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# **Science and the International Regulation of Marine Pollution**

**Elizabeth A. Kirk**

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Editors Donald Rothwell, Alex Oude Elferink, Karen Scott and Timothy Stephens

## Introduction

The definition of marine pollution found in Article 1 of the United Nations Convention on the Law of the Sea<sup>1</sup> (LOSC) originated in the work of the Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP).<sup>2</sup> It is, in that respect, firmly rooted in received scientific understandings of pollution. One might anticipate then that scientific understanding would underpin the development of the law. For science to play such a key role, however, the decision-making processes must allow for policies or laws to be revised in light of new scientific information. One might anticipate then that the decision-making processes used will be rooted in adaptive management.<sup>3</sup> Adaptive management involves consciously following an iterative approach to regulation. The approach is based upon an acknowledgement that information within the system is imperfect and that decisions must be made on the basis of that imperfect information. In adaptive management processes a range of possible responses to a given issue are reviewed and a choice is made as to which response to test in one or more pilot projects. The pilot projects are monitored and reviewed after a period of time to determine whether the law or policy reflected in them should be developed in a particular direction or whether further adaptation in policy or regulatory response is required. In the environmental context reviews are based upon *inter alia* data on the state of the environment and changes to it as a result of the implementation of policies and as a result of the effects of other drivers. As such, scientific information sits at the heart of the process, though other information such as on economic or social pressures may also be relevant.

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\* With thanks to Robin Churchill and to the editors for their insightful comments on an earlier draft.

<sup>1</sup> United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 397 (LOSC).

<sup>2</sup> Though GESAMP itself drew on the work of other organisations in arriving at it. See Joint IMCO/FAO/UNESCO/WMO Group of Experts on the Scientific Aspects of Marine Pollution 'Report of the First Session' (GESAMP London 1969) GESAMP I/11 1969.

<sup>3</sup> For a discussion of types of adaptive management see Bradley C Karkkainen, 'Adaptive Ecosystem Management and Regulatory Penalty Defaults: Toward a Bounded Pragmatism' (2002-2003) 87 *Minnesota Law Review* 57; Bradley C. Karkkainen, 'Toward Ecologically Sustainable Democracy?', in A. Fung and E.O. Wright (eds.), *Deepening Democracy: Institutional Innovations in Empowered Participatory Governance* (Verso 2003); K.N. Lee and J. Lawrence, 'Adaptive Management: Learning from the Columbia River Basin Fish and Wildlife Program' (1986) 16 *Environmental Law* 431; J.B. Ruhl, 'Taking Adaptive Management Seriously: A Case Study of the Endangered Species Act' (2004) 52 *University of Kansas Law Review* 1249, Carl Walters and C.S. Holling, 'Large-Scale Management Experiments and Learning by Doing' (1990) 71 *Ecology* 2060.

This chapter considers the approaches taken by international regimes addressing marine pollution, drawing out similarities and differences in approach across time and different sources of pollution, the degree to which they follow an adaptive management approach and the role of science in particular within decision-making. It begins with an overview of the historical development of the law, though aspects of that development are returned to throughout the chapter to illustrate the factors that have influenced the shape of the current regime. The section on historical development is followed by a discussion of the current regime which is split into a discussion of general obligations and certain source specific obligations. The final section contains conclusions and a discussion of current and future issues. The discussion throughout the chapter is illustrated with appropriate examples. While every effort has been made to draw examples from across the globe, the clearest illustrations of problems with pollution often times come from the northern hemisphere and in particular from around Europe where seas have been the most heavily polluted.

#### Historical Development of the Legal Regime in Relation to Marine Pollution

While a relative latecomer to the law of the sea, the law on marine pollution was, paradoxically, at the vanguard of the development of international environmental law. It shares a common root with many aspects of that area of law, in the concept of State responsibility. This root may help explain why the laws relating to marine pollution have developed in the way they have.

The first attempt to develop laws on marine pollution arose as a result of concerns from coastal States about the deleterious effects of oil pollution.<sup>4</sup> At the 1926 Preliminary Conference on Oil Pollution of Navigable Water the parties focussed their attention on shipping, their assumption being that the impacts of land-based sources of oil pollution were felt only by the coastal State from which they emanated and that these sources were in any event subject to sufficient control by coastal States. While the conference did result in a draft convention it never entered into force. In all likelihood the failure of the convention can be linked to the comment made during the conference— that the problem of oil pollution was much diminished and that efforts were being made by both coastal States and ship owners to address it. Thus while the potential harm to fisheries and to the high seas in general were discussed at the conference no agreement could be reached on their significance. Instead, both in drafting the convention and in (the failed) implementation of it, the key issue for States was the question of whether harm to State interests was likely to occur, and the

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<sup>4</sup> 'Final Act and Draft Convention of the Preliminary Conference on Oil Pollution of Navigable Water' (1926) 1 Foreign Relations of the United States 238.

perceived lack of harm to such interests undermined the convention. A second, and more successful, attempt to regulate pollution from oil resulted in the 1954 International Convention for the Prevention of Pollution of the Sea by Oil.<sup>5</sup>

Interest in the control of marine pollution did not really become a live issue, however, until there had been a number of significant incidents. The 1958 Geneva Conventions, for example, contain few provisions on marine pollution. The disposal of offshore installations is addressed in the Continental Shelf Convention,<sup>6</sup> and the High Seas Convention<sup>7</sup> addresses oil pollution from ships or pipelines and the dumping of radioactive waste in Articles 24 and 25. The most famous of the early pollution incidents were the Minamata mercury poisoning which became evident in the 1950s, and the grounding of the *Torrey Canyon* off Land's End in 1967, but the responses of the international community to the problems of land-based and vessel source pollution flagged up by these events differed. The *Torrey Canyon* disaster prompted the development of the 1969 International Convention on Civil Liability for Oil Pollution Damage,<sup>8</sup> the 1969 Intervention Convention<sup>9</sup> and the 1971 International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage,<sup>10</sup> whereas no treaties were adopted in direct response to the Minamata poisoning. The first treaties in this area were the Helsinki Convention 1974,<sup>11</sup> and the 1974 Paris Convention,<sup>12</sup> but these are regional conventions focussed on the North-east Atlantic area, not the seas around Japan where the Minamata poisoning occurred.

In part, the general lack of attention to land-based activities was because it was assumed that any impacts would be local and controllable by the State from which the pollutants emanated.<sup>13</sup> That the Baltic and North-Sea areas were the first to see regional agreements tackling marine pollution from

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<sup>5</sup> International Convention for the Prevention of Pollution of the Sea by Oil (adopted 12 May 1954, entered into force 26 July 1958) 327 UNTS 3 (OILPOL).

<sup>6</sup> Convention on the Continental Shelf (adopted 29 April 1958, entered into force 10 June 1964) 499 UNTS 311.

<sup>7</sup> Convention on the High Seas (adopted 29 April 1958, entered into force 30 September 1962) 450 UNTS 11.

<sup>8</sup> International Convention on Civil Liability for Oil Pollution Damage (adopted 29 November 1969 entered into force 19 June 1975) 973 UNTS 3 (1969 CLC).

<sup>9</sup> International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (adopted 29 November 1969 entered into force 6 May 1975) 970 UNTS 211.

<sup>10</sup> See generally Alan Khee-Jin Tan, *Vessel-Source Marine Pollution: The Law and Politics of International Regulation* (Cambridge University Press 2006) particularly chapter 6. International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (adopted 18 December 1971 entered into force 16 October 1978) 1110 UNTS 57, 11 ILM 284 (Fund Convention).

<sup>11</sup> 1974 Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area (adopted 9 April 1992 entered into force 17 January 2000) 2099 UNTS 195.

<sup>12</sup> Convention for the Prevention of Marine Pollution from Land-Based Sources (adopted 4 April 1974 entered into force 6 May 1978) 1546 UNTS 103.

<sup>13</sup> As late as 1970 it was still assumed that impacts would be local. See, for example, Joint IMCO/FAO/UNESCO/WMO Group of Experts on the Scientific Aspects of Marine Pollution 'Report of the Second Session' 1970 GESAMP II/11.

land-based sources again was unsurprising given that these were the areas where the impacts of land-based sources were first noticed. The Baltic Sea in particular suffered greatly, in part as a result of its geography and in part as a result of a significant pollutant load. As a result the transboundary effects of marine pollution from land-based sources were more obvious in these areas than in others. Pollution from shipping on the other hand did, more obviously, raise problems akin to transboundary issues. Whilst, many of the effects of that pollution were felt within coastal areas and thus the coastal State might wish to legislate, the ships causing the pollution could of course be registered in another State and that State might have less insight into the needs for particular forms of regulation in particular areas, or be less willing to address it than coastal States would be. There was, therefore, a more obvious need to establish global rules for the regulation of shipping to prevent harm to State interests.

Another source of pollution that was an early recipient of attention from the international community is pollution from dumping. Again the international community's attention was focussed on this form of pollution as a result of certain significant pollution events. For example, the discovery of very high levels of arsenic in Baltic waters was traced to the dumping of about 7,000 tons of arsenic in the 1930s.<sup>14</sup> Staying in the Baltic, Danish fishermen were burned by fish contaminated by mustard gas dumped following World War II. Again these types of incidents raised questions of State responsibility for harm to others whether through transboundary impacts or through harm to shared interests or through injury to nationals as in the case of the Danish fishermen. The response of the international community was to develop international regulation in the form of the London Convention (LC)<sup>15</sup> and the regional Oslo Convention.<sup>16</sup>

This brief review of the historical development of the law indicates that scientific understanding played a role in the development of these treaties, but that other interests have also proved influential. In particular it appears that the regimes developed primarily in response to perceived harm to State interests rather than in response to harm to the environment *per se*.

### Current Legal Regime

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<sup>14</sup> O. Shachter and D. Serwer 'Marine Pollution Problems and Remedies' (1971) 65 AJIL 65.

<sup>15</sup> Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (adopted 29 December 1972 entered into force 30 August 1975) 1046 UNTS 138.

<sup>16</sup> Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft (adopted 15 February 1972 entered into force 7 April 1974) 973 UNTS 3.

In relation to marine pollution, as in the law of the sea generally, the LOSC provides the framework that holds together the current regulatory regime and the provisions of Part XII are largely accepted as reflecting customary international law and in effect provide content to the requirement to act with due diligence.<sup>17</sup> The LOSC contains the general obligations that apply to the control of marine pollution across all areas and sources as well as elaborating on those obligations through measures tailored to individual sources and zones. As in other areas, the LOSC does not provide a great deal of detail, rather it establishes the basic obligations and jurisdictional framework for coastal, flag and port States. This approach was adopted for a number of reasons: the third United Nations conference on the law of the sea was not ideally suited to the elaboration, or the necessarily regular updating of the technical rules that marine pollution demands. Moreover, it was possible for the LOSC to draw upon existing treaties aimed at the control of many sources of marine pollution, and to draw in specialized bodies with the ability to update rules on a regular basis. Thus the LOSC has the potential to unify disparate pollution control regimes, but it also leaves open the possibility of fragmentation within the law on marine pollution.

### General Obligations

The primary obligation placed on States by Part XII of the LOSC is ‘to protect and preserve the marine environment’.<sup>18</sup> This provision is balanced by the right of States to exploit their resources,<sup>19</sup> and by the obligation not to unduly interfere with other States’ activities when regulating polluting activities<sup>20</sup> but, in the context of Part XII of the LOSC, these latter obligations are designed to be subordinate provisions.

The general obligation of Article 192 is elaborated upon in subsequent Articles beginning with Article 194(1), which provides that:

States shall take, individually or jointly as appropriate, all measures consistent with this Convention that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their capabilities, and they shall endeavour to harmonize their policies in this connection.

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<sup>17</sup> The ITLOS Seabed Disputes Chamber recognised the need for due diligence in protecting the environment as a rule of customary international law: Advisory Opinion on the *Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area* Case No, 17 February 2011 para 131. Given that the majority of the provisions of LOSC are accepted as customary international law, custom is not discussed further in this section.

<sup>18</sup> LOSC, article 192.

<sup>19</sup> LOSC, article 193.

<sup>20</sup> LOSC, article 194(4).

Art 194(2) goes on to reiterate the general obligation not to cause harm by pollution to areas beyond the control of the individual State concerned. Article 192 is also supported by the obligation not to transfer damage or harm from one area to another or to transform pollution from one type to another.<sup>21</sup>

These provisions raise some points that are worth noting. The first is that the standard that States are to meet in controlling pollution is not a fixed standard but a relative one. It takes account both of best practice and of the differential abilities of States to tackle marine pollution. This simple device allows the standard of control required of States to develop across time. By referring to best practicable means it takes account of developments in techniques and mechanisms to control, reduce or eliminate pollution and by taking account of the variation in capacities of States to address pollution it ensures that progress in the development of controls etc. is not delayed by the requirement to advance at the pace of the slowest while at the same time avoiding placing impossible burdens upon States that have more limited capacity to address pollution. This type of obligation is also found in other treaties that address marine pollution. For example, the Helsinki Convention (which brings together developed States and States with economies in transition) requires parties 'to prevent and eliminate pollution of the Baltic Sea Area from land-based sources by using, *inter alia*, Best Environmental Practice for all sources and Best Available Technology for point sources.'<sup>22</sup>

Secondly, the obligations found in Article 194 relate to conduct rather than result. That is, it appears that the final decision on how to meet these obligations is left to individual States, or more particularly, to the regulatory agencies charged with implementing the LOSC.<sup>23</sup> In this way these obligations give 'priority to the source state's right to authorize an activity, and, as a result, the rights of states that are possibly affected by the activity are set to the background.'<sup>24</sup> It would, however, be inappropriate to characterise these obligations as completely open-ended. Article 194 and the subsequent provisions in Part XII add more detail to the general provisions, in particular, they aim at ensuring consistency in the control of pollution through requiring States to try to harmonize their policies (Article 194) and to cooperate at the regional and global level (as appropriate) to develop international rules, standards, practices and procedures to address marine pollution (Article 197). The obligation to cooperate, which has been described by ITLOS in the MOX Plant case as 'a

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<sup>21</sup> LOSC, article 195.

<sup>22</sup> Convention on the Protection of the Marine Environment of the Baltic Sea (adopted 9 April 1992 entered into force 17 January 2000) 2099 UNTS 195 (Helsinki Convention) Article 6.

<sup>23</sup> E.A. Kirk, K. Sherlock, & A.D. Reeves, 'SUDS law: non-state actors and the haphazard route to implementation of international obligations' (2004) 4 Non-State Actors and International Law 87.

<sup>24</sup> I. Plakokefalos 'Prevention Obligations in International Environmental Law' (2012) 23 Yearbook of International Environmental Law 3, 36.

fundamental principle in the prevention of pollution of the marine environment',<sup>25</sup> is further developed through obligations to cooperate in the production and implementation of contingency plans (Article 199) and in scientific research in relation to marine pollution (Article 200). This latter obligation is particularly significant in that the LOSC also provides that the data acquired through the research conducted under Article 200 should be used to form the basis of the rules and standards etc. to be adopted under Part XII (Article 201). In this way then the LOSC not only sets out the primary obligations for addressing marine pollution, but it also puts in place a process for developing the law, which follows the principles of adaptive management and which indicates that scientific understanding is to provide the primary basis for that development. These adaptive management processes are given further shape through the obligation to conduct environmental impact assessments (Article 206) where it is thought that activities may be harmful to the environment and through the obligation to monitor and report on existing activities (Articles 204 and 205).

The adoption of these adaptive management techniques in the LOSC originally passed without much comment. It has only been with the general trend towards proceduralisation in international environmental law that the import of these provisions is beginning to be fully realised. The MOX Plant and Paper Mills<sup>26</sup> Cases combined with the adoption of the Espoo Convention<sup>27</sup> played significant roles in changing perceptions of the importance of these provisions, but the change is also reflected in the growing number of instruments incorporating these types of obligations. A requirement to conduct an EIA is found particularly in regional treaties and protocols addressing land-based sources of marine pollution.<sup>28</sup>

These sorts of procedural obligations help address shortcomings in understanding or in regulations by providing an opportunity to ensure that the data upon which decisions are based is as accurate and complete as possible. The conduct of an EIA, for example, helps demonstrate that a State has done all that is required to meet the test of due diligence in endeavouring to avoid harm to other States or to areas beyond national jurisdiction and that it has or will apply best available techniques or processes to control pollution. It also enables States to meet the requirement to cooperate with others through the sharing of information as part of the EIA process. These provisions thus enabled

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<sup>25</sup> MOX Plant Case (Ireland v. United Kingdom) (Request for Provisional Measures) (2002) 41 ILM 415 para 82.

<sup>26</sup> Pulp Mills on the River Uruguay (Argentina v. Uruguay) ICJ 20 April 2010.

<sup>27</sup> Convention on Environmental Impact Assessment in a Transboundary Context (adopted 25 February 1991 entered into force 10 September 1997) 1989 UNTS 309 as amended.

<sup>28</sup> See, for example, Regional Convention for the Conservation of the Red Sea and Gulf of Aden (adopted 1982 entered into force 20 August 1985) <[www.persga.org/Documents/Doc\\_62\\_20090211112825.pdf](http://www.persga.org/Documents/Doc_62_20090211112825.pdf)> accessed 16 February 2014 Article XI; Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Western Indian Ocean (adopted 31 March 2010 not yet entered into force) <[www.unep.org/NairobiConvention/The\\_Convention/index.asp](http://www.unep.org/NairobiConvention/The_Convention/index.asp)> accessed 16 February 2014.

the States negotiating the LOSC to sidestep the need for detailed provisions while ensuring that the standards adopted in the LOSC had meaningful content and that environmental considerations are taken into account in the appropriate contexts. The focus on process is also in keeping with customary international law: the law on State responsibility also impose obligations of conduct rather than result.

In addition to the procedural obligations outlined above, more specific obligations and powers are provided in Sections 5 and 6 of Part XII. These are examined in more detail in the following source specific sections, but one aspect germane to all is discussed here first. States are required to take the internationally agreed rules *etc.* adopted in line with Section 5 of Part XII as the starting point for their own regulation (Articles 207-212). This requirement has as an effect the creation of a network of treaty obligations drawing together treaties adopted prior to the LOSC entering into force and those agreed subsequent to it. This, at the time, rather innovative approach to law-making made it easier for States to accept the general principles in relation to marine pollution while leaving room for the development of the detailed regulations and standards as States become aware of new forms of pollution or new ways of reducing, controlling or preventing it, or simply become more willing to accept the adoption of more detailed regulations. There are, however, two key issues with this approach.

In certain areas, in particular the control of marine pollution from land-based activities, the internationally agreed rules are somewhat lacking. All that exists at the global level are soft law instruments. In these areas then it appears that States retain considerable discretion unless globally applicable international rules can be gleaned from elsewhere. One possibility is that they are to be found in common terms in other treaties, such as the regional seas conventions. A second option is that the global soft law provisions can be treated as internationally agreed rules or standards for the purposes of Part XII of the LOSC. The LOSC does not make it clear which internationally agreed rules are to be applied in this area, or in other areas of marine pollution, nor does it make clear when it can be said that international rules have been agreed. For example, if a global treaty is agreed in relation to the control of pollution from shipping, one must decide whether the very fact of concluding the treaty means that rules have been agreed, or whether agreement comes on entry into force of the treaty, or if it can be said to arise when a certain percentage of the world's shipping States have joined the agreement, or a certain percentage of the world's shipping tonnage is represented through membership of the treaty, or if indeed the rules must be accepted as customary international law. While these issues may be (and in some areas have been) resolved in

practice in relation to the laws on particular sources,<sup>29</sup> the potential of disputes as to the precise international rules to apply always remains<sup>30</sup> and so too does the potential for fragmentation.

The use of the phrase “internationally agreed rules” as part of the LOSC provisions also leaves new activities and forms of pollution unregulated at the international level until specific agreements are entered into to address them, meaning States retain discretion as to how to address these sources of pollution until rules are agreed. This (retrospective) approach to regulation is not surprising given that the precautionary approach was only really introduced in international law in the 1990s.<sup>31</sup> At the time the LOSC was being negotiated it was almost inevitable that any form of wording used in the Convention would leave gaps that would have to be addressed by subsequent agreements. It is, however, worth noting that the discretion left to States is of course limited by the general obligations upon States to take all necessary measures to control, reduce and prevent pollution. Their freedom of action is therefore somewhat curtailed compared to the position prior to the adoption of the LOSC when rights to control pollution were accompanied by only limited, or vague obligations to take preventive measures. The provisions of Part XII of the LOSC do therefore change the tenor of the law from permissive to restrictive, but the problem of gaps in the law does remain a real one.

The mechanism of linking the LOSC to other treaties whilst contributing to the problem of unregulated issues also contains a potential solution to it, which is additional to the solution of creating new treaty regimes or rules to deal with specific problems. The links the LOSC creates with different treaties have allowed the import of new approaches and principles into the LOSC regime as a whole. For example, the precautionary approach was introduced to the regulation of dumping at sea through the 1992 OSPAR Convention<sup>32</sup> and the 1996 Protocol to the London Dumping Convention.<sup>33</sup> It is now also reflected in certain provisions addressing vessel source pollution, for example, the Convention on the Control of Harmful Anti-Fouling Systems on Ships,<sup>34</sup> which addresses the use of tributyl tin as an anti-fouling agent, and the International Convention for the

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<sup>29</sup> In shipping, for example, the IMO Conventions are generally accepted as providing the relevant rules, see for example, Tan (n.10), in relation to dumping the London Convention and its 1996 Protocol are generally accepted as providing the global rules. See, for example, R. Rayfuse, M.G. Lawrence and K.M. Gjerde ‘Ocean Fertilisation and Climate Change: The Need to Regulate Emerging High Seas Uses’ (2008) 23 Int’l J. Marine & Coastal L. 297.

<sup>30</sup> See, for example, *MOX Plant* (n25).

<sup>31</sup> N. de Sadeleer *Environmental Principles From Political Slogans to Legal Rules* (Oxford University Press 2005).

<sup>32</sup> Convention for the Protection of the Marine Environment of the North-East Atlantic (adopted 22<sup>nd</sup> September 1992, entry into force 27 March 1998) 2354 UNTS 67

<sup>33</sup> (Adopted 7 November 1996 entered into force 24 March 2006) (1997) 36 ILM 1 (1996 Protocol).

<sup>34</sup> IMO Doc. AFS/CONF.26 (2001) (Adopted 5 October 2001 Entered into force 17 September 2008).

Control and Management of Ships' Ballast Water and Sediments.<sup>35</sup> It may then become possible to conclude that the precautionary approach is an internationally agreed rule applicable to both dumping and vessel source pollution. It may also be or become possible to conclude that the approach is applicable across the regulation of marine pollution as a whole. The mechanism of linking the LOSC to other treaties may also allow other principles and approaches to be diffused through the LOSC framework.

There is, however, a further point that arises from the reliance on a raft of external treaties to provide the detailed legal regime. While provisions such as those providing for EIA point to a potentially significant role for scientific understanding in the development of the law, its role is not guaranteed. The role science plays is instead dependent upon the approach taken in the specific treaty regimes addressing different sources of pollution. Thus the role of science may vary across different areas of marine pollution law.

#### Sources Specific Obligations<sup>36</sup>

##### Land-based Sources and Activities

The provisions in the LOSC represent the first real step in regulating marine pollution from land-based sources and activities (MPLBS/A). Despite the fact that this source has been recognised as the most significant source of marine pollution for several decades,<sup>37</sup> in that around 70% of marine pollution emanates, directly or indirectly, from land-based activities, it has received the least attention in terms of international regulation. Prior to the LOSC, it was addressed as a form of marine pollution only at the regional level and then only by two treaties: the Helsinki Convention 1974 and the Paris Convention 1974. Atmospheric pollution was addressed only in 1979 through the Convention on Long-range Transboundary Air Pollution.<sup>38</sup> The LOSC in itself does not appear,

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<sup>35</sup> IMO Doc. BWM/CONF/36 (2004) (adopted February 2004 not yet in force) (Ballast Water Convention).

<sup>36</sup> This section focuses largely on three of the six sources named in LOSC. Pollution from seabed activities and activities in the Area are not addressed as there are limited international rules in these areas which makes drawing clear conclusions on the role of science difficult. Atmospheric pollution is included to some degree in the discussion of land-based sources and activities, though the discussion is by no means comprehensive. Many of the treaties on atmospheric pollution have a wider remit than simply preventing pollution of the marine environment. It is therefore much harder on the whole to tie their development to events or to scientific developments relating specifically to the seas and for that reason they are not discussed here.

<sup>37</sup> See for example GESAMP Report 'On the State of the Marine Environment' 1990 Report No 39.

<sup>38</sup> (Adopted 13 November 1979 entered into force 16 March 1983) 1302 UNTS 217.

however, to significantly develop the law. It simply requires coastal States to adopt legislation and regulations and take all necessary measures to reduce, control and prevent MPLBS/A taking account of international rules and standards (Article 207). States are also called upon to harmonise their national measures at regional level and to 'endeavour' to agree regional and global standards, rules and recommended practices and procedures. Coastal States are also given enforcement jurisdiction over this form of marine pollution under Article 213. There is no further detail provided as to the content of the global or regional rules to be adopted, nor as to the content of the national law. The fact that coastal States are required only to *take account* of international rules and standards leaves a great deal of discretion to adopt stricter or indeed weaker national or regional provisions.

These measures are, however, supported by certain global 'rules' found in the 1995 Washington Declaration and Global Programme of Action on Protection of the Marine Environment from Land-Based Activities (GPA).<sup>39</sup> The GPA establishes a significant role for science at the heart of three levels of adaptive management regimes. Operative paragraph 77 of the GPA provides for review of implementation and ensures an exchange of information and data from research both on pollutant sources and impacts and on regulatory techniques to address this source of marine pollution at the global level. At the regional and national levels States are encouraged to adopt appropriate measures, plans or programmes of action and to review these through processes involving monitoring, review and revision of the measures. And at each level these processes are being used.

For example, at the global level, the GPA identifies priority issues for attention by drawing upon scientific understanding. Of these priority areas two have been addressed through global treaties: persistent organic pollutants addressed in the Stockholm Convention on Persistent Organic Pollutants 2001<sup>40</sup> (POPS Convention) and mercury addressed in the Minamata Convention on Mercury 2013.<sup>41</sup> Though neither of these conventions is focussed solely on pollution of the marine environment, they do both control these forms of pollution from land-based activities. Other sources have also received attention at the global level with wastewater discussed in the Millennium Declaration<sup>42</sup> and the Johannesburg Plan of Implementation<sup>43</sup> and litter now receiving attention,<sup>44</sup> but discussions in these areas have yet to give rise to conventions.

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<sup>39</sup> UN Environment Programme Washington Declaration on Protection of the Marine Environment from Land-Based Activities (adopted 5 December 1995) UNEP(OCA)/LBA/IG.2/6; UN Environment Programme Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (adopted 5 December 1995) UNEP(OCA)/LBA/IG.2/7.

<sup>40</sup> (Adopted 22 May 2001 entered into force 17 May 2004) 2256 UNTS 119.

<sup>41</sup> (Adopted 10 October 2013 not yet in force)

<[www.unep.org/Documents.Multilingual/Default.asp?DocumentID=97&ArticleID=1504&I=en](http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=97&ArticleID=1504&I=en)> accessed 16 February 2014.

<sup>42</sup> UNGA Res 55/2 (18 September 2000) UN Doc A/RES/55/2.

At the regional level the impact of the GPA can be seen in the fact that of the eighteen regional seas only the Antarctic and Pacific Region do not have programmes that address this form of marine pollution. All others contain measures that reflect the priorities of the GPA. For example, all of the programmes and plans addressing MPLBS/A contain and indeed start from the premise that monitoring is essential. It is used as a first step to developing plans or programmes (such as the Black Sea, Caspian Sea, and Southeast Pacific)<sup>45</sup> and as a means of monitoring or strengthening the implementation of existing plans or programmes. The monitoring that has taken place under the programmes of action has informed the development of revised programmes and plans of action across time. For example, the East Asian Regional Sea's 2000 Vision and Plan of Action<sup>46</sup> ties monitoring to a database network to be established under the action plan. This network was first suggested in the 1994 action plan.<sup>47</sup>

What we see then in relation to the MPLBS/A is both the development of norms through an adaptive management process and the apparent acceptance of those soft law 'rules' adopted under the GPA, together with the provisions of the POPs and Mercury Conventions as the international rules and standards to be applied under Part XII of the LOSC. These developments in the law also signify a move away from the traditional prompts for development in the law. Whereas the early history of the law on marine pollution has been one of response to significant incidents, it is much harder to link single incidents to the development of the POPs and Mercury Conventions. What has prompted the development of these conventions, however, is an understanding of how dangerous POPs and mercury are for both human health and the environment. The current focus on litter and

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<sup>43</sup> World Sustainable Development Summit, Plan of Implementation, (4 September 2002) UN Doc A/CONF.1999/20, Res 2.

<sup>44</sup> See UN Environment Programme Manila Declaration on Furthering the Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (26 January 2012) UNEP/GPA/IGR.3/CRP.1/Rev.1; the Honolulu Commitment (20-25 March 2011) <<http://5imdc.files.wordpress.com/2011/03/honolulucommitment.pdf>> accessed 16 February 2014; and the UN Environment Programme Honolulu Strategy: A Global Framework for Prevention and Management of Marine Debris (20-25 March 2011) <<http://5imdc.wordpress.com/about/commitment/>> accessed 16 February 2014 (Honolulu Strategy).

<sup>45</sup> See the Commission on the Protection of the Black Sea Against Pollution 'Plan for the Environmental Protection and Rehabilitation of the Black Sea' Adopted in Sofia, Bulgaria, 17 April 2009 <[www.blacksea-commission.org/bssap2009.asp](http://www.blacksea-commission.org/bssap2009.asp)> accessed 16 February 2014 Introduction; <[www.caspianenvironment.org/newsite/Activities-SAP-TDA.htm](http://www.caspianenvironment.org/newsite/Activities-SAP-TDA.htm)> accessed 16 February 2014; <[www.cpps-int.org](http://www.cpps-int.org)> accessed 16 February 2014.

<sup>46</sup> Regional Programme of Action for the Protection of the Marine Environment of the East Asian Seas from the Effects of Land-based Activities '2000 Vision and Plan of Action' (UNEP 2000).

<sup>47</sup> UNEP 'Action Plan for the Protection And Sustainable Development of the Marine And Coastal Areas Of The East Asian Region' UNEP(OCA)/EAS IG5/6 Annex IV 3.

wastewater again indicates that priorities are being set based on the impact on the environment and human health, rather than as a result of single, high profile events.

### Dumping

The regulation of dumping presents an unusual story in terms of the role of science. The LOSC provides quite simply that States are to adopt laws and measures 'to prevent, reduce and control pollution of the marine environment by dumping' (Article 210 (1) and (2)) and that these laws and measures are to be 'no less effective' than global rules and standards. (Art 210 (6)). The content of the regime then depends upon those global rules and standards. They are to be found in the LC as amended by its 1996 Protocol, which is supported by regional seas agreements, such as the OSPAR Convention, the protocol to the Barcelona Convention,<sup>48</sup> and the Black Sea Convention,<sup>49</sup> which contain similar provisions. For the purposes of this discussion the 1996 Protocol to the LC is focused upon. The Protocol introduces an adaptive management approach to dumping by providing for monitoring of the state of the sea by States that issue permits. It also provides for review and updating of the Protocol by the Meeting of Parties following reports by States of the data acquired on the state of the marine environment and data from reviews of the effectiveness of measures taken to implement it. The importance of basing regulation upon sound science is also reflected in the requirements to prioritise scientific research and the sharing of data from such research under Article 14. In addition, the Protocol requires States to follow a particular decision-making process which is akin to carrying out an EIA and in which prescribed factors are to be taken into account. Similar provisions are found in some of the regional seas agreements addressing dumping, such as the 1995 amendments to the Dumping Protocol to the Barcelona Convention.<sup>50</sup> All of this suggests that scientific understanding should play a key role in the development of the law. The history of development of the law in this area points, however, to a different conclusion, which is that scientific understanding on the impacts of dumping of material at sea is sometimes overshadowed by other considerations. This conclusion is also supported by some recent developments in this area, which have taken place under the 1996 Protocol regime.

The international rules in operation at the time that the LOSC was introduced were contained in the LC which largely permitted dumping. Some key steps in tightening those rules came about not

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<sup>48</sup> Protocol for the Prevention of Pollution in the Mediterranean Sea by Dumping from Ships and Aircraft < (adopted 16 February 1976 entered into force 12 February 1978) 1102 UNTS 27.

<sup>49</sup> Convention on the Protection of the Black Sea Against Pollution (adopted 21 April 1992 entered into force 15 January 1994) 1764 UNTS 3.

<sup>50</sup> See <[www.unepmap.org](http://www.unepmap.org)> accessed 16 February 2014.

directly as a result of scientific evidence, but rather as a result of campaigns by NGOs in the 1980s and 1990s. First, the actions of the International Transport Federation and the U.K. National Union of Seamen in 1983 preventing dumping of radioactive wastes at sea paved the way for a ban on such activity.<sup>51</sup> Secondly, the actions of Greenpeace influenced the adoption of the 1996 Protocol to the LC. The key change in the law introduced by the 1996 Protocol was a move from a largely permissive approach to dumping under which States were free to dump all materials that were not expressly prohibited (under the LC), to a largely restrictive approach with dumping prohibited for all materials save those that are expressly permitted (under the 1996 Protocol). This move did to some degree reflect growing scientific understanding of the dangers posed by the dumping of materials at sea, but the provisions went further **than some sections of the scientific community believed** necessary at the time they were adopted.<sup>52</sup> The motivation for adopting more stringent requirements was largely political with NGOs and the public placing pressure on governments following proposals to dump the Brent Spar oil rig at sea. The argument presented by NGOs and others was that decisions on this type of issue ought to take account of a range of values, not just scientific evidence.<sup>53</sup>

Recent developments under the auspices of the 1996 Protocol also show decisions being influenced by issues other than scientific understanding. For example, scientific understanding has indicated that permitting sequestration of carbon dioxide in the water column or seabed should not be permitted until clear regulations are in place.<sup>54</sup> However, the parties to the LC permitted sequestration in the seabed (though not in the water column) in 2006 prior to ensuring that adequate regulation existed.<sup>55</sup> In this instance the decision appears to have been influenced by the objectives of the climate change regime, rather than being based upon the advice of the scientific community.<sup>56</sup> There are of course examples of other decisions adopted by the Parties to the 1996 Protocol, which do more closely reflect scientific understanding<sup>57</sup> and the examples given here

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<sup>51</sup> S. Charnovitz, 'Two Centuries of Participation: NGOs and International Governance' (1997) 18 Michigan Journal of International Law 183, 264

<sup>52</sup> Alan Sielen, 'The New International Rules on Ocean Dumping: Promise and Performance' (2008-09) 21 Geo Int'l Env't'l L Rev 295.

<sup>53</sup> E.A. Kirk, 'Marine Governance, Adaptation and Legitimacy' (2012) 22 Ybk IEL 110.

<sup>54</sup> International Panel on Climate Change, 'Special Report on Carbon Dioxide Capture and Storage' (Cambridge University Press 2005) at para 5.7.3, which points to the need for concrete standards to ensure the safe storage of carbon dioxide. See also the 'Summary for Policy Makers' at para. 25.

<sup>55</sup> Resolution LP.1(1) on the Amendment to Include CO<sub>2</sub> Sequestration in Sub-Seabed Geological Formations in Annex 1 to the London Protocol 2006 In OSPAR Convention a subtly different approach to disposal of carbon dioxide in the seabed is taken. Parties may not authorize the storage of carbon dioxide in the seabed unless authorizations follow OSPAR standards. See OSPAR Decision 2007/2 on the Storage of Carbon Dioxide Streams in Geological Formations.

<sup>56</sup> See the discussion in Kirk (n. 53).

<sup>57</sup> See, for example, Resolution no. LC-LP.1(2008) on the Regulation of Ocean Fertilization, which was adopted on 31 October 2008.

should not undermine that fact. They are designed instead to highlight the point that although the regime provides for an adaptive management process, which should provide a significant role for science, that role is (and always has been) at times overshadowed by other considerations.

### Vessel Source Pollution

As with MPLBS/A and dumping, the law on vessel source pollution is grounded in the regime established by Part XII of the LOSC. This draws together the obligations found in the various other treaties addressing vessel source pollution. In this role the LOSC is supported by (or perhaps supports) the International Maritime Organisation (IMO), which oversees around 50 treaties. The IMO is not only involved in the development of new treaties and revision of existing ones, but it also adopts recommendations, codes and guidelines on their implementation. In this sense one could say that an adaptive management approach is followed by the IMO through the regular review and updating of treaties such as MARPOL.<sup>58</sup>

A review of the development of treaties and soft law instruments within the IMO indicates, however, that the role of science is not in practice always as significant as one might hope. Instead development is oftentimes influenced by the views of particular States and interest groups as well as being prompted by high profile shipping incidents. For example, environmental groups and States such as Australia (which was particularly affected by invasive species from ballast water) have successfully persuaded others to follow the precautionary approach in adopting the Ballast Water Convention. While the Convention may chime with scientific understanding, the key to its adoption lies in politics not science and this example is not unique. Throughout the history of the law on vessel source pollution science has played, at best, an accompanying role to the role of special interests, be they State interests or the interests of non-State actors.

Beginning with the earliest regulation a significant focus of the law on vessel source pollution appeared to be the protection of coastal State interests rather than the protection of the marine environment per se. Thus, for example the 1969 CLC and the 1971 Fund Convention<sup>59</sup> were adopted.

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<sup>58</sup> International Convention for the Prevention of Pollution by Ships (adopted 2 November 1973) (1973) 12 ILM 1319 as amended by the Protocol of 1978 (adopted 17 February 1978 entered into force 2 October 1982) 1340 UNTS 61 and Amendments to the Annex of the Protocol of 1978 relating to the International Convention for the prevention of pollution from ships, 1973 (Adopted 25 September 1997 entered into force 1 February 1999). MARPOL is in fact kept under constant review by the Marine Environment Protection Committee.

<sup>59</sup> See also 1996 International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (adopted 3 May 1996 not in force) (1996) 35 ILM 1415;

In part this focus reflects the fact that much of the development of the law took place following significant pollution events, such as the *Torrey Canyon*, *Amoco Cadiz*, and *Exxon Valdez* disasters. These all had an obvious impact on the interests of particular coastal States. And indeed the development has continued to follow incidents such as the *Erika* and *Prestige* disasters.<sup>60</sup> Of course other conventions, which had a broader role in protecting the environment were also adopted at an early stage, such as OILPOL, addressing operational pollution, which was superseded by MARPOL.<sup>61</sup> But even these did not always reflect best scientific understanding on how to address marine pollution. For example, although some States recognised the need for ocean wide standards to address vessel source pollution in the 1950s, such standards were not adopted in OILPOL. Instead the provisions focused on protecting coastal areas from oil pollution.<sup>62</sup>

The relative influence of other special interest groups, besides States, can also be seen in the adoption of some new standards, for example, when crude oil washing (COW) was initially accepted as an alternative to segregated ballast tanks its adoption reflected the impact of the oil industry in moderating the standards to be adopted and the adoption of the double hull standard was largely as a result of lobbying by the USA which reflected domestic concerns. The influence of special interests has also been seen in other areas such as in the regulation of anti-fouling systems and control of air pollution from ships.<sup>63</sup> Similarly the impact of competing interest groups can be seen in debates over whether or not to adopt more stringent measures in particularly sensitive sea areas under MARPOL 73/78.<sup>64</sup>

Even within the LOSC the provisions of Part XII to a degree could be described as reflecting the interests of particular groups. The LOSC allocates jurisdiction to each of the three groups of States that may have an interest in shipping – flag, coastal and port States – but the rights of each vary.

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and for a detailed discussion of the treaties on nuclear damage see Birnie, Boyle and Redgwell *International Law and the Environment* (Oxford University Press, 2009) 520 *et seq.*

<sup>60</sup> For example 1969 CLC and 1971 Fund Convention were each amended by protocols adopted in 1984. These were replaced by two further Protocols in 1992 which replaced 1969 CLC and 1971 Fund Convention with new “1992” Conventions: Protocol of 1992 to Amend the International Convention on Civil Liability for Oil Pollution Damage 1969, with Annex and Final Act, (adopted 27 November 1992 Entered into force 30 May 1996) 1956 UNTS 285; Protocol to Amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (Adopted 27 November 1992 Entered into force 30 May 1996) 1953 UNTS 330. See also N. Liu and F. Maes, ‘The European Union and International Maritime Organization: EU’s External Influence on the Prevention of Vessel-Source Pollution’ (2010) 41 *Journal of Maritime Law and Commerce* 581.

<sup>61</sup> MARPOL also contains provisions to prevent or minimise disasters (introducing the double hull standard for tankers, for example).

<sup>62</sup> Tan (n.10) Chapter 3.

<sup>63</sup> *Ibid.*

<sup>64</sup> See C. Purvis, ‘Coastal State Jurisdiction under UNCLOS: The *Shen Neng 1* Grounding on the Great Barrier Reef Comment’ (2011) 36 *Yale J Int’l L* 207.

Thus flag States are to ensure that their laws 'at least have the same effect as that of generally accepted international rules and standards' (Article 211(2)). Port States have no such requirement, nor indeed does there appear to be a limitation on the measures that they may adopt. Coastal States, however, must ensure that any measures they adopt do not impede innocent, or transit passage, or freedom of navigation and that measures relating to the design, construction, manning or equipment of foreign vessels may only be adopted if 'they are giving effect to generally accepted international regulations' (Articles 21) and 'giving effect to applicable international regulations' (Article 42). This formulation of the rights of coastal States is inevitable, given that any alternative approach might hamper global trade through shipping, but it also privileges the interests of shipping rather than of the marine environment save to the extent that coastal States are also port States.

The role played by special interests and significant events in the development of the laws on vessel source pollution points then to less emphasis being placed upon scientific understanding in the development of this area of law than might be anticipated. While it clearly plays a role, it appears to be often times outweighed by other considerations.

## **Conclusions**

A key objective of this chapter was to establish the role that science played and plays in the regulation of marine pollution. What has become clear is that a singular conclusion on that role cannot be given. While it does appear that as a whole the marine pollution regimes are moving towards affording scientific understanding a more significant role, variations exist between the different regimes. The move towards affording science a more significant role is evident in the adoption of an adaptive management approach within the LOSC Part XII and within the relatively new regime to address MPLBS/A. It is also seen in the regime on dumping, and is present to a degree in relation to vessel source pollution. In both dumping and vessel source pollution the role of science appears, however, to be less significant than in relation to MPLBS/A and, instead, the influence of special interest groups or the effects of politics appear to be key to the development of the law. Nevertheless in these areas too we have witnessed a move in the direction of affording scientific understanding more significance with, for example, the adoption of some treaties and measures following a precautionary approach. It seems likely therefore that the role of science will continue to grow in the regulation of marine pollution. There are, however, certain key challenges that are still present and likely to be faced in the future.

The first challenge is to provide greater clarity in relation to certain approaches and obligations. The variations in approach to adaptive management point to the need to develop a clear understanding of what is meant by adaptive management in the context of marine pollution. The regime as a whole would also benefit from further clarification of some obligations. Within the specific regime on MPLBS/A there is a need to clarify the nature of obligations at the international level. For example, consideration is needed of the degree to which the regional treaty regimes combine to establish a clear interpretation of the provisions of Part XII, or to provide customary international law. Similarly, it would be beneficial to have a greater understanding of the degree to which principles and approaches apply across all sources of marine pollution. For example, it is not clear that the precautionary approach is applicable to the law on MPLBS/A, though it quite clearly applies in other areas, such as dumping.

Such clarification may help us address current problem sources such as pollution from plastics. In part the problem that plastics give rise to is one of scale: ever more plastic is finding its way into the ocean whether from land-based sources or from disposal at sea. In part the problem is one that we have seen with other forms of pollution: plastics generally take a long time to break down and cannot be neutralised by the oceans. The inability of the oceans to neutralise plastics leads them to accumulate in, for example, large mid ocean rubbish patches. The results of the pollution include fish being caught in ghost fishing nets<sup>65</sup> and whales killed by eating plastic sheeting from agriculture.<sup>66</sup> As well as raising issues of coordination and integration across regimes, the increasing pollution from plastics raises the question of who will provide a solution to the problem. While the general obligation to prevent, reduce and control pollution requires all States to address pollution from plastics through regulations and enforcement action, and while some measures already exist which give more shape to this obligation,<sup>67</sup> it still leaves the question of how to address pollution that is already in the marine environment. Where plastics accumulate within the EEZ or territorial sea of a State that State may have an incentive to remove the plastic. Where they accumulate on the high seas the incentives for single State action are weaker and so a coordination problem arises. Ongoing efforts to address these issues can be seen in the Honolulu Strategy and the Honolulu Commitment and in the work being done to establish the Global Partnership on Marine Litter. There

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<sup>65</sup> United Nations General Assembly Resolution on Large-scale Pelagic Driftnet Fishing and its Impact on the Living Marine Resources of the World's Oceans And Seas UNGA Res 44/225 (22 December 1989 UN Doc A/RES/44/225.

<sup>66</sup> Giles Tremlett 'Spanish sperm whale death linked to UK supermarket supplier's plastic: Sperm whale on Spanish southern coast had swallowed 17kg of plastic waste dumped by greenhouses supplying produce to UK' Guardian On Line 8 March 2013 <[www.theguardian.com/world/2013/mar/08/spain-sperm-whale-death-swallowed-plastic](http://www.theguardian.com/world/2013/mar/08/spain-sperm-whale-death-swallowed-plastic)> accessed 16 February 2014.

<sup>67</sup> See MARPOL Annex V.

is, however, still the need for considerable development in the regulation of this type of pollution and in particular in the mechanisms to address it. One option might be to adopt a fund approach similar to that operating in relation to vessel source pollution. The resulting fund could then commission companies to remove and recycle any plastics or other materials. In addition pollution from plastics highlights the problems that a responsive approach to pollution gives rise to which include significant accumulation of pollutants in the environment and significant harm to the environment and to State interests before measures are taken to address the problem. Clarifying the measures necessary to implement approaches such as the precautionary approach and adaptive management may help ensure prompt attention to such pollutants before they become particularly problematic.

Secondly, if the current marine pollution regime(s) are to be truly effective in tackling certain current issues then they must be fully integrated with related regimes, such as the climate change regime, the biodiversity regime and fisheries regimes. For example, various measures have been proposed to help mitigate human impact on the climate.<sup>68</sup> Some of these, such as fertilizing the oceans with iron to increase the growth of plankton and so ensure more carbon dioxide is removed from the atmosphere, or sequestering carbon dioxide in the water column or in or on the seabed, are regarded in the marine context as polluting activities. As discussed earlier, these two examples fall under the LC regime and both have been discussed by the parties to the Convention. The parties decided in Resolution no. LC-LP.1 (2008) to treat ocean fertilization as a prohibited dumping activity until scientific research proves its safety following the advice of its scientific group.<sup>69</sup> But ocean fertilization has also been considered by the parties to the Convention on Biological Diversity<sup>70</sup> (CBD) and could equally be considered by the Parties to the UN Convention on Climate Change<sup>71</sup>. As it happens, the Parties to the CBD took a similar approach to that taken by the Parties to the LC, though there are some differences between the two. This example illustrates the possibility of fragmentation in the law. The second example, points to the potentially 'undue' influence of one regime upon another. Although the LC adopts a precautionary approach to dumping, it permitted sequestration in the seabed (though not in the water column) prior to ensuring that an adequate regulatory system was in place contrary to scientific advice. And as noted earlier, the decision appears to have been influenced by the objectives of the climate change regime, rather than being based upon the principles of the LC itself.

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<sup>68</sup> For a fuller discussion see Chapter 34.

<sup>69</sup> See Report of the Conference of the Parties to the Convention on Biological Diversity on the Work of Its Ninth Meeting, UNEP Doc. UNEP/CBD/COP/9/29 (9 October 2008) at 154.

<sup>70</sup> (Adopted 5 June 1992 entered into force 29 December 1993) 1760 UNTS 79.

<sup>71</sup> (Adopted 9 May 1992 entered into force 21 March 1994) 1771 UNTS 107.

Similar challenges are raised by other new technologies and activities. For example, the installation of offshore wind farms may cause disruption to marine life both during the construction phase and through the noise pollution that results from their operation. Tidal power installations may also create noise pollution and cause disruption to species through changing the water flow where they are placed. The need for an integrated approach to decision making is evident here too. In this sense integration may mean both ensuring that decision-making operates in a complementary way across regimes, but also that scientific and other data is shared between regimes. These forms of integration may not on their own, however, be sufficient to ensure the best outcome in managing these potential sources of pollution. It may also be necessary to draw upon tools such as the ecosystem approach in decision-making. Several treaties relating to the marine environment already adopt elements of the ecosystem approach.<sup>72</sup> For example, the LOSC and LC note the need to control pollution to prevent interference with other uses of the seas and to prevent harm to marine life.<sup>73</sup> The LOSC also notes the need to prevent the transfer of pollution from one medium to another<sup>74</sup> and the LC and its 1996 Protocol are designed to address precisely this problem. Similarly the POPs Convention is based on the premise that account should be taken of both the immediate and the long-term environmental impacts of chemicals such as pesticides when deciding on their use. None of the conventions embrace all elements of this approach, however, and so further work is needed to address the question of how best to implement this approach or others designed to ensure integrated decision-making.

It is difficult, when faced with the challenges outlined above, to draw a clear conclusion as to the future of the LOSC. While integrated decision making will be key to managing our oceans, and while the LOSC provides a strong framework to support such decision-making, the influence of the wider regulatory context may significantly impact upon the role that the LOSC is able to play. The examples given suggest that steps are being taken to try to prevent fragmentation, by ensuring that decision-making is integrated both within and across regimes. They also point to the possibility that, at times, the interests and issues governed by the LOSC will be overshadowed by other interests or issues and that where that happens the principles and provisions of the LOSC will become less important in their regulation.

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<sup>72</sup> See UN GA 'Report of the UN Open Ended Informal Consultative Process at its seventh meeting'(17 July 2006) UN Doc GA 61/63

<sup>73</sup> LOSC Article 194 and LC Article I.

<sup>74</sup> LOSC Article 195.