;”
\textsuperscript{363} Harrison J, \textit{Making the Law of the Sea}, p. 178
\textsuperscript{364} Oxman BH, 'The Duty to Respect Generally Accepted International Standards', p. 153
laws and regulations governing the activities of individuals and companies subject to their jurisdiction and when these do not comply with them, the state has a duty to identify the violators. If non-compliance is general, then a standard cannot be considered as generally accepted but the mere existence of non-compliance cannot be read as the standard not being generally accepted if there is evidence of governmental enforcement. In the same way, if individuals and companies voluntarily comply with the standards despite insufficient governmental practice, then the standard needs to be considered as generally accepted. This may happen in those cases in which the industry considers compliance with a newly adopted standard positive for reasons such as safety or responsible citizenship, or because it is a way to offset political pressure or avoid civil liability.\footnote{Oxman BH, 'The Duty to Respect Generally Accepted International Standards', p. 154} In conclusion, while practice by individuals does not generate international obligations, “their voluntary compliance with an international standard, with the express or tacit approval of their own government, can be taken into account in determining whether there is general acceptance of the standard for purposes of securing compliance by nationals of some other state”.\footnote{Ibid}

The paragraphs above have shown that there are a number of factors that come to play in order to determine whether a standard has become generally accepted or not but there is no agreed definition of the term ‘generally accepted international rules and standards.’ The Committee on Coastal State Jurisdiction relating to Marine Pollution of the International Law Association issued a report for the occasion of the 2000 London Conference where it concluded that “generally accepted rules and standards cannot be equated with customary law nor with legal instruments in force for the states concerned (...) instead, are primarily based on state practice, attaching only secondary importance to the nature and status of the instrument containing the respective rule or standard”.\footnote{Report of the Committee on Coastal State Jurisdiction Relating to Marine Pollution, 2000 London Conference of the International Law Association available at www.ila-hq.org/download.cfm/docid/C52ADCAF-E925-4BD4-8159B588EFD02597 accessed July 29, 2016} That means that the standard may be expressed “by means of a non-binding document, an agreement which at the time of adoption was rejected by a certain number of states but later on nevertheless became acceptable to all as reflected in state practice, a resolution of an international organization, e.a”.\footnote{Ibid}

The central element for determining the generally accepted character of a standard is then state practice. “Virtually all governments are in fact more cautious about what standards they will implement than about how they vote in a global multilateral forum. To the extent that the duty to respect generally accepted standards arises out of the actual laws, regulations, and enforcement
activities of governments, rather than their rhetorical positions, the risk of being bound by seriously inconvenient standards may not be substantial”. 369 The question that follows now is what is the required degree of state practice. To this question there is no numerical answer, nor a functional one. The expression ‘generally accepted’ was chosen for its vagueness and because obliging states to conform to generally accepted international standards worked as “a positive alternative to unilateral coastal state competence to prescribe and enforce pollution or safety regulations for foreign ships navigating off the coast. That alternative could have been undermined if maritime states had sought to restrict or even discuss the scope of the duty”. 370

4.3.4. Air pollution in the Law of the Sea Convention

The Law of the Sea Convention regulates the pollution of the marine environment from and through the atmosphere. It requires states to “adopt laws and regulations to prevent, reduce and control pollution of the marine environment from or through the atmosphere”. 371 The scope of this article is broad in two senses; in the activities and the pollutants that covers. Regarding the activities, it covers the activities within the territory under the state’s sovereignty and ships of their nationality wherever they are. Regarding the pollutants, it covers any potential pollutant of the marine environment. 372 Article 212 requires states not only to address this type of pollution through the legislation that they shall adopt, but also recognizes the need to “take other measures as may be necessary to prevent, reduce and control such pollution”. 373 Moreover, it recognizes the need to cooperate through the competent international organizations “to establish global and regional rules, standards and recommended practices and procedures to prevent, reduce and control such pollution”. 374

The regulation of air pollution of the marine environment needs to be commented separately from the pollution of ships. There are substantial differences that need to be addressed. This section provides the aspects that set the regulation of air pollution apart from the regulation of other types of pollution from ships.

As has been explained, the LOSC does not specify the rules to regulate marine pollution, instead it establishes a duty to regulate all sources of pollution by means of the rules of reference.

369 Oxman BH, ‘The Duty to Respect Generally Accepted International Standards’, p. 157
370 Ibid, p. 156
371 LOSC, article 212.1
373 LOSC, article 212.2
374 LOSC, article 212.3
The regulatory duty of the rules of reference varies in its form depending on the type of pollution they relate to. For the regulation of atmospheric pollution, the regulatory duty adopts its weaker form. The rule of reference for the regulation of atmospheric pollution requires “taking into account internationally agreed rules, standards and recommended practices and procedures”. This provision entails that states have “very wide discretion to adopt their own laws and is in effect a power to set national standards uncontrolled by any internationally agreed criteria”. Paragraph 3 of article 212 of the LOSC addresses the obligation to establish international rules. The first significant difference of this provision with that of article 211.1 is that it refers to the ‘competent international organizations’ in the plural meaning that there is no single organization that is responsible for the regulation of air pollution. It is also important to note that while article 211.1 of the LOSC obliges states to establish international rules and standards to prevent, reduce and control pollution of the marine environment from vessels through the competent organization, article 212.3 on atmospheric pollution only encourages them to “endeavor to establish global and regional rules, standards and recommended practices and procedures”. Consequently, the compliance with the duty to regulate atmospheric pollution is left to the “good faith of individual states”. The reason for this provision being hortatory is that in the negotiations at UNCLOS III, developing states advocated for a double standard and developed states were also reluctant on having uniform standards, they feared the economic cost of it. In this context of apparent “negligible level of international control” where states can adopt laws that are not subject to an international standard, there are a variety of instruments that are relevant for the regulation of atmospheric pollution of the marine environment. Bering in mind that article 212 of the LOSC applies not only to air pollution from ships but also to the air space under their sovereignty, this entails that instruments such as the Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol, the UNFCCC and the Kyoto Protocol, as well as other regional instruments, are relevant for the purpose of this issue. Moreover, the IMO declares itself as “the appropriate forum for States to establish global and regional rules, standards and recommended practices and procedures applicable to vessels to prevent, reduce and control pollution of the marine environment

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375 Boyle, 'Marine Pollution Under the Law of the Sea Convention', p. 354
376 LOSC, article 212.1
378 LOSC, article 212.3
380 Ibid
381 The UN Division for Ocean Affairs issued the Obligations of States Parties to the United Nations Convention on the Law of the Sea, where it lists the conventions and agreements to be implemented by the states to fulfill their obligations under article 212 of the LOSC. Available at http://www.un.org/depts/los/doalos_publications/publicationstexts/E.04.V.5.pdf accessed July 31, 2016

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from or through the atmosphere”\textsuperscript{382} within the framework of articles 212.3 and 222 of the LOSC. The conclusion that can be drawn from the analysis of the framework for atmospheric pollution set up by the LOSC is that the regulation of air pollution from ships by the IMO can overlap with the regimes established by other relevant treaties.\textsuperscript{383} It can happen that the treaties regulating air pollution in general, can potentially apply to vessels when they are within the jurisdiction of a state.\textsuperscript{384}

When the IMO first addressed the need for regulating air pollution from ships, it took into account the preexisting international instruments on air pollution.\textsuperscript{385} In the subsequent sections, the IMO’s response to vessel-source air pollution will be analyzed as well as its interactions with other air pollution treaties.

4.4. IMO’s regulation of air pollution from ships

As was explained above, the IMO has established international rules for the regulation of air pollution from ships. It was in the late 1980s that the IMO started work on prevention of air pollution from ships.\textsuperscript{386} In the early stages, the IMO had recognized the scientific evidence of negative effects for the environment and human health of emissions to the atmosphere from numerous sources. Ships were regarded as being co-responsible of this type of pollution as one of the sources that generates air pollution.

In November 1991, the IMO Assembly in its seventeenth session adopted Resolution A.719(17) where it recognized the “urgent necessity of establishing an international policy on prevention of air pollution from ships”.\textsuperscript{387} The Resolution compelled the MEPC to develop a new annex to the International Convention on the Prevention of Pollution from Ships of 1973, as modified by the Protocol of 1978 (MARPOL Convention). In 1997, a Conference of the Parties to MARPOL was held in London where the Protocol of 1997 to amend the MARPOL Convention was adopted. The Protocol added Annex VI to the Convention and it was entitled Regulations for the Prevention of Air Pollution from Ships. The Conference also adopted the Technical Code on Control of Emissions of Nitrogen Oxides from Marine Diesel Engines (NO\textsubscript{x} Technical Code). In the Conference it was requested that the MEPC review the NO\textsubscript{x} emission limits every five years at least, after the entry into force of Annex VI. Annex VI entered into force on 19 May 2005.


\textsuperscript{383} Harrison J, ‘Pollution of the Marine Environment From and Through the Atmosphere’, p. 173

\textsuperscript{384} Ibid, p.173

\textsuperscript{385} Resolution A.719(17) Prevention of Air Pollution from Ships, adopted 6 November 1991

\textsuperscript{386} IMO, MARPOL: Annex VI and NTC 2008 with Guidelines for Implementation (2013), p. 1

\textsuperscript{387} Ibid
It is necessary to remind here that the LOSC establishes a general obligation for states acting through the competent international organization to establish international rules and standards regarding vessel-source pollution. The MARPOL Convention is the states’ response to that obligation. MARPOL is the instrument that deals with operational discharges, that is, discharges that relate to the normal operation of the vessel. There are six technical annexes to MARPOL, each dealing with a different type of pollution. The LOSC defined ‘pollution of the marine environment’ to include all types of pollution while MARPOL only addresses the discharges from vessels. In article 2.2 of MARPOL a ‘harmful substance’ is defined as “any substance which, if introduced into the sea, is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea, and includes any substance subject to control by the present Convention.” This definition coincides with that of article 1.1(4) of the LOSC in that both cover actual and potential harm to the marine environment.

With regard to jurisdiction, this chapter has elaborated on how the LOSC allocates jurisdiction to regulate pollution from ships to flag, coastal and port states. The MARPOL Convention establishes in article 9.3 that “the term ‘jurisdiction’ shall be construed in light of international law in force at the time of application or interpretation of the present Convention”. That international law refers to the framework for jurisdiction set up in the LOSC. The LOSC, as explained above “provides for different jurisdiction to coastal States, namely with respect to vessels within their ports, their territorial sea, and their EEZ, as well as to flag States and to port States”. Consequently, Annex VI of MARPOL, which establishes international standards for the regulation of air pollution from ships needs to be implemented by states according to the framework for jurisdiction established by the LOSC.

4.5. Conclusions

This chapter has analyzed the legal framework for the regulation of vessel-source pollution. It was shown that the LOSC establishes the primary obligation to protect and preserve the marine environment and to take all measures necessary to prevent, reduce and control pollution of the

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388 LOSC, article 211.1
389 The Annexes to MARPOL Convention relate to the prevention of pollution by oil (Annex I), noxious liquid substances in bulk (Annex II), harmful substances carried by sea in packaged forms (Annex III), sewage from ships (Annex IV), garbage (Annex V), and air pollution from ships (Annex VI)
390 MARPOL Convention, article 2.2
391 MARPOL Convention, article 9.3
In order to comply with this obligations, the LOSC establishes that states shall adopt laws and regulations and establish international, global and regional rules and standards for all sources of pollution. Articles 207 to 212 of the LOSC regulate that duty for each type of pollution, however, this duty is not uniform. For the regulation of vessel-source pollution, the duty is not the same for coastal and flag states.

Flag states do have a duty to adopt laws and regulations for the prevention, reduction and control of the marine pollution from vessels of their nationality. However, coastal states are empowered to do so but not bound. They may adopt laws and regulations in the areas subject to their jurisdiction and in accordance with the limits established by the LOSC, namely, without hampering the right to innocent passage of foreign ships in their territorial sea and conforming to and giving effect to generally accepted international rules and standards in their EEZ. It was explained how the LOSC does not specify the content or extend of the laws and regulations, instead it provides rules of reference. The rules of references vary in their form. They take the stronger form for the regulation of vessel-source pollution by flag states, in which they establish that the regulations need to “at least have the same effect as that of generally accepted international rules and standards”. The role of the rule of reference in this case is to establish a minimum standard for legislation and to leave to the state to take more stringent measures than those set by the international standard.

The duty to regulate pollution from and through the atmosphere also contains a reference to internationally agreed rules and standards but in this case the role of the rule of reference is much weaker than that of the rule of reference for the regulation of vessel-source pollution by flag states. When it comes to regulating atmospheric pollution, the LOSC only requires to take into account the international rules and standards. Consequently, states are given wide discretion to adopt their own laws that may result in national standards not conforming any “internationally agreed criteria”.

This chapter has also analyzed the concept of generally accepted international rules and standards. It was concluded that what makes a rule or standard generally accepted is not the nature of the instrument that contains it but the attitudes of states in respect of that rule. It is state practice that determines whether an international rule or standard has been generally accepted.

393 LOSC, articles 192 and 194
394 LOSC, article 211.2
396 LOSC, articles 211.4 and 211.5. For a summary of the jurisdiction of coastal states in relation to vessel-source pollution see table in section 4.3.2.2.
397 LOSC, article 211.2
5. International regulation of air pollution from ships

The first chapter of this paper explained how the atmosphere is a source of many pollutants that are introduced into the marine environment. The pollutants are varied and they generate acid depositions that are a threat to human health and the environment in general as they increase the acidity of the soil and fresh water degrading forests, reducing crop growth and affecting wild life. When these pollutants enter the water column, they have an impact on the acidity of the seawater, which affects calcifying organisms and the food-webs. Moreover, climate change emissions such as CO\textsubscript{2} contribute to sea-level rise and water warming.

It was noted that land-based activities are the main source of pollution that enters the marine environment through the atmosphere, nevertheless, it is becoming “subject to increasingly strict regulation at the national and international level”. Air pollution from ships, by contrast, is becoming a more pressing issue as the world fleet grows at a faster pace than that of the global GDP and trade growth. Maritime transport emits oxides of sulphur, oxides of nitrogen, volatile organic compounds, ozone and particulate matter. It is also known to contribute in 2.1 per cent of global GHG emissions.

As was mentioned, the IMO has regulated the air emissions from ships. Annex VI of MARPOL contains the international standards for the prevention of air pollution from ships, however, it was also noted that there exist other regimes on air pollution that can interact with that set up by the IMO. This chapter will analyze the regime in Annex VI of MARPOL and it will point out the interactions with other international instruments. For this purpose, this chapter will only focus on the most important air pollutants from ships; sulphur oxides, nitrogen oxides and greenhouse gases. Therefore, ozone-depleting substances and volatile organic compounds will be left out.

Annex VI of the MARPOL Convention is entitled Regulations for the Prevention of Air Pollution from Ships and was incorporated into the Convention by means of the Protocol of 1997 to the MARPOL Convention. This Protocol was adopted by a Conference of the Parties to the MARPOL Convention held in London in 1997 which also adopted the Technical Code on Control of Emissions of Nitrogen Oxides from Marine Diesel Engines (NO\textsubscript{x} Technical Code). The NO\textsubscript{x} Technical Code is mandatory under MARPOL Annex VI. Since the entry into force in 2005 of these regulations.

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399 Harrison J, ‘Pollution of the Marine Environment From and Through the Atmosphere’, p. 170
400 Atmospheric pollutants are nitrogen, sulphur, carbon, heavy metals and other organic compounds
401 Nitrogen, sulphur and carbon are responsible for the lowering of pH levels of sea water
402 Harrison J, ‘Pollution of the Marine Environment From and Through the Atmosphere’, p. 171
403 See section 1.1
404 IMO, “Third IMO GHG Study 2014, Reduction of GHG emissions from ships”, MEPC at its 67th session, p. 13
instruments, Annex VI and the Code have been revised by the MEPC as requested by the Conference of Parties. In October 2008, the MEPC considered and adopted the revised Annex VI and NO\textsubscript{x} Technical Code.

Annex VI of MARPOL contains emission standards for ozone depleting substances, nitrogen oxides, sulphur oxides, volatile organic compounds and emissions arising through incineration as well as CDEM standards. CDEM standards are concerned with the replacement or modification of diesel engines, exhaust gas cleaning systems and shipboard incinerators. Since 2011, the Annex also regulates energy efficiency for ships. In 2009, MEPC 59 developed a package of specific technical measures and operational following the request made by the 22nd Session of the IMO Assembly in 2003 to identify and develop the mechanisms needed to achieve limitation or reduction of GHG emissions from international shipping. MEPC 61 adopted the amendments to MARPOL Annex VI in 2011 to add Chapter 4 on Regulations on Energy Efficiency for Ships.\textsuperscript{404}

5.1. Regulation of sulphur oxides
The main cause of sulphur oxides emissions is the burning of fossil fuel. The MARPOL Convention regulates this type of emissions from ships in Regulation 14 of Annex VI. However, this is not the first instrument to ever regulate sulphur oxides emissions.

The 1985 Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes of the 1979 Convention on Long-Range Transboundary Air Pollution established in article 2 that “the Parties shall reduce their national annual sulphur emissions or their transboundary fluxes by at least 30 per cent as soon as possible”.\textsuperscript{405} This Protocol provided a regional response for these emissions but did not specify its scope, resulting in the potential inclusion of emissions from ships as the 1979 Convention defined long-range air pollution as “air pollution whose physical origin is situated wholly or in part within the area under the national jurisdiction of one State and which has adverse effects in the area under the jurisdiction of another State at such a distance that it is not generally possible to distinguish the contribution of individual emission sources or groups of sources”.\textsuperscript{406} However, at the time of adoption of the 1994 Protocol on Further Reduction of Sulphur Emissions of the 1979 Convention, in which some of the provisions could potentially apply to emissions from ships when these are in an area of the jurisdiction of a party,\textsuperscript{407} the parties decided not to tackle

\textsuperscript{405} Convention on Long-Range Transboundary Air Pollution, article 2
\textsuperscript{406} Convention on Long-Range Transboundary Air Pollution, article 1(b)
\textsuperscript{407} Harrison J, ‘Pollution of the Marine Environment From and Through the Atmosphere’, p. 174
emissions from ships under this regime but rather do it in the context of IMO for a global response to the issue.

The Chapter 3 of Annex VI is dedicated to the requirements for control of emissions from ships. It contains Regulation 14 which sets the standards for the sulphur content of fuel oil used on board ships. The regulation of the sulphur content in fuel oil needs to be regarded as an equipment standard, therefore, a CDEM standard. The first wording of Regulation 14 established a maximum of 4.5 per cent m/m.\(^{408}\) Amendments made in 2008 established standards subject to step changes over the years that required a maximum of 4.5 per cent m/m prior to 1 January 2012, 3.5 per cent m/m on and after 1 January 2012 and 0.5 per cent m/m on and after January 2020. While Regulation 14 limits the sulphur content of fuel oil to reduce sulphur emissions, it also allows flag states to require other methods as an alternative to the measures in Regulation 14 as long as they are at least as effective in terms of emissions reductions.

Regulation 14 establishes special emissions requirements for the Sulphur Emission Control Areas (SO\(_x\) ECA). In these areas the standards are higher because it was considered that they were more susceptible of being affected by the emissions. Also, it was a way to compromise between the interests of those states that demanded stricter standards and the actors that tried to resist the cost of stringent regulations.\(^{409}\) The Baltic Sea was a SO\(_x\) ECA in the original text of Annex VI. Amendments to the Annex added the North Sea area, the North American area and the United States Caribbean Sea area.\(^{410}\) Regulation 14.3.4 establishes that the IMO can designate any other area, including any port area, as a SO\(_x\) ECA in accordance with the procedures set forth in appendix III to Annex VI.\(^{411}\) The MEPC has the power to designate the additional SO\(_x\) ECAs.\(^{412}\) The standards set for SO\(_x\) ECAs are also subject to step changes. There is a maximum of 1.5, per cent m/m prior to 1 July 2010, 1.0 per cent m/m on and after 1 July 2010 and 0.1 per cent on and after 1 January 2015.

According to Harrison,\(^{413}\) the principal means of enforcing the standards for SO\(_x\) emissions is port state control.\(^{414}\) The enforcement is carried out through the inspection of the relevant documentation. A document called Bunker Delivery Note (BDN) is provided by the supplier of fuel oil and it needs to be kept onboard of the ship. According to Regulation 18.7.1 of Annex VI, port

\(^{408}\) The fuel oil sulphur limits is expressed in terms of percentage of mass. See http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Sulphur-oxides-(SOx)—Regulation-14.aspx accessed August 5, 2016
\(^{409}\) Harrison J, ‘Pollution of the Marine Environment From and Through the Atmosphere’, p. 175
\(^{410}\) MARPOL Convention, Annex VI, Regulation 14.3
\(^{411}\) MARPOL Convention, Annex VI, Appendix III, para. 1.3 “An emission control area should be considered for adoption by the Organization if supported by a demonstrated need to prevent, reduce and control emissions of NOx or SOx and particulate matter or all three types of emissions from ships.”
\(^{412}\) Harrison J, ‘Pollution of the Marine Environment From and Through the Atmosphere’, p. 175
\(^{413}\) Ibid, p. 176
\(^{414}\) See section 4.3.2.3 for an analysis on port state jurisdiction
states authorities are entitled to inspect the BDN on board any ship subject to the MARPOL Convention while the ship is in its port or offshore terminal. The BDN contains the details of the fuel oil in question and needs to be accompanied by a sample of the fuel oil. However, it is not easy to implement shipping regulations in a consistent manner at the international level. The main difficulty is related to the format of the BDN. It tends to be a carbon copy not always legible and not always in English. Moreover, the testing of the sample that accompanies the BDN is not well received in the shipping industry as this practice is not carried out in a consistent manner, thus, generating unfair competition between operators. Another difficulty related to the compliance of Regulation 14 is the availability of fuel oil that is compliant with it. It can be the case where ships find themselves in the port of a state that is not a party of MARPOL Annex VI. The MEPC has been inquired about this problem, however, it did not take action on it. It merely reminded that ships need to comply with Regulation 14 and in case of non-availability of compliant fuel oil, they are required to present a record of the actions taken to attempt to achieve compliance and to provide evidence that it attempted to purchase compliant fuel oil. Regulation 18.2.2 establishes that a ship “should not be required to deviate from its intended voyage or to delay unduly the voyage in order to achieve compliance”. The MEPC is obliged to review the standards on sulphur content by 2018 and contrast it with the global market supply. To this end, ships shall notify their flag states and port states when they cannot purchase compliant fuel oil, and the states parties to Annex VI shall notify the IMO when a ship has presented evidence of the non-availability.

5.2. Regulation of nitrogen oxides

Nitrogen oxides are generated during the combustion process of fuel oil. The precursors of NOx are nitrogen and oxygen which compose 99 per cent of the engine intake air. Oxygen is consumed during the combustion process but a certain percentage of nitrogen oxidizes to form oxides of nitrogen. The formation of NOx depends on the combustion temperature and the time the nitrogen is exposed to high temperatures. The higher the combustion temperature, the greater the amount of NOx formation. Slow speed engines generate more NOx than high speed engines. As was explained earlier, the adverse effects of NOx on the environment are acidification, formation of tropospheric ozone, and nutrient enrichment. The sources of nitrogen oxides are both land-based and

415 MARPOL Convention, Annex VI, Regulation 18.8.1
416 IMO, Report of the 53rd Meeting of the Marine Environment Protection Committee, para. 4.18
417 MARPOL Convention, Annex VI, Regulation 18.2.1
418 MARPOL Convention, Annex VI, Regulation 18.2.2
419 MARPOL Convention, Annex VI, Regulation 14.8
420 MARPOL Convention, Annex VI, Regulations 18.2.4 and 18.2.5
industries and ship engines. The first international instrument to address nitrogen oxides emissions was the 1979 Convention on Long-Range Transboundary Air Pollution, the same instrument that addressed sulphur oxides emissions for the first time. This instrument dealt with this type of pollution at the regional level for North America and Europe. The 1988 Protocol to this Convention established a number of targets to reduce the national annual nitrogen oxides emissions or transboundary fluxes of the parties. The scope of the Protocol were stationary and mobile sources of nitrogen oxides. According to the definition of the mobile sources in the Protocol,[422] ships are included in the scope of the Protocol, nevertheless, a provision in a technical annex of the Protocol made the standards applicable only to road vehicles until certain data became available.[423] The parties to this Convention never addressed emissions from shipping as they agreed they would be better regulated at the global level through the IMO.[424]

In the MARPOL Convention, the emissions of nitrogen oxides are regulated in Annex VI, Regulation 13. The standards in this Regulation differ from those in Regulation 14 in that they apply to the design and construction of ship engines (CDEM standards).[425] These standards set limits for the emission of \( \text{NO}_x \) at different rated engine speeds. Regulation 13 expresses the rated engine speed with the symbol \( n \) and it is calculated in crankshaft revolutions per minute.[426] Thus, at a certain speed there is a maximum of \( \text{NO}_x \) emissions that an engine can emit. Moreover, the standards are divided in tier. The date of construction of an engine determines which tier applies to the engine in question. The scope of this Regulation is any marine diesel engine with a power output of more than 130 kW installed on a ship or marine diesel engine of these characteristics that has undergone major conversion on or after January 2000.[427] The original text of Annex VI contained only the Tier I standards for the emission of \( \text{NO}_x \) of engines constructed on or after 1 January 2000. Amendments to the Annex made in 2008 added tier II and Tier III. Tier II standards apply to engines constructed on or after 1 January 2011 and establish stricter limits that those in Tier I, they also apply to ships with engines constructed on or after 1 January 2016 when the ship is operating outside a \( \text{NO}_x \) ECA. Tier III standards apply to engines constructed on and after 1 January 2016.[428]
The amendments of 2008 not only added stricter standards for newer engines, they also made the standards retroactive for engines constructed on or after 1 January 1990 but prior to 1 January 2000 if a marine diesel engine has an output power of more than 5,000 kW and a per cylinder displacement at or above 90 L.\textsuperscript{429} The standards that apply to the engines with these characteristics are contained in Regulation 13.7.4 of Annex VI. The ships with such engines require to either have an approved method certified by the flag state or a certification that the engine operates within the limits established by the standards in Tier I, II or III.\textsuperscript{430} The reason for the introduction of this retroactive provision is the realization of the possibility of reducing NO\textsubscript{x} emissions with minor adjustments to the engines. This provision allows for long-life ship engines to continue operating while they comply with the standards.

As happened with SO\textsubscript{x} regulations, it is also possible to establish NO\textsubscript{x} Emission Control Areas. The procedures and criteria to establish them are the same as those described in the previous section for SO\textsubscript{x} emissions. So far, two NO\textsubscript{x} ECAs have been established, the North American and the United States Caribbean Sea ECAs.\textsuperscript{431} The NO\textsubscript{x} emission limits that apply to ships in NO\textsubscript{x} ECAs are those set in Tier III for engines constructed on or after 1 January 2016.

The following table summarizes the standards for the NO\textsubscript{x} emissions from ships:

<table>
<thead>
<tr>
<th>Tier I (engines constructed on and after 1 January 2000)\textsuperscript{1}</th>
<th>Tier II (engines constructed on and after 1 January 2011)\textsuperscript{2}</th>
<th>Tier III (engines constructed on and after 1 January 2016 and operating in a NO\textsubscript{x} ECA) 2008 Amendments (entered into force July 2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n is less than 130 rpm</td>
<td>17.0 g/kWh</td>
<td>14.4 g/kWh</td>
</tr>
<tr>
<td>n is 130 rpm or more but less than 2,000 rpm</td>
<td>$45 \cdot n^{(-0.2)}$ g/kWh</td>
<td>$44 \cdot n^{(-0.23)}$ g/kWh</td>
</tr>
<tr>
<td>n is 2,000 rpm or more</td>
<td>9.8 g/kWh</td>
<td>7.7 g/kWh</td>
</tr>
</tbody>
</table>

1. \textsuperscript{429}MARPOL Convention, Annex VI, Regulation 13.7.1
2. \textsuperscript{430}MARPOL Convention, Annex VI, Regulation 13.7.1.1 and .2
In 1997, a conference of the parties to MARPOL adopted the Technical Code on Control of Emissions of Nitrogen Oxides from Marine Diesel Engines (NO\textsubscript{x} Technical Code 2008). Following the entry into force of Annex VI on 19 May 2005, the Code became mandatory for all marine diesel engines that are subject to Regulation 13.\textsuperscript{432} In July 2005, MEPC 53 agreed to the revision of the Code and concluded it in 2008. The Code serves as a guide to manufacturers, shipowners and administrations to comply with the emission standards set out in Regulation 13. The Code shall be applied in the certification, testing and measurement procedures for the standards set forth in Regulation 13.\textsuperscript{433} The NO\textsubscript{x} Technical Code 2008 establishes that engines must be pre-certified as complying with the requirements. The certification of an engine must be carried out not only at the end of its construction but also after its installation onboard of a ship as the installation process may have altered its qualities and therefore no longer be able to comply with the emissions standards. An International Air Pollution Certificate issued by the flag state must be kept onboard and renewed every five years. Port state authorities are entitled to verify the certificates.\textsuperscript{434}

As can be concluded from this section, compliance with NO\textsubscript{x} emissions limits is achieved through the development of appropriate technology.\textsuperscript{435} Consequently, the prospective furthering of the limits will largely depend on the advancements made in the technology. The strengthening of the standards could stagnate if the technology does not advance, however, the amendments made to the standards must be adopted through the tacit amendment procedure.\textsuperscript{436} The tacit amendment procedure facilitates the rapid development of the standards, but this will ultimately depend on the political will of states and their sufficient mobilization at IMO.\textsuperscript{437}

5.3. Regulation of greenhouse gas emissions

As was explained, greenhouse gases emissions have a series of adverse effects on the environment.\textsuperscript{438} All kinds of human activities generate GHG emissions, among them there is the shipping industry. Although a minor contributor to global GHG emissions, the shipping industry has also been subject to regulations that aim at limiting the emissions of this kind of gases.

\textsuperscript{432} MARPOL Convention, Annex VI, Regulation 13.1.1 “This regulation shall apply to: .1 each marine diesel engine with a power output of more than 130 kW installed on a ship; and .2 each marine diesel engine with a power output of more than 130 kW that undergoes a major conversion on or after 1 January 2000 except when demonstrated to the satisfaction of the Administration that such engine is an identical replacement to the engine that is replacing and otherwise not covered under paragraph 1.1.1 of this regulation.”

\textsuperscript{433} MARPOL Convention, Annex VI, Regulation 13.8

\textsuperscript{434} MARPOL Convention, Annex VI, Regulation 10

\textsuperscript{435} Harrison J, ‘Pollution of the Marine Environment From and Through the Atmosphere’, p. 180

\textsuperscript{436} See section 3.3

\textsuperscript{437} Harrison J, ‘Pollution of the Marine Environment From and Through the Atmosphere’, p. 181

\textsuperscript{438} See section 1.3
At the global level, the UNFCCC is an international treaty that aims at preventing dangerous anthropogenic interference with the climate system through the stabilization of GHG concentrations. The UNFCCC requires all parties to develop national inventories of GHG emissions and take measures to mitigate climate change from anthropogenic sources but only developed countries are bound to meet specific GHG emissions targets. The reason for this differentiation is that the Convention responds to the Common but Differentiated Responsibilities (CBDR) principle. In accordance with this principle, the emission targets set out in the Kyoto Protocol to the UNFCCC only bind the developed countries. The Kyoto Protocol is the only global air pollution instrument to have addressed shipping emissions. It does not regulate them, instead it obliges developed states to “pursue limitation or reduction of the emissions of greenhouse gases not controlled by the Montreal Protocol from (...) marine bunker fuels, working through the (...) International Maritime Organization”.

Responding to the mandate of the Kyoto Protocol, at the Conference of the Parties to MARPOL Convention in 1997 on air pollution, the IMO was invited to undertake a study of GHG emissions from ships as a first step. Once a first study on GHG emissions was issued, a second step was taken in the form of an Assembly resolution that urged the MEPC to “identify and develop the mechanism or mechanisms needed to achieve the limitation or reduction of GHG emissions from international shipping”. This provision also urged the MEPC to give priority to the establishment of a GHG emission baseline, the development of a methodology to describe the GHG efficiency of a ship in terms of a GHG emission index for that ship, the development of guidelines by which the GHG emission indexing scheme may be applied in practice and the evaluation of technical, operational and market-based solutions. The development of these measures shall be conducted in co-operation with the Secretariat of the UNFCCC. The MEPC is the organ of the IMO responsible for the development of the IMO regulation of GHG emissions from ships. It is responsible for the methodological aspects related to the reporting of GHG emissions from ships,

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439 UNFCCC, article 2
440 UNFCCC, article 3.1 “The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof.”
441 Kyoto Protocol, Annex I lists the developed states
442 Montreal Protocol on Substances that Deplete the Ozone Layer to the Vienna Convention for the Protection of the Ozone Layer
443 Kyoto Protocol, article 2.2
444 The IMO conducted the First IMO GHG Study 2000, the Second IMO GHG Study 2009 and the Third IMO GHG Study 2014
445 Resolution A.963(23) of 5 December 2003 para. 1
446 Resolution A.963(23) of 5 December 2003 para. 1(a), (b), (c) and (d)
447 Resolution A.963(23) of 5 December 2003 para. 3
the development of a work plan and keeping the matter under review and preparing consolidated statements on the continuing IMO policies and practices on this matter.\textsuperscript{448} The amendments to Annex VI of MARPOL that added Chapter 4 on Regulations on Energy Efficiency of Ships were adopted at MEPC62.\textsuperscript{449} These Regulations constitute the first legally binding climate change treaty to be adopted since the Kyoto protocol\textsuperscript{450} and the first ever mandatory global greenhouse gas reduction regime for an entire industry sector.\textsuperscript{451}

Chapter 4 of Annex VI establishes different degrees of obligations for shipowners. The Chapter applies to all ships of 400 gross tonnage and above.\textsuperscript{452} All ships with these characteristics must “keep onboard a ship specific Ship Energy Efficiency Management Plan (SEEMP)”\textsuperscript{453} The MEPC adopted guidelines for the development of the SEEMP in which it recognizes that “there are a variety of options to improve efficiency – speed optimization, weather routeing and hull maintenance, for example – and that the best package of measures for a ship to improve efficiency differs to a great extent depending upon ship type, cargoes, routes and other factors”.\textsuperscript{454} Because of this, shipowners have discretion to adopt the energy efficiency measures that they consider appropriate and the goal they aim at achieving. The guidelines emphasize that the goal setting is voluntary.\textsuperscript{455} The purpose of this Plan is to provide “a possible approach for monitoring ship and fleet efficiency performance over time”.\textsuperscript{456} Thus, what moves shipowners to adopt energy efficiency measures is the economic gain rather than a prescriptive requirement.\textsuperscript{457}

Chapter 4 does establish binding obligations to limit GHG emissions from ships. These obligations apply to newly constructed ships\textsuperscript{458} or ships that have undergone major conversion.\textsuperscript{459} Shipowners and shipbuilders shall meet the required Energy Efficient Design Index (EEDI). The

\textsuperscript{448} Resolution A.963(23) of 5 December 2003 para. 2(a), (b) and (c)
\textsuperscript{449} MEPC 62nd Session, 11 to 15 July 2011
\textsuperscript{452} MARPOL Convention, Annex VI, Regulation 19
\textsuperscript{453} MARPOL Convention, Annex VI, Regulation 22.1
\textsuperscript{454} Resolution MEPC.213(63) 2 March 2012 para. 4.1.2
\textsuperscript{455} Resolution MEPC.213(63) 2 March 2012 para. 4.1.7
\textsuperscript{456} Resolution MEPC.213(63) 2 March 2012 para. 1.2
\textsuperscript{457} Harrison J, ‘Pollution of the Marine Environment From and Through the Atmosphere’, p. 183
\textsuperscript{458} MARPOL Convention, Annex VI, Regulation 2.23 defines newly constructed ships as “‘New ship’ means a ship: .1 for which the building contract is placed on or after 1 January 2013; or .2 in the absence of a building contract, the keel of which is laid or which is at a similar stage of construction on or after 1 July 2013; .3 the delivery of which is on or after 1 July 2015”
\textsuperscript{459} MARPOL Convention, Annex VI, Regulation 2.24 defines major conversion as “‘Major Conversion” means in relation to chapter 4 a conversion of a ship: .1 which substantially alters the dimensions, carrying capacity or engine power of the ship; or .2 which changes the type of the ship; or .3 the intent of which in the opinion of the Administration is substantially to prolong the life of the ship; or .4 which otherwise so alters the ship that, if it were a new ship, it would become subject to relevant provisions of the present Convention not applicable to it as an existing ship; or .5 which substantially alters the energy efficiency of the ship and includes any modifications that could cause the ship to exceed the applicable required EEDI as set out in regulation 21.
EEDI that ships must attain varies according to the ship’s size and type. A formula allows to calculate the EEDI (the formula can be consulted in the annex of this paper). However, shipowners and shipbuilders decide how to attain the targets. The requirements of the EEDI are to be attained over time. They are applied in four phases, each with a higher rate for reduction of emissions. As it is for the case of NO\textsubscript{x} emissions, the reason for the progressively stringent targets is the expectancy that technology advancements will allow for ships with lower GHG emissions. In order to improve technology so that it is possible for ships to comply with the required EEDI, Regulation 23.2 of Annex VI establishes that parties shall promote the development of technology. It also establishes that parties co-operate with other parties to promote the transfer of technology and exchange of information to states which request technical assistance, particularly developing states. The transfer of technology however, is subject to the party’s national laws, regulations and policies.

The IMO is obliged to review the targets set in each phase in order to evaluate if those are attainable according to the status of the technological developments. In the case where the technology allows for more stringent targets, these should be reviewed. This provision also works for the case where technology has not improved as expected and the targets need to be review because they are unattainable.

5.4. The developed/developing countries dichotomy in relation to the regulation of GHG emissions from ships

The role of the developed and developing countries as actors in the regulation of vessel-source pollution has been explained in Chapter 2. The divide between countries in relation to their development is relevant for the regulation of GHG emissions from ships at the IMO because some developing countries argued that the application of the EEDI for ships should be mandatory for developed countries and voluntary for developing countries. Developing countries were seeking that the principle of common but differentiated responsibilities would inform the IMO regulation of GHG emissions as it informs the UNFCCC.

This proposal was resisted by the majority of the parties to MARPOL Convention. However, it was agreed that a clause would be added to Regulation 19 of Annex VI on the application of

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460 Resolution MEPC.245(66) 4 April 2014, 2014 Guidelines on the Method of Calculation of the Attained Energy Efficiency Design Index (for New Ships), para. 2
461 Phase 0, 1 January 2013-31 December 2014; Phase 1, 1 January 2015-31 December 2019; Phase 2, 1 January 2020-1 December 2024; Phase 3, 1 January 2025 and onwards
462 MARPOL Convention, Annex VI, Regulation 21.6
463 See section 2.2.3 for an explanation of the developed, developing and least developed divide
464 IMO, Report of the Marine Environment Protection Committee on its Sixty-first Session, MEPC 61/24, para. 5.46
regulations on energy efficiency which allows for an exception to the main rule. The exception allows flag states to “waive the requirement for a ship of 400 gross tonnage and above from complying with regulation 20 and regulation 21”\textsuperscript{465} for four years (since the entry into force of the provision in 1 January 2013 to 1 January 2017).\textsuperscript{466} This provision was aimed at satisfying developing countries, but there is no reference in Annex VI that implies that developed countries cannot take advantage of the exception.

The exception posed a question with regard to the reduction factors that states that had taken advantage of the exception should implement. As was explained in the previous section, the required EEDI is to be applied in four phases, each with a higher rate for reduction of emissions. States taking advantage of this exception, i.e. not applying any EEDI measures until 1 January 2017, would need to implement the second phase which starts in 2015 and ends in 2017 without having implemented the first one. To this question, the MEPC responded that “the waiver provisions specified in regulation 19.4 of MARPOL Annex VI should be granted to an individual ship and not be applied as a general waiver to postpone the implementation of the EEDI requirements for four years”\textsuperscript{467}.

Another aspect of the IMO regulation of GHG emissions that is relevant to the developed and developing countries divide is the provisions on financial and technological assistance. Regulation 23 of Annex VI establishes that the parties shall promote and provide support to states, especially developing states, that request technical assistance.\textsuperscript{468} It also requires that the parties co-operate to promote the development and transfer of technology and exchange information to states which require technical assistance, particularly developing states. This Regulation subjects the assistance to the national laws of the parties.\textsuperscript{469} The obligation in this provision is, therefore, rather weak. Efforts have been made at the IMO to make this provision effective. A MEPC Resolution established for that purpose an \textit{Ad hoc} Expert Working Group on facilitation of Transfer of Technology for ships.\textsuperscript{470} The mandate of this Working Group is to assess the potential implications and impacts of the regulations in Chapter 4 of Annex VI, especially on developing countries and their needs in relation to technology transfer and financing. The mandate of the Working Group also includes the creation of an inventory of energy efficiency technologies for ships and the identification of barriers to technology transfer. It also includes the development of a model

\begin{itemize}
\item\textsuperscript{465} MARPOL Convention, Annex VI, Regulation 19.4
\item\textsuperscript{466} MARPOL Convention, Annex VI, Regulation 19.5
\item\textsuperscript{467} IMO, \textit{Report of the Marine Environment Protection Committee on its Sixty-third Session}, MEPC 63/23, para. 4.27
\item\textsuperscript{468} MARPOL Convention, Annex VI, Regulation 23.1
\item\textsuperscript{469} MARPOL Convention, Annex VI, Regulation 23.2
\item\textsuperscript{470} Resolution MEPC.229(65) 13 May 2013, Promotion of Technical Co-operation and Transfer of Technology relating to the Improvement of Energy Efficiency of Ships, para.3
\end{itemize}
agreement for the transfer of financial and technological resources and capacity-building between parties. The Working Groups shall make recommendations and report to the MEPC.\footnote{MEPC Resolution MEPC.229(65) 13 May 2013, Promotion of Technical Co-operation and Transfer of Technology relating to the Improvement of Energy Efficiency of Ships, para.3.1, 3.2 and 3.3} The Resolution recognizes that the transfer of technology needs to respect the property rights, including intellectual property rights.\footnote{MEPC Resolution MEPC.229(65) 13 May 2013, Promotion of Technical Co-operation and Transfer of Technology relating to the Improvement of Energy Efficiency of Ships, para.4} This is in fact a reminder of the wording of Regulation 23.2 of Annex VI in which the obligation to promote the development and transfer of technology is subject to the national laws, regulations and policies of the parties. The Resolution urges the parties with the ability to do so, to support developing countries but it is a non-binding instrument.\footnote{MEPC Resolution MEPC.229(65) 13 May 2013, Promotion of Technical Co-operation and Transfer of Technology relating to the Improvement of Energy Efficiency of Ships, para.6} In the end, the transfer of technology will depend on the will of developed states to take action on this issue. Property rights represent the main barrier for the implementation of this provision.\footnote{Harrison J, ‘Pollution of the Marine Environment From and Through the Atmosphere’, p. 185} 

5.5. Furthering the regulation of GHG emissions from ships

The previous sections have shown that the IMO regulations on GHG emissions from ships leave a lot of room to the discretion of shipowners and shipbuilders in relation to the implementation of the emission reduction targets set out in Chapter 4 of Annex VI of MARPOL. Many actors at IMO noted the need to further the regulations on this matter.\footnote{Ibid, p. 186} The options available to further the regulation of GHG emissions from shipping are varied. The obvious response to demands of furthering the regulation is the strengthening of the existing regulations. Regulation of 22 on the Ship Energy Efficiency Management Plan obliges ships to develop the plan but it does not impose a goal to achieve in terms of improvement in energy efficiency, thus, this regulation could be amended to include reduction targets. A SEEMP that would require the achievement of energy efficiency targets would need to allow shipowners to attain them over time. In the line of these measures, the targets established for new ships by the EEDI Regulations could be amended to apply to all vessels.

Another type of measures that are being considered at the IMO are marked-based measures for GHG emissions reduction. There are two types of market-based measures. The Second IMO GHG Study assessed the strengths and weaknesses of an International GHG Fund for Shipping and
a Maritime Emissions Trading Scheme.\textsuperscript{476} Both types of measures were considered to have very good environmental and cost effectiveness and to incentivize technological change.\textsuperscript{477}

The establishment of market-based measures based on an International GHG Fund would imply levying marine fuel oil. The consequent price increase would incentivize shipowners to operate more efficiently, which translates into reducing fuel consumption and thus, fewer GHG emissions.

The creation of a Maritime Emissions Trading Scheme would consist of emissions credits that shipowners would need to give up in order to operate the ship. These measures would mean that the price of operating a ship on fossil fuel oil would rise. However, more energy-efficient ships would need less emissions credits than less energy-efficient ships.

The IMO concluded that both a Maritime Emission Trading Scheme and an International GHG Fund “appear to be cost-effective policy instruments with high environmental effectiveness”\textsuperscript{478} however they “both require setting up new institutions or extending the scope of existing ones, which may be challenging”.\textsuperscript{479}

\section*{5.6. Enforcement of international regulations on air pollution from ships}

The previous sections have shown that air pollution from ships has only been addressed by the instruments adopted under the auspices of the IMO. Instruments dealing with air pollution in general have intentionally left out the air emissions from shipping. States have preferred that the control of this type of pollution from ships be regulated within the legal framework established by the LOSC. The LOSC then refers, by means of the rule of reference, to the standards set out at IMO. These standards are found in Annex VI on Regulations for the Prevention of Air Pollution from Ships of the MARPOL Convention. It is necessary to remind here that the Protocol that added Annex VI to the Convention is optional.

Earlier it has been shown that the level of acceptance of Annex VI is not as high as other annexes.\textsuperscript{480} There are 87 parties to Annex VI. That amounts to approximately half of the parties to MARPOL, which makes it the annex with the least number of parties. The standards in Annex VI are referred to in article 212 of the LOSC in the rule of reference. The international standards can be applied when they are generally accepted. The question whether standards can be considered

\begin{flushright}\textsuperscript{476} Second IMO GHG Study 2009\\
\textsuperscript{477} Second IMO GHG Study 2009, para. 6.130\\
\textsuperscript{478} Second IMO GHG Study 2009, para. 6.131\\
\textsuperscript{479} Second IMO GHG Study 2009, para. 6.131\\
\textsuperscript{480} See section 4.3.4\end{flushright}
generally accepted has already been addressed, the practice of states needs to be analyzed in order to determine that. In the case of Annex VI of MARPOL it is difficult to say whether the standards have become generally accepted. The main reason for this Annex not to be as accepted as the other IMO instruments is found in the provisions in Chapter 4 that refer to energy efficiency of ships. There are states that have made objections to those regulations, thus, these regulations do not apply to them. However, due to the framework for jurisdiction established by the LOSC, Annex VI can be applied to ships with the nationality of a state that is not a party to the Annex. The MARPOL Convention is not only implemented by flag states but also by coastal and port states. This renders Annex VI more relevant than it might appear by just looking at the number of contracting parties of the percentage of the world tonnage that they represent.

The most important way in which the standards in Annex VI are implemented is through port state control. This mechanism has been introduced into MARPOL to allow its parties to verify whether a foreign vessel and its documentation comply with international standards. Article 5.2 of MARPOL establishes that officers of a party can carry out inspections at their ports of ships that are required to hold a certification in accordance with provisions of the Regulations of the Convention. This article limits the inspections to verifying if there is a valid certificate onboard. If there are clear grounds to believe that the conditions of a ship do not correspond with the particulars of the certificate or if the ship does not carry the valid certificate, the party carrying out the inspection shall ensure that the ship shall not sail until it can proceed to sea without presenting an unreasonable threat to the marine environment. This provision will be applied to any ship, whether or not they have the nationality of a state party to the MARPOL Convention as the parties to MARPOL are under the obligation to apply its provisions in a non-discriminatory manner. Indeed, article 5.4 of MARPOL establishes that ships of non parties will be subject to the requirements of the Convention in order to ensure that no more favorable treatment is given to such ships. The enforcement of air pollution from ships through port state control has been ensured by memoranda of understanding. These regional agreements seek to ensure uniform port state control of the regulations on vessel-source pollution. The Paris MOU ensures uniform port state control in the waters of European coastal states and the North Atlantic basin from North America to Europe.

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481 See section 4.3.3
483 See section 5.4 and 5.5
484 See section 4.3.1 for an analysis on how the LOSC sets out a regime in which the standards in the IMO conventions have implications for states that are third parties to those conventions
The enforcement of the provisions in Annex VI of MARPOL by coastal states responds to the framework for jurisdiction established in the LOSC. As was explained earlier, the concept of jurisdiction in MARPOL must be constructed in the light of international law in force at the time of application.\textsuperscript{485} Therefore, article 4.2 of MARPOL on violations of the Convention within the jurisdiction of a party to the Convention requires interpretation in the light of articles 211 and 21 of the LOSC. Article 4.2 on violations establishes that any violation of the requirements of the MARPOL Convention within the jurisdiction of any party to the Convention shall be prohibited and sanctions shall be established therefor under the law of that party. In the light of Article 211.4 of the LOSC, article 4.2 of MARPOL allows coastal states to enforce Annex VI against ships within their territorial sea. In the territorial sea, coastal states have the authority to prescribe discharge standards as long as they do not hamper innocent passage of foreign vessels. In the EEZ, coastal states can enforce the regulations in Annex VI against foreign vessels as long as these have been generally accepted.\textsuperscript{486} As was pointed out earlier, it has not been agreed whether these regulations have been generally accepted. Thus, the extend of the jurisdiction of coastal states in their EEZ on the matter of air pollution remains uncertain.

Resolution MEPC.247(66) added to Annex VI added chapter 5 on the verification of compliance with the provision of this annex.\textsuperscript{487} Regulation 25 of this chapter establishes that the parties shall be subject to periodic audits by the IMO to verify compliance with and implementation of Annex VI. The Secretary-General has responsibility for administering the auditing of IMO member states to which member states shall submit and facilitate the conduct of. The states will also have to implement a program of actions based on the findings of the audit.\textsuperscript{488}


\textsuperscript{486} LOSC, article 211.5

\textsuperscript{487} Resolution MEPC.247(66) adopted on 4 April 2014

\textsuperscript{488} MARPOL Convention, Annex VI, Regulation 25.3
6. Conclusion

The shipping industry is crucial for the functioning of global trade as it carries about 90 per cent of it. The world fleet efficiently carries all kinds of cargo to almost every corner of the world. Although shipping is cleaner than other modes of transport, its contribution to the degradation of the environment and to climate change cannot be ignored, especially because the world fleet is growing at a higher rate than that of the global GDP and trade. The normal operation of ships introduces a variety of pollutants into the environment, but the focus of this paper has been on air pollution from ships.

Air pollution from ships contributes to ocean acidification and eutrophication, global warming and adverse public health effects. The emissions to the atmosphere from ships are divided into greenhouse gases and non-greenhouse gases. Non-greenhouse gas emissions from ships are of more concern than greenhouse gas emissions since they contribute substantially to acid rain, photochemical smog and produce soot and ash. The shipping industry runs on bunker fuel oil, which is a by-product of the standard oil refining process that can have up to a 100 times more $\text{SO}_x$ than road diesel. Due to the tight link between fuel consumption and noxious emissions, the obvious response to reducing emissions is to reduce the consumption of fuel. The industry has already applied measures for reducing fuel consumption that entail a reduction in costs, but the growth in the volume of shipping has far outweighed any fuel efficiency savings. Because of this, it has been necessary to regulate the air emissions from ships as there are no incentives left for the industry. Despite the known adverse effects of air emissions from ships, air pollution has been the last type of pollution from ships to be regulated at the global level.

The air emissions from ships have been regulated in the context of the framework for jurisdiction over vessel-source pollution set out by the law of the sea. The issue of vessel-source pollution is expressed in a different type of balance than that of other environmental issues. Despite the special context of vessel source pollution, its development has been stimulated by the developments in international environmental law. This paper has shown how the developments in the protection of the marine environment have followed those in international environmental law. The UN conferences relating to the protection of the environment have been establishing the pace of the developments at IMO (formerly IMCO). IMCO assumed the task of formulating international marine environmental conventions at its entry into force in 1958 despite not having such mandate. The entry into force of the LOSC had major consequences for the international regulation of shipping, as it revised the legal framework within which the IMO operates.
In article 192, the LOSC establishes a primary obligation to protect and preserve the marine environment. In relation to the protection of the marine environment from vessel-source pollution, the LOSC obliges states to act through the IMO to establish the international rules and standards for this type of pollution. Then, it establishes a framework for jurisdiction within which states act in different capacities. Flag, port and coastal states have to adopt laws and regulations that have to conform to, in different degrees, with those international rules and standards.

The IMO, in its role of global standard-setting authority for the protection of the marine environment from vessel-source pollution, has proven to have done very valuable work in implementing the environmental provisions of the LOSC. Despite the difficulties posed by the conflicting interests of the member states of IMO, the Organization has succeeded in creating the regulatory treaties that contain the global standards for cleaner shipping and it has pioneered the continuous revision of instruments. Moreover, its structure allows for the active participation of industry and environmental NGOs.

The actors participating in the making of the international standards are very diverse and they have conflicting interests that complicate and slow down the law-making process. The preeminence of flag state jurisdiction for vessel-source pollution in the LOSC entails that states with strong maritime interests resist the strengthening of environmental provisions for vessels at the IMO as the LOSC obliges them to adopt laws and regulations which have at least the same effect as generally accepted international rules and standards. Prescriptive jurisdiction of coastal states is very limited. While they can adopt any type of national standards in their internal waters, they may only adopt national discharge and navigation standards in their territorial seas. In their EEZ, they may only adopt laws to give effect to international discharge standards. However, it has been the pressure exercised by individual states or regions and their efforts at unilateral action at strengthening standards that has stimulated progress at IMO.

IMO, and especially its MEPC, has been able to create a comprehensive regime to tackle pollution of the marine environment from ships that is sufficiently flexible to adapt the instruments to the technological advancements that allow for better control of vessel-source pollution. The MARPOL Convention is the IMO instrument that contains the international standards for the regulation of vessel-source pollution. It did not include air pollution from ships until 1997, when Annex VI was adopted, and it did not enter into force until 2005. The standards are designed to be incremental. They become more stringent over time as it is expected that the state of technology will allow shipowners to comply with the stricter emission limits. In line with the flexibility that was sought in the LOSC for the regulation of vessel-source pollution, Annex VI includes, for each
type of emission regulated, a clause on the review of the standards. These clauses oblige the parties to review the status of technological developments in order to verify if the technology allows for compliance with the standards. The supposition that technology will improve to meet the progressive standards serves as an incentive for its development. Annex VI of MARPOL has been able to balance out the interests of different states by allowing the establishment of NO\textsubscript{x} and SO\textsubscript{x} Emission Control Areas where stricter emissions standards apply. This way, there are two implementation speeds for emission standards.

The LOSC references generally accepted international rules and standards for the regulation of vessel-source pollution established through the competent international organization. When the standards are generally accepted, they have implications for states that are not parties to the treaty that contains them. It has been found that there is evidence that indicates that the standards for air pollution from ships are not generally accepted. While most IMO treaties have a high degree of acceptance, Annex VI of MARPOL, which is optional, does not have as many parties as the other annexes and some states have objected to some of the amendments to its technical standards on energy efficiency.

The framework for jurisdiction in the LOSC does not provide for wide implementation of the standards in Annex VI. Flag states are not under the obligation to adopt them because they are not generally accepted. And many of the standards for air pollution are CDEM standards, therefore, coastal states can only require foreign ships to comply with them while they are in their internal waters. Port state jurisdiction deals only with discharge violations in the high seas, thus, any breach of international rules relating to CDEM and other vessel standards are outside of the scope of this jurisdiction.

The issue of the emissions from the shipping industry is a rather pressing one. The expected growth of the industry has proven the need for a periodical revision of the standards. As technology improves, the legal instruments shall adapt the standards to the new circumstances. The limitations in the implementation of air pollution standards relate to the framework for jurisdiction set out in the LOSC. However, the work of the IMO in regulating air pollution of an entire industry has been remarkable. Despite the tensions between coastal and maritime states, the Organization has been able to create treaty obligations for the control of air emissions from ships with efficient mechanisms to amend its technical standards. While the framework for jurisdiction in the LOSC is very unlikely to change, we can only hope that Annex VI will be further accepted and become generally accepted. As in any other area of international law, any developments on the regulation of air pollution from ships will ultimately depend on the will of states to develop it.
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Annex

1. Energy Efficiency Design Index

If part of the Normal Maximum Sea Load is provided by shaft generators, $SFC_{ME}$ and $C_{FME}$ may – for that part of the power – be used instead of $SFC_{AE}$ and $C_{FAE}$.

** In case of $P_{PTI(i)} > 0$, the average weighted value of $(SFC_{ME} \cdot C_{FME})$ and $(SFC_{AE} \cdot C_{FAE})$ to be used for calculation of $P_{eff}$.