
1. The LOSC regime for protection of the marine environment – fit for the twenty-first century?

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1. INTRODUCTION

The aim of the United Nations Convention on the Law of the Sea (LOSC),² according to its preamble, is to establish ‘a legal order for the seas and oceans which will’, inter alia, ‘promote ... the conservation of their living resources, and the study, protection and preservation of the marine environment’.³ To further these environmental aims, the LOSC dedicates the whole of one of its 13 substantive parts, Part XII, to ‘protection and preservation of the marine environment’, as well as including numerous provisions elsewhere relating to this issue.

The emphasis on the protection of the marine environment in the LOSC presents a striking contrast to the previous attempt to codify the law of sea, the four Geneva Conventions of 1958. The latter had contained only a handful of rather undeveloped provisions on environmental matters. The main reason for this difference is because 14 years after the adoption of the Geneva Conventions, and one year before the start of the Third UN Conference on the Law of the Sea (UNCLOS III), at which the LOSC was negotiated and eventually adopted, the protection of the environment (including the marine environment) was for the first time placed squarely on the political and legal agenda of the international community with the holding of the UN Conference on the Human Environment at Stockholm in 1972.⁴ Thus, the negotiators of the LOSC had before them the Declaration and Action Plan adopted at the Stockholm Conference, as well as the principles adopted in preparation for the Conference by an Intergovernmental Working Group on Marine Pollution.⁵ Furthermore, shortly before and

¹ I would like to thank my colleagues, Elizabeth Kirk and Nengye Liu, and the editor of this book, Rosemary Rayfuse, for their comments on a previous draft of this chapter. The usual disclaimer applies.

² United Nations Convention on the Law of the Sea (adopted and opened for signature 10 December 1982, entered into force 16 November 1994) 1833 UNTS 3. As of 7 January 2015 there were 167 parties to the Convention.

³ LOSC, Preamble, para. 4.

⁴ Provisions on the protection of the marine environment are contained in Principle 7 of the Stockholm Declaration and in Chapter II (Recommendations 70–94) of the Action Plan for the Human Environment, adopted at the Conference, UN Doc. A/CONF.48/14/Rev 1 (1972).

⁵ A/CONF.48/IWGMP.II/5 (1971). Recommendation 92 of the Stockholm Action Plan called on States to endorse the principles ‘as guiding concepts’ for the forthcoming Third UN Conference on the Law of the Sea. See further M.H. Nordquist et al. (eds), *United Nations Convention on the Law of the Sea 1982. A Commentary* (hereafter *Virginia Commentary*), Vol. IV (Martinus Nijhoff 1991) 8–9 and 36–7.

during the early years of UNCLOS III, a number of major treaties relating to the marine environment were adopted. These include the London Dumping Convention, 1972;⁶ the International Convention for the Prevention of Pollution from Ships, 1973 (hereafter the MARPOL Convention);⁷ a number of regional marine environmental treaties, some concluded pursuant to UNEP's Regional Seas Programme (adopted in 1976);⁸ and the first wildlife treaties whose coverage included marine species, such as the Convention on International Trade in Endangered Species (1973) (CITES)⁹ and the Convention on Migratory Species (1979) (CMS).¹⁰

The LOSC is often described as a 'constitution for the oceans'. In accordance with this constitutional nature, the LOSC is perceived politically as being the basic foundation for the whole of the law of the sea and superior to any other treaty concerned with marine matters. Legally, this superiority is reflected in Article 311, which provides that the LOSC prevails over pre-existing treaties inconsistent with it and severely limits the capacity of parties to the LOSC to conclude treaties that modify its provisions *inter se*. This basic constitutional status of the LOSC probably extends to international marine environmental law,¹¹ especially as the LOSC remains the only global treaty to address, in however incomplete a fashion, all matters relating to the protection of the marine environment. In this context it is noteworthy that a number of significant treaties relevant to the marine environment provide that they are to be applied consistently with the LOSC.¹² Furthermore, the LOSC itself provides that obligations assumed by States under other marine environmental treaties 'should be carried out in a manner consistent with the general principles and objectives' of the LOSC.¹³

Nevertheless, while the LOSC may have something of a fundamental status in international marine environmental law, it is not in practice the most important treaty

⁶ 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.

⁷ International Convention for the Prevention of Pollution from Ships (adopted 2 November 1973, entered into force 2 October 1983) 1340 UNTS 62.

⁸ For discussion see Nilufer Oral, 'Forty years of the UNEP Regional Seas Programme: from past to future', Chapter 16 in this volume.

⁹ Convention on International Trade in Endangered Species of Wild Fauna and Flora (adopted 3 March 1973, entered into force 1 July 1975) 993 UNTS 243.

¹⁰ Convention on the Conservation of Migratory Species of Wild Animals (adopted 23 June 1979, entered into force 1 November 1983) 1651 UNTS 333.

¹¹ This position is also taken by M.L. McConnell and E. Gold, 'The Modern Law of the Sea: Framework for the Protection and Preservation of the Marine Environment' (1991) 23 *Case Western Reserve Journal of International Law* 83, 84 and 98.

¹² See, for example, the London Dumping Convention, Art. XII; the MARPOL Convention, Art. 9(2); the CITES Convention, Art. XIV(6); the CMS Convention, Art. XII(1); and the Convention on Biological Diversity (adopted 5 June 1992, entered into force 29 December 1993) 1760 UNTS 79, Art. 22(2).

¹³ LOSC, Art. 237(2). Note, however, that Art. 237(1) provides that the provisions of Part XII are 'without prejudice to the specific obligations assumed by States under special conventions and agreements concluded previously which relate to the protection and preservation of the marine environment and to agreements which may be concluded in furtherance of the general principles set forth in this Convention'.

for protecting the marine environment, as will become evident in later chapters in this book. That is because much of the LOSC dealing with the protection of the marine environment, like a good deal of the rest of the LOSC, is of a framework nature and contains few detailed norms of environmental protection. There are a number of reasons why this is so. First, because the LOSC aims to settle 'all issues relating to the law of the sea',¹⁴ it could not provide detailed provisions on every issue without becoming excessively long and unwieldy. Second, if the LOSC had provided detailed provisions on all questions relating to the protection of the marine environment, many of them (especially those concerning the prevention of pollution) would have become rapidly out of date as the need for higher standards of protection became apparent¹⁵ and the desirability of measures to address newly perceived environmental problems became evident.¹⁶ Third, it was in any case not necessary to have detailed provisions on some matters (such as dumping and pollution from ships) because, as noted above, detailed treaties addressing those matters already existed.

The aim of this chapter is not to provide a systematic and detailed analysis of the provisions of the LOSC relating to the protection of the marine environment. That has been done before by others,¹⁷ and in any case lack of space would preclude such an exercise here. Instead, this chapter will try to assess the value of the LOSC today, more than 30 years after its adoption in 1982, and for the years ahead. It does so in two ways. First, it asks how the LOSC would compare with an ideal general treaty on protection of the marine environment that might be drawn up now. Second, the chapter tries to determine the effect and influence that the marine environmental provisions of the LOSC have had on the practice of States and international organizations since its adoption. Some might object that the first of these aims involves an unreasonable and unfair comparison because international environmental law has developed so much since 1982: one cannot expect the LOSC to have anticipated future developments. That, of course, is true; and might therefore lead to the conclusion that the LOSC had become outdated as far as protection of the marine environment was concerned. However, such a conclusion would be premature. The framework nature of the LOSC means that it does not contain a detailed set of norms frozen in time. Furthermore, it has evolved to a degree since its entry into force in 1994. While it lacks a mechanism

¹⁴ Preamble of the LOSC, para. 1 (emphasis added).

¹⁵ Cf. the way in which MARPOL and the London Dumping Convention have been frequently amended and updated: see further Henrik Ringbom, 'Vessel-source pollution', Chapter 5 in this volume, and David L. VanderZwaag, 'The international control of ocean dumping: navigating from permissive to precautionary shores', Chapter 6 in this volume.

¹⁶ Examples of such problems include global climate change and its consequences for the marine environment (on which see section 6 of this chapter below), and the existence and significance of deep sea environments, such as seamounts, cold-water coral reefs and hydro-thermal vents, together with their associated ecosystems and biodiversity.

¹⁷ See, for example, the *Virginia Commentary*, above n 5, especially Vol. IV; K. Hakapää, *Marine Pollution in International Law* (Suomalainen Tiedeakatemia 1981); D.M. Johnson (ed.), *The Environmental Law of the Sea* (IUCN 1981); and Y. Tanaka, *The International Law of the Sea* (2nd edn, Cambridge University Press 2015) chapters 7–9.

resembling the conference or meeting of the parties that many multilateral environmental agreements have in order to drive those agreements normatively forward,¹⁸ it does have various means of development.¹⁹ These include, inter alia, the conclusion of implementation agreements (two have so far been concluded, and there is now the possibility of a third, as explained below); the adoption by the ISA of regulations for mining in the Area (i.e. the seabed beyond the limits of national jurisdiction); the adoption of resolutions by the UN General Assembly in response to the UN Secretary-General's reporting functions under Article 319(2)(a) of the LOSC; and the interpretation of the LOSC by international courts and tribunals.²⁰ Examples of the use of all of these means will be given below.

The structure of this chapter is to look in turn at each of those matters with which, it is suggested, an ideal contemporary general marine environmental treaty would deal, and to consider how, if at all, the LOSC addresses them. Insofar as it does address them, some comment will be made about the adequacy and practical effect of the LOSC provisions in question. The issues to be considered are: (1) principles for marine environmental policy-making and legislation; (2) the conservation of species; (3) the protection of habitats (which together with (2) broadly equates to the conservation of marine biodiversity); (4) the prevention of marine pollution; and (5) climate change.

2. PRINCIPLES FOR MARINE ENVIRONMENTAL POLICY-MAKING AND LEGISLATION²¹

Many of the more recent regional agreements for the protection of the marine environment contain a range of principles to guide States and international organizations when engaged in making policy and legislating to protect the marine

¹⁸ The LOSC parties do meet annually, but their role is limited to overseeing the three institutions created by the LOSC (the Commission on the Limits on the Continental Shelf, the International Tribunal for the Law of the Sea (ITLOS) and the International Seabed Authority (ISA)). There has been resistance to giving those meetings any greater role. See further T. Treves, 'The General Assembly and the Meeting of States Parties in the Implementation of the LOS Convention' in A.G. Oude Elferink (ed.), *Stability and Change in the Law of the Sea: The Role of the LOS Convention* (Martinus Nijhoff 2005) 55. On the role of conferences/ meetings of the parties of multilateral environmental agreements, see, inter alia, J. Brunée, 'COPing with consent: Law-Making under Multilateral Environmental Agreements' (2002) 15 *Leiden Journal of International Law* 1; and R. Churchill and G. Ulfstein, 'Autonomous Institutional Arrangements in Multilateral Environmental Agreements: A Little Noticed Phenomenon in International Law' (2000) 94 *American Journal of International Law* 623.

¹⁹ See further A.E. Boyle, 'Further Development of the 1982 Law of the Sea Convention: Mechanisms for Change' (2005) 54 *International and Comparative Law Quarterly* 563.

²⁰ One could add the amendment procedures of the LOSC to this list, but they are widely considered too cumbersome to be useful: see, for example, D. Freestone and A.G. Oude Elferink, 'Flexibility and Innovation in the Law of the Sea: Will the LOS Convention Amendment Procedures ever be used?' in Oude Elferink, above n 18, 180–3.

²¹ See further Yoshifumi Tanaka, 'Principles of international marine environmental law', Chapter 2 in this volume.

environment.²² One would expect the ideal contemporary marine environmental treaty posited above to do the same. As far as the LOSC is concerned, it does contain some such principles but they are somewhat limited, for reasons that will be explained. The principles that one might expect an ideal treaty to contain would include the following.²³

2.1 Prevention of Environmental Harm Principle

A version of this principle is found in Article 194(2) of the LOSC. It requires States to 'take all measures necessary to ensure that activities under their jurisdiction or control are so conducted as not to cause damage by pollution to other States and their environment, and that pollution arising from incidents or activities under their jurisdiction or control does not spread beyond the areas where they exercise sovereign rights in accordance with this Convention.' Article 194(2) is similar to Principle 21 of the 1972 Stockholm Declaration,²⁴ which has been described as a 'statement of contemporary international law',²⁵ but is more limited because it covers only 'damage by pollution' whereas Principle 21 refers to damage without qualification as to the type of damage. It is not clear what practical impact Article 194(2) has had on the practice of States.

2.2 Environmental Impact Assessment

Although the phrase 'environmental impact assessment' is found nowhere in the LOSC, Article 206 provides for such assessment in all but name. It requires States that 'have reasonable grounds for believing that planned activities under their jurisdiction or control may cause substantial pollution of or significant and harmful changes to the marine environment' to assess, 'as far as practicable, ... the potential effects of such activities on the marine environment' and either to publish the results of such assessments or provide reports to 'the competent international organizations', which should make such reports available to all States. Article 206 is more limited than some other treaties requiring environmental impact assessment as it requires an assessment

²² See R.R. Churchill and A.V. Lowe, *The Law of the Sea* (3rd edn, Manchester University Press 1999) 335–7. See also the references in Tanaka, Chapter 2 in this volume.

²³ The list of principles discussed here, which is longer than that in Chapter 2, is based on P. Sands and J. Peel, *Principles of International Environmental Law* (3rd edn, CUP 2012), Chapter 6. The authors of texts on international environmental law differ in the principles they enumerate. Thus, the list of principles discussed here is neither necessarily complete nor one that would command universal support. Other principles that might have been considered are the principle of public participation and transparency and the principle of common but differentiated responsibility. The former is less relevant to a framework treaty like the LOSC than environmental treaties that provide for concrete norms to be revised and developed by an international organization or conference/meeting of the parties. The principle of common but differentiated responsibility is considered briefly below (see text at notes 104 and 105) and is also discussed in Tanaka, Chapter 2 in this volume.

²⁴ See above n 4.

²⁵ P. Birnie, A. Boyle and C. Redgwell, *International Law and the Environment* (3rd edn, OUP 2009) 145.

only 'as far as practicable'. On the other hand, unlike some other treaties, it is not limited to planned activities that would have only a transboundary impact. It is not evident that Article 206 has had a great deal of impact in practice. It was relied on by Ireland in its claim against the United Kingdom in the *MOX Plant* arbitration,²⁶ but never considered by the arbitral tribunal as Ireland withdrew its claim for jurisdictional reasons before the tribunal could consider the merits of the case. Article 206 was also invoked by Malaysia in its notification and statement of claim instituting arbitral proceedings against Singapore in respect of the latter's land reclamation activities in the Straits of Johor, Malaysia claiming that Singapore had made no assessment of the impact of its activities on waters under the jurisdiction of Malaysia. As in the *MOX Plant* case, the arbitral tribunal never considered the merits of this claim as the parties reached a negotiated settlement of their dispute. However, the question of an environmental impact assessment was considered by the ITLOS in its order of provisional measures in the case. Noting that no assessment of the effects of its land reclamation activities had been undertaken by Singapore and that 'it cannot be excluded that, in the particular circumstances of this case, the land reclamation works may have adverse effects on the marine environment', the ITLOS ordered Malaysia and Singapore to establish promptly a group of independent experts to determine 'the effects of Singapore's land reclamation and to propose, as appropriate, measures to deal with any adverse effects of such land reclamation'.²⁷ The ITLOS did not refer explicitly to Article 206, and its language actually suggests a lower threshold for when an assessment is required than Article 206 itself. Apart from these two cases, other instances of challenges to the adequacy of an environmental impact assessment of a marine project that have become public suggest that the States concerned have relied on instruments that provided more detail of what is required of an assessment than the rather sketchy provisions of the LOSC. Thus, in the case of the Nord Stream pipeline project in the Baltic, the States concerned about the project invoked not the LOSC but the Espoo Convention.²⁸

In addition to Article 206, specific provisions have been developed for environmental impact assessments to be carried out in relation to activities in the Area. Thus, the 1994 Implementation Agreement requires an application for approval by the ISA of a plan of work for the exploration of minerals in the Area to be accompanied by 'an assessment

²⁶ Memorial of Ireland, Chapter 7, available at <http://www.pca-cpa.org/showpage.asp?page_id=1148> (last accessed 6 May 2015).

²⁷ *Case concerning Land Reclamation by Singapore in and around the Straits of Johor (Malaysia v Singapore)*, Provisional Measures, Order of 8 October 2003, paras 96 and 106(1), respectively, available at <http://www.itlos.org/fileadmin/itlos/documents/cases/case_no_12/12_order_081003_en.pdf> (last accessed 18 May 2015).

²⁸ Espoo Convention on Environmental Impact Assessment in a Transboundary Context (adopted 25 February 1991, entered into force 10 September 1997) (1991) 30 *International Legal Materials* 802. See further S. Vinogradov, 'Challenges of Nord Stream: Streamlining International Frameworks and Regimes for Submarine Pipelines' (2009) 52 *German Yearbook of International Law* 241.

of the potential environmental impacts of the proposed activities'.²⁹ The three sets of mining regulations so far adopted by the ISA give further effect to this obligation. Thus, they require a contractor to attach to a plan of work for exploration a preliminary assessment of the possible impact of the proposed exploration activities on the marine environment and a description of a programme for oceanographic and environmental baseline studies that would enable an assessment of the potential environmental impact including, but not restricted to, the impact on biodiversity of the proposed exploration activities. In addition, before commencing exploration activities, a contractor must submit to the ISA an impact assessment of the potential effects on the marine environment of the proposed activities; a proposal for a monitoring programme to determine the potential effect on the marine environment of the proposed activities; and data that could be used to establish an environmental baseline against which to assess the effect of the proposed activities.³⁰ These provisions have been applied in practice in the 22 contracts for exploration that the ISA has so far concluded.³¹

2.3 Precautionary Principle

Definitions of the precautionary principle differ, but broadly the principle means that where there is a threat of serious damage to the environment, lack of full scientific certainty as to whether such damage will occur or as to its causes is not to be used as a reason to postpone (cost-effective) measures to prevent such damage.³² The first international instruments referring to this principle did not appear until after the adoption of the LOSC, in the mid-1980s,³³ so it is not surprising that there is no reference to the principle in the LOSC. Nevertheless, there is arguably an embryonic use of the principle in the definition of marine pollution in the LOSC. Article 1(1)(4) defines 'pollution of the marine environment' as including the introduction of substances or energy into the marine environment that not only results in deleterious effects but also that 'is likely to result' in such effects. The latter can be argued to have a precautionary element.³⁴ Be that as it may, the precautionary principle/approach is explicitly referred to in some of the subsequent development of the LOSC. Thus, the

²⁹ Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982 (adopted 28 July 1994, entered into force 28 July 1996) 1836 UNTS 42, Annex, section 1, para. 7.

³⁰ Regulations on Prospecting and Exploration for Metallic Nodules in the Area (2000, as amended in 2013), reg. 31(6), annex II, section IV, para. 24 and annex IV, section 5, para. 5.2; Regulations on Prospecting and Exploration for Polymetallic Sulphides in the Area (2010), reg. 33(6), annex 2, section IV, para. 24 and annex 4, section 5, para. 5.2; and Regulations on Prospecting and Exploration for Cobalt-Rich Ferromanganese Crusts in the Area (2012), reg. 33(6), annex II, section IV, para. 24 and annex IV, section 5, para. 5.2. The texts of the Regulations are available at <<https://www.isa.org.jm/mining-code/Regulations>> (last accessed 18 May 2015). See further Michael Lodge, 'Protecting the marine environment of the deep seabed', Chapter 7 in this volume.

³¹ For details, see <<https://www.isa.org.jm/deep-seabed-minerals-contractors>> (last accessed 18 May 2015).

³² See further Birnie, Boyle and Redgwell, above n 25, 152–64.

³³ S. Marr, *The Precautionary Principle in the Law of the Sea* (Martinus Nijhoff 2003) 5–7.

³⁴ See further *ibid.*, 52–3.

three sets of mining regulations so far adopted by the ISA all refer to the precautionary approach,³⁵ the importance of which was emphasized in the 2011 Advisory Opinion of the Sea-Bed Disputes Chamber;³⁶ while the UN Fish Stocks Agreement³⁷ calls on States and regional fisheries management organizations to employ a precautionary approach in the management of straddling fish stocks and highly migratory species. The ITLOS has been urged by the applicants in three provisional measures cases to apply the precautionary principle. While not explicitly endorsing the principle, the ITLOS in each case held that ‘prudence and caution’ required the parties to co-operate in taking certain actions and prescribed provisional measures reflecting that approach.³⁸

2.4 Polluter Pays Principle

The polluter pays principle means broadly that the costs of pollution are to be borne by the person causing the pollution and not by its victims or society generally. Although the principle was endorsed by the OECD in a series of recommendations from the early 1970s onwards, it was not until the 1992 UN Conference on Environment and Development that the principle ‘for the first time secured international support as an environmental policy’.³⁹ It is therefore not surprising that there is no trace of the principle in the handful of provisions of the LOSC dealing with liability and compensation for damage caused by pollution.⁴⁰

2.5 Sustainable Development

The first use of the term ‘sustainable development’ occurs in the report of the World Commission on Environment and Development (popularly known as the Brundtland Report), which defines it as ‘development that meets the needs of the present without

³⁵ See the Nodule Regulations, above n 30, Regs 31(2) and (5), and annex IV, section 5.1; Sulphides Regulations, above n 30, Regs 33(2) and (5), and annex 4, section 5.1; and Crusts Regulations, above n 30, Regs 33(2) and (5), and annex IV, section 5.1.

³⁶ *Advisory Opinion on the Responsibilities and Obligations of States sponsoring Persons and Entities with respect to Activities in the Area*, paras 131–5, available at <<https://www.itlos.org/cases/list-of-cases/case-no-17/>> (last accessed 18 May 2015).

³⁷ Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (adopted 4 August 1995, entered into force 11 December 2001) 2167 UNTS 3, Art. 6 and Annex II.

³⁸ *Southern Bluefin Tuna Cases (New Zealand v Japan; Australia v Japan)*, Provisional Measures, Order of 27 August 1999, paras 77, 79 and 80 (1999) 38 *International Legal Materials* 1624; *MOX Plant Case (Ireland v United Kingdom)*, Provisional Measures, Order of 3 December 2001, para. 84, available at <<https://www.itlos.org/cases/list-of-cases/case-no-10/>> (last accessed 18 May 2015); and *Land Reclamation case*, above n 27, para. 99.

³⁹ Birnie, Boyle and Redgwell, above n 25, 322.

⁴⁰ LOSC, Arts 139(2), 235 and 304 and Annex III, Art. 22. The last of these comes closest to the principle by stipulating, although without further elaboration, that a contractor undertaking activities in the Area ‘shall have responsibility or liability for any damage arising out of wrongful acts in the conduct of its operation’ and that the International Seabed Authority has responsibility or liability for damage arising out of its unlawful acts.

compromising the ability of future generations to meet their own needs'.⁴¹ The report was published five years after the adoption of the LOSC, so it is not surprising that the LOSC contains no reference to sustainable development. Nevertheless, ideas of sustainability are to be found in the LOSC. Most obviously they occur in its provisions concerning fisheries. Thus, the LOSC requires a State managing the fisheries of its exclusive economic zone (EEZ) and States co-operating in the management of high seas fisheries to take measures that are 'designed to maintain or restore populations of harvested species at levels which can produce the maximum sustainable yield'.⁴² Elsewhere the LOSC provides that 'the Area and its resources are the common heritage of mankind' and that the exploration and exploitation of the mineral resources of the Area are to be 'carried out for the benefit of mankind as a whole'.⁴³ Arguably these provisions mean that the mining of the mineral resources of the Area should be not only for the benefit of the present generation of humankind but also for the benefit of future generations. Such intra-generational and inter-generational equity is an important element of sustainable development.⁴⁴

2.6 Ecosystem Approach

The desirability of an ecosystem approach, under which an ecosystem should be managed as a whole rather than its individual components being managed separately and in isolation from one another, has been developed on the global plane by the Conference of the Parties to the Convention on Biological Diversity (CBD)⁴⁵ in general terms⁴⁶ and by the Food and Agriculture Organization (FAO) specifically for fisheries.⁴⁷ This development considerably post-dates the LOSC,⁴⁸ so it is not surprising that the term 'ecosystem approach' is nowhere used in the LOSC. Nevertheless, rudimentary instances of such an approach can be found in its provisions on the

⁴¹ World Commission on Environment and Development, *Our Common Future* (OUP 1987) 43. This definition has subsequently been refined in a variety of international instruments. There is a vast literature on what is involved in sustainable development.

⁴² LOSC, Arts 61(3) and 119(1)(a). See further the following section of this chapter, especially the text at notes 61 and 62.

⁴³ LOSC, Arts 136 and 140.

⁴⁴ Birnie, Boyle and Redgwell, above n 25, 119–23.

⁴⁵ Above n 12.

⁴⁶ Conference of the Parties to the Convention on Biological Diversity, Decision V/6 (2000) available at <<http://www.cbd.int/decision/cop/default.shtml?id=7148>> (last accessed 30 April 2015).

⁴⁷ See, in particular, the Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem, 2001 available at <ftp://ftp.fao.org/fi/DOCUMENT/reykjavik/y2198t00_dec.pdf> (last accessed 30 April 2015). See further FAO, *Putting into Practice the Ecosystem Approach to Fisheries* (2005) available at <<http://www.fao.org/docrep/009/a0191e/a0191e00.htm#TOC>> (last accessed 30 April 2005).

⁴⁸ The first international instrument providing for an ecosystem approach actually predates the adoption of the LOSC, although not the substantive negotiation of its environmental provisions: see Convention on the Conservation of Antarctic Marine Living Resources (adopted 20 May 1980, entered in force 7 April 1982) 1329 UNTS 47, Arts II(3) and IX.

conservation of species associated with or dependent on harvested fish stocks (discussed in more detail in the next section) and in relation to activities in the Area, where the ISA is required to adopt regulations to prevent pollution, other hazards to the marine environment and ‘interference with the ecological balance of the marine environment’, as well as to protect and conserve the natural resources of the Area and prevent damage to the fauna and flora of the marine environment.⁴⁹

2.7 Co-operation

The principle of co-operation is deeply embedded in the LOSC, indeed one could say that co-operation is its *leitmotiv*, so frequently do its provisions call for co-operation between its parties in relation to a host of diverse matters. Part XII of the LOSC (on the protection and preservation of the marine environment) contains not only numerous calls for co-operation in relation to specific matters, notably in relation to the development of international rules and standards to prevent marine pollution (discussed further below), but also a general provision on co-operation in Article 197, which requires States to ‘co-operate on a global basis and, as appropriate, on a regional basis, directly or through competent international organizations, in formulating and elaborating international rules, standards and recommended practices and procedures consistent with this Convention, for the protection and preservation of the marine environment, taking into account characteristic regional features.’ For its part the ITLOS, in the *Mox Plant* case, after noting that ‘the duty to cooperate is a fundamental principle in the prevention of pollution of the marine environment under Part XII of the Convention and general international law and that rights arise therefrom which the Tribunal may consider appropriate to preserve under Article 290 of the Convention [on provisional measures],’ held that ‘prudence and caution’ required Ireland and the United Kingdom to cooperate in various ways.⁵⁰

3. CONSERVATION OF SPECIES⁵¹

One would expect the conservation of marine species to be a major concern of the ideal contemporary marine environmental treaty posited in the introduction to this chapter. In contrast, the LOSC gives the impression that its drafters did not consider the conservation of species to be a significant marine environmental issue. Part XII of the LOSC, although headed ‘protection and preservation of the marine environment’, contains only a handful of brief, general and rather peripheral obligations relating to the conservation of species. Furthermore, the provisions of the LOSC relating to the

⁴⁹ LOSC, Art. 145.

⁵⁰ *MOX Plant* case, above n 38, paras 82 and 84. This passage was quoted with approval in the subsequent *Land Reclamation* case, above n 27, para. 92. In that case the ITLOS also prescribed specific co-operative action that the parties should take: see para. 106(1).

⁵¹ See also Alexander Proelss and Katherine Houghton, ‘Protecting marine species’, Chapter 11 in this volume and Dire Tladi, ‘Conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction: towards an implementing agreement’, Chapter 12 in this volume.

settlement of disputes create something of a dichotomy between protection of the environment and the conservation of living resources.⁵² Article 297 excludes from compulsory settlement disputes concerning a coastal State's obligations in the EEZ relating to the conservation of 'living resources', whereas disputes concerning 'the protection and preservation of the marine environment' are not so excluded. The tribunal in the Chagos Marine Protected Area arbitration between Mauritius and the United Kingdom had to consider where the boundary between those two matters lay.⁵³ Mauritius argued that the marine protected area established by the United Kingdom in the whole of the 200-nautical-mile zone around the Chagos Islands, which included a complete prohibition on fishing, was an environmental matter, whereas the United Kingdom contended that it concerned the conservation of living resources and so was excluded from the tribunal's jurisdiction. The tribunal found that when establishing the marine protected area, the United Kingdom had characterized the measure as primarily an environmental one and could not go back on that characterization in the arbitration proceedings.⁵⁴ The ITLOS has struck a blow against the dichotomy between protection of the marine environment and the conservation of living resources, albeit within the limited context of provisional measures. Article 290 of the LOSC provides that where a dispute is before a court or tribunal, provisional measures may be prescribed if it is considered appropriate, inter alia, to 'prevent serious harm to the marine environment'. In the *Southern Bluefin Tuna* cases, the ITLOS, in considering whether there was a threat of such harm, observed that 'the conservation of the living resources of the sea is an element in the protection and preservation of the marine environment'.⁵⁵

Most of the provisions of the LOSC addressing the conservation of species are found, not in Part XII, but in Parts V and VII (on the exclusive economic zone (EEZ) and high seas, respectively). These parts contain conservation obligations relating to 'living resources', 'harvested species' and 'species associated with or dependent upon harvested species'. None of these phrases is defined in the LOSC. The second and third of these three categories are clearly distinct from each other. Given that the LOSC imposes quite different conservation obligations for 'living resources' compared with 'species associated with or dependent upon harvested species' (as will be seen), those two categories would also seem to be quite distinct. Nor would 'living resources' seem to include marine species that are neither 'harvested species' nor 'species associated with or dependent upon harvested species', otherwise such species would be subject to

⁵² A similar differentiation may also be seen in LOSC Art 21 (on the coastal State's legislative jurisdiction in the territorial sea) and Annex VIII (on special arbitration), although in those cases no practical drawbacks follow from the differentiation.

⁵³ *Chagos Marine Protected Area Arbitration (Mauritius v United Kingdom)*, Award of 18 March 2015, available at <www.pca-cpa.org/showpage.asp?pag_id=1429> (last accessed 18 May 2015).

⁵⁴ Award, paras 283–91.

⁵⁵ *Southern Bluefin Tuna Cases*, above n 38, para. 70. This dictum was repeated with approval by the ITLOS in its *Advisory Opinion on the Request submitted by the Sub-Regional Fisheries Commission* (of 2 April 2015), paras 120 and 216, available at <https://www.itlos.org/fileadmin/itlos/documents/cases/case_no.21/advisory_opinion/C21_AdvOp_02.04.pdf> (last accessed 18 May 2015).

more onerous conservation obligations than ‘associated or dependent’ species, which would appear to go against the scheme of conservation in Parts V and VII of the LOSC. In the absence of a definition of ‘living resources’, it is reasonable to assume that the word ‘resources’ has its ordinary dictionary meaning of ‘money or means of raising money’⁵⁶ or ‘a stock or supply of materials or assets’.⁵⁷ Thus, ‘living resources’ would seem to refer to marine species, whether fauna or flora, that either are commercially exploited (equating to ‘harvested species’) or that have the potential to be commercially exploited.⁵⁸ Species ‘dependent upon harvested species’ would seem to refer primarily to species that are the predators of harvested species. Species ‘associated with’ harvested species would seem to include species that may be caught incidentally when fishing, species that are the prey of harvested species, or species having some other form of biological association with harvested species. The first of these include not only species of fish caught as by-catch, but also smaller marine mammals (particularly dolphins and porpoises) and amphibians (such as turtles), which are caught in various kinds of net and consequently drown,⁵⁹ as well as some sea birds (notably albatrosses), which are attracted to the bait used in long-line fishing and are then caught on the hooks and die.⁶⁰ The prey of harvested species includes smaller fish as well as plankton and a variety of other lower life forms. Thus, ‘species associated with or dependent upon harvested species’ include a wide variety of marine species ranging from mammals and birds to plankton and other lower life forms. However, they and harvested species are unlikely to include all marine species. For those species that are not so included, the LOSC provides no conservation obligations at all. Even if the populations and well-being of such non-included species are not threatened by fishing, they may be adversely affected by other human activities, such as the exploitation of seabed resources and the laying of cables and pipelines. Insofar as such species are adversely affected by pollution, their conservation is obliquely provided for through the LOSC’s provisions on the prevention of pollution (discussed below) since the definition of pollution in Article 1(1)(4) of the LOSC includes ‘harm to ... marine life’.

In relation to the conservation of ‘living resources’, Articles 61(2) and (3) of the LOSC require a coastal State within its EEZ ‘to ensure through proper conservation and management measures that the maintenance of’ such resources ‘is not endangered by over-exploitation’, taking into account the best scientific evidence available to it. Such measures must be ‘designed to maintain or restore populations of harvested

⁵⁶ *Chambers English Dictionary* (7th edn, Chambers 1988) 1251.

⁵⁷ *Concise Oxford Dictionary* (10th edn, OUP 1999) 1219.

⁵⁸ See further D. Owen, ‘The Application of the Wild Birds Directive beyond the Territorial Sea of European Community Member States’ (2001) 13 *Journal of Environmental Law* 39, 49–56.

⁵⁹ See further B. Miller, ‘Combating Driftnet Fishing in the Pacific’ in J. Crawford and D.R. Rothwell (eds), *The Law of the Sea in the Asian-Pacific Region* (Martinus Nijhoff 1995) 155; and K. Mulvaney and B. McKay, ‘Small Cetaceans: Status, Threats and Management’ in W.C.G. Burns and A. Gillespie (eds), *The Future of Cetaceans in a Changing World* (Transnational Publishers 2003) 189 at 195–7.

⁶⁰ See further E. Dunn, ‘Reducing Seabird Bycatch: From Identifying Problems to Implementing Policy’ in D. Vidas and P.J. Schei (eds), *The World Ocean in Globalisation* (Martinus Nijhoff 2011) 247.

species at levels that can produce the maximum sustainable yield, as qualified by relevant environmental and economic factors', taking into account any generally recommended international minimum standards. On the high seas, Articles 117 and 118 require States whose nationals fish there to take, or to co-operate with other States in taking 'measures necessary for the conservation' of living resources. Article 119(1)(a) requires such measures to be designed to maintain or restore populations of harvested species at levels that can produce the maximum sustainable yield (MSY), as qualified by relevant environmental and economic factors. It is immediately evident that the provisions for both the EEZ and high seas are limited, weak and lack precision. In the case of the high seas, unlike the EEZ, there is no obligation to ensure that living resources are not endangered by over-exploitation. The main goal of conservation and management measures, both in the EEZ and on the high seas, is to achieve MSY. However, that is a goal that is heavily qualified. The reference to 'economic factors' suggests that catch limits could be set for economic reasons, such as protecting employment in the fishing industry, at a level that would delay or prevent the restoration or maintenance of stocks to the level of MSY, although not to the extent of endangering the maintenance of living resources.⁶¹ Furthermore, and more fundamentally, the reliance of the LOSC on MSY as the principal policy tool of fisheries management has been criticized because it is difficult to calculate the MSY for a particular stock, it is impossible to apply MSY completely in a multi-species fishery, and MSY is only concerned with limiting catches and does not deal with the need to restrict effort.⁶²

Turning to the conservation of 'species associated with or dependent upon harvested species', Article 61(4) of the LOSC requires a coastal State, in adopting conservation and management measures for the living resources of its EEZ, 'to take into consideration' the effect of such measures on associated or dependent species 'with a view to maintaining or restoring populations of such... species above levels at which their reproduction may become seriously threatened'. Article 119(1)(b) lays down a similar obligation on States fishing on the high seas. Those provisions are particularly weak. The obligation on States is merely to 'take into consideration' the effect of their measures on associated and dependent species with a view to maintaining or restoring populations of such species 'above levels at which their reproduction may become

⁶¹ W.T. Burke, *The New International Law of Fisheries* (Clarendon Press 1994) 54–5; and D.R. Christie, 'The Conservation and Management of Stocks located solely within the Exclusive Economic Zone' in E. Hey (ed.), *Developments in International Fisheries Law* (Kluwer 1999) 395, 402–3.

⁶² See, eg, R. Barnes, 'The Convention on the Law of the Sea: An Effective Framework for Domestic Fisheries Conservation?' in D. Freestone, R. Barnes and D. Ong (eds), *The Law of the Sea: Progress and Prospects* (OUP 2006) 233, 243–4; Burke, above n 61, 52–5; Christie, above n 61, 402–4; E. Hey, 'The Persistence of a Concept: Maximum Sustainable Yield' (2012) 27 *International Journal of Marine and Coastal Law* 763; and M. Markowski, 'The International Legal Standard for Sustainable EEZ Fisheries Management' in G. Winter (ed.), *Towards Sustainable Fisheries Law: A Comparative Analysis* (IUCN 2009) 3, 29.

seriously threatened', not to ensure that their measures maintain or restore populations of associated or dependent species at or to a sustainable level.⁶³

The obligations of coastal States to conserve a stock of living resources that is shared with one or more other States, a matter dealt with by Article 63(1) of the LOSC, was the subject of one of the questions on which the ITLOS was asked to give an advisory opinion by the Sub-Regional Fisheries Commission in a request made in March 2013. In its opinion the ITLOS contributed to developing the LOSC by spelling out the rather vague obligation of co-operation in Article 63(1) in ways that strengthen that obligation.⁶⁴ However, there have been two cases where the ITLOS has not taken the possible opportunity to strengthen the fisheries provisions of the LOSC through a dynamic interpretation. In the *Volga* case, the ITLOS rejected Australia's argument that Article 73 of the LOSC should be read so as to allow a coastal State, when releasing an arrested fishing vessel on the payment of a bond, to require the released vessel to carry a vessel monitoring system (VMS) and to disclose details of its ultimate beneficial owners.⁶⁵ Had the ITLOS accepted Australia's argument, it would have strengthened the capacity of coastal States more effectively to control the activities of foreign fishing vessels in their EEZs. Such illegal fishing is one of the reasons why the world's fish stocks are in a crisis state (see further below). Second, in the *Virginia G* case the ITLOS was asked to interpret the requirement in the LOSC that there be a 'genuine link' between a ship and the State conferring its nationality upon it. An interpretation giving this requirement some content and teeth would strike a blow at flag of convenience fishing vessels, which, as will be pointed out below, are one of the causes of the current crisis in world fisheries. Unfortunately, the ITLOS failed to do so. It held that there were no prerequisites or conditions that had to be satisfied before a State granted its nationality to a ship: it was immaterial if the owner and crew of a vessel were not nationals of the flag State. It was sufficient for a genuine link if the flag State exercised effective jurisdiction and control over a vessel at the relevant time.⁶⁶ However, the ITLOS did strike a modest blow for coastal States trying to control the activities of foreign vessels fishing in their EEZs by holding that the bunkering of (i.e. supplying fuel oil to) foreign vessels within the EEZ fell within the jurisdiction of the

⁶³ For more detailed critiques of the provisions of the LOSC relating to the conservation of living resources and associated and dependent species, see, inter alia, Barnes, above n 62, Burke, above n 61, and Christie, above n 61.

⁶⁴ *Advisory Opinion*, above n 55, paras 182–218. The ITLOS also clarified, and thereby strengthened, the obligations of the flag States of foreign vessels fishing in the EEZ of a coastal State: see paras 109–40. The Advisory Opinion came too late in the production of this chapter to allow proper discussion of its content.

⁶⁵ *The Volga Case (Russian Federation v Australia)*, Judgment of 23 December 2002, available at <http://www.itlos.org/fileadmin/itlos/documents/cases/case_no_11/Judgment.Volga.E.pdf> (last accessed 30 April 2015).

⁶⁶ *The Virginia G (St. Vincent v Guinea)*, Judgment of 14 April 2014, paras 110 and 322–5, available at <<http://www.itlos.org/index.php?id=171>> (last accessed 30 April 2015). For detailed discussion, and criticism, of the approach of the ITLOS on this issue, see T. Scovazzi, 'ITLOS and Jurisdiction over Ships' in H. Ringbom (ed.), *Jurisdiction over Ships: Post-UNCLOS Developments in the Law of the Sea* (Brill, in press).

coastal State, something that had not been clear in the LOSC.⁶⁷ Thus, a coastal State may exercise some control over foreign fishing vessels by prohibiting bunkering in its EEZ, so reducing the amount of time they may spend fishing there, or it may require them to refuel at its ports, thus obtaining some tax revenues from the sale of the fuel.

The conservation obligations outlined above apply only to the EEZ and high seas. In relation to other maritime zones, the provisions of the LOSC relevant to the conservation of species are even weaker. In the case of internal waters and the territorial sea, apart from the general provisions of Part XII outlined below, the LOSC imposes no conservation obligations at all. The same is true of the continental shelf. Even though the continental shelf within 200 miles overlaps with the EEZ, the conservation obligations relating to the latter do not apply to those species that are considered to be part of the natural resources of the continental shelf, namely sedentary species.⁶⁸ Such species are defined as 'organisms which at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil'.⁶⁹ they include abalone, clams, mussels, various species of crustacean, sponges, coral and some of the organisms found around hydrothermal vents.⁷⁰ Only in the case of the Area, i.e. the seabed and subsoil beyond the limits of national jurisdiction, are there some specific conservation provisions. Article 145 stipulates that '[n]ecessary measures shall be taken ... with respect to activities in the Area to ensure effective protection for the marine environment from harmful effects which may arise from such activities.' To that end, the International Seabed Authority shall adopt appropriate regulations for, inter alia, 'the prevention, reduction and control of ... interference with the ecological balance of the marine environment ... and the protection and conservation of the natural resources of the Area and the prevention of damage to the flora and fauna of the marine environment.' The three sets of mining regulations adopted so far by the Authority contain only fairly general provisions aimed at protecting the marine environment and do not refer explicitly to the conservation of species.⁷¹

As mentioned earlier, Part XII of the LOSC, although headed 'protection and preservation of the marine environment', contains few provisions relating to the conservation of species. Taking the relevant articles in numerical order, Article 192 sets out a basic obligation on States parties to 'protect and preserve the marine environment'. Article 193 goes on to provide that States parties 'have the sovereign right to exploit their natural resources [which obviously include marine living resources] pursuant to their environmental policies and in accordance with their duty to protect and preserve the marine environment'. Even reading those provisions in the light of the

⁶⁷ Ibid., paras 217–23.

⁶⁸ LOSC, Art. 68.

⁶⁹ LOSC, Art. 77(4).

⁷⁰ See further J. Mossop, 'Protecting Marine Biodiversity on the Continental Shelf beyond 200 Miles' (2007) 38 *Ocean Development and International Law* 283, 291–2 and the literature referred to there. See also Joanna Mossop, 'Reconciling activities on the extended continental shelf with protection of the marine environment', Chapter 8 in this volume.

⁷¹ See further the regulations above n 30 and Michael Lodge, 'Protecting the marine environment of the deep seabed', Chapter 7 in this volume.

ITLOS dictum in the *Southern Bluefin Tuna* cases quoted earlier,⁷² they are far too abstract and general to impose any meaningful obligations on States to conserve marine species. Perhaps only by causing serious harm to marine species could a State be said to be in breach of its obligations under those Articles.

The next provision in Part XII is Article 194(5), which stipulates that '[t]he measures taken in accordance with this Part [i.e. Part XII] shall include those necessary to protect and preserve rare and fragile ecosystems as well as the habitat of depleted, threatened or endangered species'. Article 194(5) does not protect marine species as such, but only insofar as they are part of 'rare and fragile ecosystems'. Even then, the scope of the obligation of States parties to protect and preserve such ecosystems is not clear. On one view the obligation relates only to the protection of such ecosystems from pollution since Article 194 is headed 'Measures to prevent, control and reduce *pollution* of the marine environment' (emphasis added) and the first four paragraphs of the article are explicitly concerned only with pollution. A broader view is that since Article 194(5) does not mention pollution at all, and refers to measures 'taken in accordance with this Part' (which include any taken pursuant to Articles 192 and 193) rather than 'in accordance with this Article', it requires the protection of rare and fragile ecosystems from any form of interference. In the *Chagos Marine Protected Area* arbitration, the tribunal, without discussing the matter in any detail, favoured the latter view.⁷³

The final provision in Part XII that has some relevance to the conservation of species is Article 196(1). It provides that:

States shall take all measures necessary to prevent, reduce and control pollution of the marine environment resulting from the use of technologies under their jurisdiction or control, or the intentional or accidental introduction of species, alien or new, to a particular part of the marine environment, which may cause significant and harmful changes thereto.

Among such harmful changes would be adverse effects on the health and populations of native species. It is not clear from the text of Article 196(1) whether the reference to the introduction of alien or new species is linked to 'resulting from', and therefore the obligation not to introduce such species applies only as a measure to prevent pollution, or whether such introduction relates to 'prevent, reduce and control', in which case there is an obligation to prevent, reduce and control the introduction of new and alien species unconnected to the prevention of pollution. While grammatically the former reading seems more plausible, the drafting history of Article 196(1) indicates that it is the latter interpretation that represents the true intention of the parties.⁷⁴ In some parts of the world, the introduction of alien and new species has had a significant impact on native marine species.⁷⁵ Such introduction has occurred in many cases after the LOSC

⁷² See text at n 55. See also *Advisory Opinion*, above n 55, para. 120.

⁷³ Award, above n 53, para. 538. For further discussion of the scope of Art. 194(5), see Y. Takei, *Filling Regulatory Gaps in High Seas Fisheries* (Martinus Nijhoff 2013), 76–7 and literature cited there.

⁷⁴ *Virginia Commentary*, above n 5, 73–6.

⁷⁵ R. Balkin, 'Ballast Water Management: Regulatory Challenges and Opportunities' in R. Caddell and R. Thomas (eds), *Shipping, Law and the Marine Environment in the 21st Century* (Lawtext Publishing 2013) 137, 138–40.

entered into force. One of the main ways that alien species enter a marine environment is through the discharge of ballast water. It is therefore a matter of regret, and in the case of some shipping States arguably a breach of Article 196(1), that so few States parties to the LOSC have ratified the Ballast Water Convention,⁷⁶ which is designed to prevent the introduction of alien species through ballast water – indeed, the number of ratifications is not yet sufficient to bring the Convention into force.⁷⁷

What has been the practical impact of the provisions of the LOSC relating to the conservation of species? As far as ‘living resources’ are concerned, it is no exaggeration to say that world fisheries are in serious crisis. According to the biennial reports on the State of World Fisheries and Aquaculture published by the FAO, for the past decade or more nearly 30 per cent of fish stocks have been over-exploited (a percentage that has trebled since the mid-1970s) and nearly 60 per cent of stocks have been fully exploited and therefore are at risk of over-exploitation without effective management.⁷⁸ Fishing has also had a serious impact on species other than fish, including smaller marine mammals, turtles and sea birds. Over 550 species of marine fish and invertebrates are listed as threatened in the IUCN Red List.⁷⁹ It would be simplistic to blame only the weak conservation provisions of the LOSC for this state of affairs – there are many other causes, including the over-capacity of many fishing fleets (fuelled by heavy subsidies), the use of flags of convenience, developments in technology, the use of non-selective fishing gear, short-termism in fisheries management because of pressure from the fishing industry, and lack of enforcement capability.⁸⁰ Nevertheless, while it would be impossible to show cause and effect, it is likely that the shortcomings of the LOSC are also a factor. Certainly, there has been widespread recognition that its conservation provisions are inadequate (even allowing for the framework nature of the LOSC), as shown by the subsequent adoption of a wide range of hard and soft-law measures to remedy those shortcomings.⁸¹ Such measures have been adopted in a wide

⁷⁶ International Convention on the Control and Management of Ships’ Ballast Water and Sediments (adopted 13 February 2004, not yet in force) (2004) 19 *International Journal of Marine and Coastal Law* 446.

⁷⁷ As at 5 June 2015, 44 States, representing 32.86 per cent of world shipping tonnage, had ratified the Convention, whereas for its entry into force the Convention requires ratification by 30 States, whose ships account for 35 per cent of world shipping tonnage (art. 18(1)). See IMO, Summary of Status of Conventions, available at <<http://www.imo.org/About/Conventions/StatusOfConventions/Pages/Default.aspx>> (last accessed 7 July 2015).

⁷⁸ See FAO, *The State of World Fisheries and Aquaculture 2014*, 7 and 37–41, available at <<http://www.fao.org/3/a-i3720e/index.html>> (last accessed 6 May 2015). See also T.J. Pitcher and W.W.L. Cheung, ‘Fisheries: Hope or Despair?’ (2013) 74 *Marine Pollution Bulletin* 506. They state that 70 per cent of all world fish populations are ‘unsustainably overexploited (defined as fish biomass less than half of the biomass at MSY)’ (508).

⁷⁹ Pitcher and Cheung, *ibid.*, 510.

⁸⁰ See further, *inter alia*, C. Clover, *The End of the Line* (University of California Press 2006); C.-C. Schmidt, ‘Economic Drivers of Illegal, Unreported and Unregulated (IUU) Fishing’ (2005) 20 *International Journal of Marine and Coastal Law* 479; and WWF, *Poorly Managed Fishing* (available at <http://wwf.panda.org/about_our_earth/blue_planet/problems/problems_fishing/> (last accessed 6 May 2015)).

⁸¹ For reasons of space, no details of those measures can be given here. For a recent overview, see R. Churchill, ‘Fisheries and Their Impact on the Marine Environment: UNCLOS

range of fora, including the FAO, CITES, CMS, UNEP's Regional Seas Programme and regional fisheries management organizations (RFMOs). One set of measures, the UN Fish Stocks Agreement, may be considered as having been developed within the framework of the LOSC.⁸² While a self-standing treaty, the Agreement states that it is designed to implement effectively the provisions of the LOSC concerning the conservation and management of straddling fish stocks (i.e. stocks of fish that are found both in the EEZ and on the high seas or that migrate between the two) and highly migratory species (i.e. those species, such as tuna, that are listed in Annex I of the LOSC).⁸³ The Agreement is also to be 'interpreted and applied in the context of and in a manner consistent with' the LOSC.⁸⁴ The Agreement sets significantly stricter conservation obligations for the species with which it is concerned than the LOSC, including the use of the precautionary approach.⁸⁵

In the past 15 to 20 years the international community has become increasingly concerned about threats to biodiversity beyond the limits of national jurisdiction. In 2004 the General Assembly, within the framework of its annual review of the LOSC and ocean affairs, set up an Ad Hoc Open-ended Informal Working Group on the conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction.⁸⁶ One of the options being considered arising out of the work of the Working Group, and for which there appears to be considerable support from States, is the adoption of what would be a third implementation agreement.⁸⁷ The conservation of species would be a central element of such an agreement.

4. PROTECTION OF HABITATS

Many marine activities have the potential to cause significant damage to marine habitats, with consequential adverse effects for marine life dependent on those habitats. Such activities include bottom and beam trawling; fishing by using explosives, often leading to the severe damage to or destruction of coral reefs; the exploitation of seabed mineral resources (including hydrocarbons, manganese nodules, polymetallic sulphides and ferro-manganese crusts); and the laying of cables and pipelines. One would therefore expect that the protection of habitats would be a significant concern of the ideal contemporary marine environmental treaty posited in the introduction to this

and Beyond' in M. Chantal Ribeiro (ed.), *30 Years after the Signature of the UN Convention on the Law of the Sea: the Protection of the Environment and the Future of the Law of the Sea* (Coimbra Editora 2014) 23, 34–47.

⁸² Above n 37.

⁸³ Fish Stocks Agreement, Art. 2.

⁸⁴ Fish Stocks Agreement, Art. 4.

⁸⁵ Fish Stocks Agreement, Arts 5 and 6 and Annex II. See also text, above n 37.

⁸⁶ UN General Assembly Resolution 59/24 (2004), para. 73.

⁸⁷ UN General Assembly Resolution 68/70 (2013), paras 196–201. See further E. Druel, R. Billé and J. Rochette, *Getting to Yes? Discussions towards an Implementing Agreement to UNCLOS on Biodiversity in ABNJ* (2013), available at <www.iddri.org> (last accessed 6 May 2015); and G. Wright et al., *The Scores at Half-Time* IDDRI Brief No. 02/14, available at <www.iddri.org> (last accessed 6 May 2015).

chapter. In the case of the LOSC, however, its provisions dealing with the protection of habitats are very limited, there being only two provisions explicitly concerned with this matter. The first is Article 194(5), which stipulates that '[t]he measures taken in accordance with this Part [i.e. Part XII] shall include those necessary to protect and preserve rare and fragile ecosystems as well as the habitat of depleted, threatened or endangered species'. As discussed above, the arbitral tribunal in the *Chagos Marine Protected Area* arbitration found that this provision requires the protection of the habitats described from any form of interference, not simply from pollution. Nevertheless, the types of habitat to be protected are fairly limited.

The second way in which the LOSC addresses the protection of habitats is through provisions relating to the Area. Article 145 requires the ISA to adopt regulations to prevent interference by seabed mining with 'the ecological balance of the marine environment' and for the 'protection and conservation of the natural resources of the Area and the prevention of damage to the flora and fauna of the marine environment'. This terminology appears broad enough to include the habitats of the Area. In addition, Article 162(2)(w) and (x) authorizes the Council of the ISA to issue emergency orders to suspend mining operations in the Area in order to prevent serious harm to the marine environment and to disapprove areas for exploitation 'where substantial evidence indicates the risk of serious harm to the marine environment'. Such harm would appear to include damage to habitats. In implementation of its powers under Article 145, the ISA has adopted mining regulations that provide some protection for habitats in the Area from prospecting or exploration.⁸⁸

Within the framework of its annual review of the LOSC and ocean affairs, the UN General Assembly has adopted, from 2004 onwards, a number of resolutions that call on States and regional fisheries management organizations to prohibit bottom fishing around vulnerable marine ecosystems (such as seamounts, hydrothermal vents and cold-water coral reefs) beyond the limits of national jurisdiction, unless conservation and management measures have been established to prevent significant adverse impacts on such ecosystems.⁸⁹ It is possible that in due course those resolutions will generate new customary international law in the same way as the General Assembly resolutions calling for a prohibition on high seas driftnet fishing, which were adopted before the entry into force of the LOSC and therefore outside its framework, are said to have done,⁹⁰ or will be regarded as an agreed interpretation of Article 194(5) of the LOSC. Further protection for habitats in areas beyond national jurisdiction will also be provided if the possible implementing agreement on the conservation of biodiversity beyond areas of national jurisdiction, referred to above, is adopted.

The very broad obligations in Articles 192 and 193 to 'protect and preserve the marine environment', discussed in the previous section, can be read to include the protection of habitats, although the obligations seem too general to be used in practice to restrain damage to habitats except in the most serious cases. Otherwise, the reality is

⁸⁸ See further the regulations above n 30 above and M. Lodge, Chapter 7 in this volume.

⁸⁹ UN General Assembly Resolutions 59/25 (2004), paras 66–7; 61/105 (2006), paras 80 and 83–7; 64/72 (2009), paras 113–17 and 119–27; and 66/68 (2011), paras 121–37.

⁹⁰ See G.J. Hewison, 'The Legally Binding Nature of the Moratorium on Large-Scale High Seas Drift Net Fishing' (1994) 25 *Journal of Maritime Law and Commerce* 557.

that within the limits of national jurisdiction the LOSC provides no meaningful protection for habitats except in the case of 'rare and fragile ecosystems' and the habitats of 'depleted, threatened or endangered species'. Instead, most international law relating to the protection of habitats is provided by the CBD, the CMS and agreements concluded thereunder, and regional marine environmental treaties and commissions.

5. PREVENTION OF MARINE POLLUTION

One would expect the ideal marine environmental treaty posited in the introduction to this chapter to deal with pollution of the marine environment, and that is indeed a major concern of the LOSC. There are, in fact, far more provisions in Part XII and elsewhere in the LOSC dealing with marine pollution than with any other marine environmental issue. In essence those provisions define pollution of the marine environment; identify six sources of such pollution; call on States parties to the LOSC to develop international rules and standards to 'prevent, reduce and control pollution' from each of those six sources; require States to legislate to implement such rules and standards and enforce that legislation; set the jurisdictional parameters for individual States to regulate marine pollution going beyond international rules and standards; and briefly address questions of liability and compensation. Those are all the issues with which one would expect the ideal marine environmental treaty to deal, and each is considered in turn below.

Turning first to the definition, 'pollution of the marine environment' is defined in Article 1(1)(4) of the LOSC as follows:

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

This definition is based on one developed by two scientific bodies, the Intergovernmental Oceanographic Commission of UNESCO and the UN's Group of Experts on the Scientific Aspects of Marine Pollution.⁹¹ At the time that the LOSC was drafted, there was no discussion as to whether the definition included noise, now recognized as potentially harmful to the marine environment, particularly to the well-being of cetaceans. It has been cogently argued that noise is a form of energy and is therefore covered by the definition.⁹² Compared with what one would expect in a contemporary marine environmental treaty, the definition is deficient and outdated by containing no explicit precautionary element. That omission is understandable given the time at which

⁹¹ *Virginia Commentary*, above n 5, 753–4.

⁹² See H.M. Dotinga and A.G. Oude Elferink, 'Acoustic Pollution in the Oceans: The Search for Legal Standards' (2001) 31 *Ocean Development and International Law* 151; and K.N. Scott, 'International Regulation of Underwater Noise' (2004) 53 *International and Comparative Law Quarterly* 287.

the LOSC was negotiated and adopted.⁹³ Nevertheless, the phrase 'likely to result in ... deleterious effects' can be interpreted to introduce some element of the need for precaution into the definition.

The LOSC identifies six sources of marine pollution and contains separate provisions dealing with each. Those sources are, in the order in which they are dealt with in the LOSC, land-based sources;⁹⁴ seabed activities subject to national jurisdiction;⁹⁵ activities in the Area, i.e. the seabed and subsoil beyond the limits of national jurisdiction;⁹⁶ dumping;⁹⁷ vessels;⁹⁸ and the atmosphere. In relation to each source, the LOSC requires States to 'prevent, reduce and control' pollution. This phrase is nowhere defined, and the scope of an obligation to 'prevent, reduce and control' pollution is on its face neither very clear nor helpful as the three terms are potentially conflicting: for example, it is possible to control pollution without reducing it; and 'prevent' may imply that there should be no discharges of pollutants at all, rather than controlled or reduced discharges. In using an identical phrase in its draft articles on the non-navigational uses of international watercourses and on transboundary aquifers, the International Law Commission, referring to the use of the phrase in the LOSC, explained that the obligation to 'prevent' relates to new pollution, whereas the obligations to 'reduce' and 'control' relate to existing pollution. The latter obligations reflect the fact that States are willing to tolerate significant pollution, provided that the State causing the pollution is making its best efforts to reduce the pollution to a mutually acceptable level. A requirement that existing pollution be abated immediately could, in some cases, result in undue hardship. On the other hand, failure of a State to exercise due diligence to reduce pollution to acceptable levels would be a breach of its obligations.⁹⁹ Given that the ILC refers specifically to the LOSC, it would seem reasonable to give the phrase 'prevent, reduce and control' pollution in the LOSC the same meaning and scope as the ILC does in its draft articles.

Turning next to the adoption of international rules and standards to prevent, reduce and control pollution, the LOSC requires such rules in respect of activities in the Area to be adopted by the International Seabed Authority.¹⁰⁰ The Authority has so far done so in relation to the prospecting for and exploration of seabed minerals, but not for commercial production, which has yet to begin.¹⁰¹ In relation to the other sources of marine pollution, the LOSC calls on States to act through competent international

⁹³ See further the section on principles above, text at n 33.

⁹⁴ See further David Osborn, 'Land-based pollution and the marine environment', Chapter 4 in this volume.

⁹⁵ See further J. Mossop, Chapter 8 in this volume.

⁹⁶ See further M. Lodge, Chapter 7 in this volume.

⁹⁷ See further D. VanderZwaag, Chapter 6 in this volume.

⁹⁸ See further H. Ringbom, Chapter 5 in this volume.

⁹⁹ International Law Commission, Draft Articles on the Law of Non-Navigational Uses of International Watercourses, Commentary on Draft Article 21, *Yearbook of the International Law Commission* 1994 vol II(2), 122; and Draft Articles on the Law of Transboundary Aquifers, Commentary on Draft Article 12, *Report of the International Law Commission on the Work of its 60th Session*, UN Doc. A/63/10 (2008), 38.

¹⁰⁰ LOSC, Arts 209(1) and 145.

¹⁰¹ See further the regulations, above n 30 and M. Lodge, Chapter 7 in this volume.

organizations or diplomatic conferences. The nature of this obligation varies, depending on the source. The weaker obligation is in relation to land-based sources, dumping and the atmosphere, where the LOSC stipulates merely that States parties '*shall endeavour to establish* global and regional rules, standards and recommended practices and procedures' (emphasis added).¹⁰² In the case of pollution from seabed activities within national jurisdiction and shipping, the obligation is stronger: here States '*shall establish*' international rules and standards (emphasis added).¹⁰³ In the case of pollution from land-based sources, any international rules and standards adopted shall take 'into account characteristic regional features, the economic capacity of developing States and their need for economic development'.¹⁰⁴ This is an early formulation of what has become known as the principle of common but differentiated responsibility,¹⁰⁵ and is its only appearance in the marine environmental provisions of the LOSC, with the exception of Article 194(1), which stipulates that States are to take all necessary measures to control pollution 'in accordance with their capabilities'.

The provisions of the LOSC calling for the adoption of international rules and standards have had little direct practical impact, apart from the Area. In relation to land-based sources, dumping and shipping, a wealth of global and/or regional rules had been adopted by the time the LOSC entered into force in 1994 and have continued to be developed since, but there is no evidence that the various international organizations and treaty regimes under which such development has taken place have been influenced by the provisions of the LOSC referred to above. For atmospheric pollution and seabed activities within national jurisdiction, some global and/or regional rules and standards have been adopted since the LOSC came into force, but again there is no explicit evidence that in doing so the States concerned were influenced by obligations in the LOSC.

The LOSC not only calls on States collectively to adopt international rules and standards to prevent, reduce and control pollution from each source, it also requires them individually to implement such rules and standards through their national legal systems, regardless of whether or not they are parties to the treaties or soft-law measures containing such rules and standards. Again the nature of the obligation varies, depending on the source of marine pollution. The strongest obligation is in relation to pollution from shipping. Here flag States 'shall adopt laws and regulations' to control pollution from their ships that 'shall at least have the same effect as that of generally accepted international rules and standards established through the competent international organization or general diplomatic conference'.¹⁰⁶ Almost as strong are the obligations relating to seabed activities within national jurisdiction, the Area and

¹⁰² LOSC, Arts 207(4), 210(4) and 212(3).

¹⁰³ LOSC, Arts 208(5) and 211(1).

¹⁰⁴ LOSC, Art. 207(4).

¹⁰⁵ See further Y. Tanaka, Chapter 2 in this volume.

¹⁰⁶ LOSC, Art. 211(2). As to the meaning of the phrase following 'same effect', see International Law Association, 'Final Report of the Committee on Coastal State Jurisdiction relating to Marine Pollution' in *Report of the Sixty-Ninth Conference* (International Law Association 2000) 443. Note that coastal States may, but are not required to, adopt national legislation applicable to foreign ships that gives effect to international rules: see LOSC, Arts 211(4) and (5).

dumping, where States 'shall adopt laws and regulations' to control pollution from those sources that 'shall be no less effective than international rules, standards and recommended practices and procedures'.¹⁰⁷ Far weaker are the obligations that relate to land-based sources and atmospheric pollution, where the national laws and regulations that States must adopt need do no more than 'tak[e] into account' international rules and standards.¹⁰⁸ It is not known how far States have given effect to this set of legislative obligations in practice, and it would be a massive undertaking to try to discover the answer.

States are required to enforce the laws and regulations that they adopt further to the above obligations. The jurisdictional framework for such enforcement is largely in accordance with existing customary international law. Thus, in relation to activities taking place within national jurisdiction with the consent of the territorial State, which covers land-based sources, seabed activities within national jurisdiction and some forms of atmospheric pollution, enforcement is solely by the territorial State. The LOSC requires enforcement, but does not otherwise limit that State's discretion.¹⁰⁹ In the case of dumping, enforcement must be undertaken by flag States in respect of their ships, by coastal States in respect of dumping in their maritime zones, and by port States in respect of ships loading waste in their ports for the purpose of dumping.¹¹⁰ Clearly there is the potential for overlaps of jurisdiction here. Article 216(2) addresses this issue by providing that no State 'shall be obliged ... to institute proceedings when another State has already instituted proceedings'. In the case of national legislation relating to the Area, the LOSC is not wholly clear. It appears to imply that States may enforce their legislation,¹¹¹ while the Authority also has the power to enforce its own rules on which national legislation is based.¹¹²

With shipping the position becomes more complex and departs from customary international law in some significant respects. The traditional position continues to apply to flag States. They shall enforce their laws and regulations in respect of their ships, but may not arrest them in the ports and territorial seas of other States.¹¹³ However, the LOSC develops customary law as far as coastal and port States are concerned. Coastal States' powers depend on the maritime zone in which suspected polluting foreign ships are found. In the territorial sea, a coastal State may undertake physical inspection of a foreign ship in innocent passage that is alleged to have violated that State's laws or applicable international rules and, where the evidence so warrants, arrest it and institute legal proceedings.¹¹⁴ A coastal State has unrestricted enforcement jurisdiction where a foreign ship has engaged in 'wilful and serious pollution' because that renders the ship's passage non-innocent.¹¹⁵ However, in those parts of the territorial sea, if any, that constitute straits subject to a right of transit passage, a coastal

¹⁰⁷ LOSC, Arts 208(1) and (3); 209(2) and 214; and 210(1) and (6).

¹⁰⁸ LOSC, Arts 207(1) and 212(1).

¹⁰⁹ LOSC, Arts 213, 214 and 222.

¹¹⁰ LOSC, Art. 216(1).

¹¹¹ LOSC, Arts 215 and 139.

¹¹² LOSC, Arts 153, 162(2) and 165(2)(c).

¹¹³ LOSC, Art. 217.

¹¹⁴ LOSC, Arts 220(2) and 27.

¹¹⁵ LOSC, Art. 19.

State's enforcement jurisdiction is greatly constrained, and it may arrest a polluting ship only if the suspected illegal pollution causes or threatens 'major damage to the marine environment of the straits'.¹¹⁶ Finally, in its EEZ a coastal State has a graduated enforcement competence, depending on the severity of the alleged illegal pollution committed by a foreign ship. At a minimum the coastal State may request certain information from the alleged offending ship. However, where the alleged violation of national legislation implementing 'applicable international rules' has resulted 'in a substantial discharge causing or threatening significant pollution of the marine environment', a coastal State may undertake physical inspection of the ship in the EEZ or territorial sea if the ship has refused to give, when requested, certain specified information or has given manifestly incorrect information. Only where the alleged violation has resulted 'in a discharge causing major damage or threat of major damage to the coastline or related interests of the coastal State, or to any resources of its territorial sea or exclusive economic zone' may the coastal State, if the evidence so warrants, arrest and prosecute the ship.¹¹⁷

The most radical innovation made to enforcement jurisdiction in respect of pollution from ships concerns port States. While Article 220(1) follows customary international law – although supplementing it as a result of the introduction of the EEZ – by providing that a State may arrest and prosecute a foreign ship in one of its ports which is alleged to have violated applicable international rules in that State's territorial sea or EEZ, Article 218 is truly innovative because it provides that a port State may also take legal proceedings against a ship in one of its ports that is alleged to have discharged polluting matter *outside* that State's territorial sea or EEZ 'in violation of applicable international rules'. The port State must not take legal proceedings where the discharge occurred in the internal waters, territorial sea or EEZ of another State unless that State or the flag State so requests. In practice, few port States appear to have enacted the necessary legislation to endow themselves with this radical new enforcement competence; and in the case of those that have, there appear to be no reports of such powers yet having been exercised.¹¹⁸

The LOSC not only deals with the adoption and implementation of international rules and standards, it also sets the jurisdictional parameters for individual States parties to regulate marine pollution by national law going beyond international rules and standards. The LOSC contains no restrictions on the legislative or enforcement jurisdiction of States in relation to measures to control pollution going beyond international rules and standards in respect of land-based sources, seabed activities within national jurisdiction, the Area or atmospheric sources. This is scarcely surprising given that the first and second of those sources, and to some extent the fourth, all relate to activities within national jurisdiction that cannot take place without the consent of

¹¹⁶ LOSC, Art. 233.

¹¹⁷ LOSC, Art. 220(3), (5), (6) and (8).

¹¹⁸ The USA has prosecuted a foreign ship for alleged pollution committed outside the maritime zones of the USA, but that was not on the basis of the LOSC as the USA is not a party and the prosecution took place before the LOSC entered into force: see S. Gehan, 'United States v. Royal Caribbean Cruises, Ltd.: Use of Federal "False Statements Act" to extend Jurisdiction over Polluting Incidents into Territorial Seas of Foreign States' (2001) 7 *Ocean and Coastal Law Journal* 167.

the territorial State. The position in relation to dumping is almost the same, the only restriction imposed on a coastal State's freedom of action being that its power to 'permit, regulate and control' dumping in its maritime zones shall not be exercised until after it has engaged in 'due consideration of the matter with other States which by reason of their geographical situation may be adversely affected thereby'.¹¹⁹

The only source of marine pollution where there are significant constraints on States' freedom of action to enact legislation going beyond international rules is shipping. The existence of such constraints, which apply largely only to coastal States, reflects the international nature of the shipping industry. In the territorial sea the coastal State may prescribe pollution control measures for foreign ships in innocent passage going beyond international rules, provided that such measures do not 'apply to the design, construction, manning or equipment of foreign ships'.¹²⁰ Such measures must be publicized and must be non-discriminatory.¹²¹ However, where the territorial sea consists of straits subject to the regime of transit passage, the coastal State is prohibited from adopting legislation going beyond international rules.¹²² Within its EEZ, according to Article 211(6), a coastal State may adopt legislation going beyond international rules only where the latter are considered inadequate to provide sufficient ecological protection for areas of its EEZ that require special measures to prevent pollution for 'recognized technical reasons in relation to [their] oceanographic and ecological conditions as well as ... the protection of [their] resources and the character of [their] traffic'. The exercise of this legislative power is subject to certain conditions. The coastal State must not impose design, construction, manning or equipment standards on foreign ships other than generally accepted international rules and standards; it must consult the International Maritime Organization (IMO) and obtain the latter's approval for its proposed measures; and it must not apply its legislation to foreign ships until 15 months after having first approached the IMO.¹²³ Within areas of the EEZ that are ice-covered where 'particularly severe climatic conditions and the presence of ice covering such areas for most of the year create obstructions or exceptional hazards to navigation' and pollution from ships could cause 'major harm to or irreversible disturbance of the ecological balance', Article 234 provides that a coastal State may unilaterally adopt legislation with significantly fewer constraints. The only conditions are that coastal State measures must be non-discriminatory and have 'due regard to navigation'.¹²⁴ There appear to be no instances yet of any State having made any use of the powers given by Article 211(6). However, there have been some instances of unilateral EEZ measures that do not conform to the conditions of Article 211(6). For example, following the *Prestige* disaster in 2002, when an elderly leaking oil tanker caused massive oil pollution after having being sunk by the Spanish authorities, France, Portugal and Spain all adopted laws, without any consultation with the IMO or having given foreign ships the requisite notice, banning from their EEZs single hull tankers

¹¹⁹ LOSC, Art. 210(5).

¹²⁰ LOSC, Arts 21(1)(f) and (2), and 211(4).

¹²¹ LOSC, Arts 21(3) and 24(1)(b).

¹²² LOSC, Art. 42(1)(b).

¹²³ LOSC, Art. 211(6).

¹²⁴ LOSC, Art. 234.

carrying heavy fuel oil that were more than 15 years old; and Morocco made the entry of such ships into its EEZ subject to prior notification.¹²⁵

The final significant matter concerning marine pollution with which the LOSC deals is the question of liability and compensation. Article 235 provides that States are liable for breaches of their international obligations concerning the prevention, reduction and control of marine pollution and calls on them to ensure that 'recourse is available' under their national legal systems for 'prompt and adequate compensation' in respect of pollution damage caused by those under their jurisdiction. Article 235 goes on to require States to co-operate to implement and develop international law regarding liability and compensation schemes. Before the entry into force of the LOSC, there was already in existence an effective and widely used international regime governing liability and compensation for damage caused by oil pollution from ships.¹²⁶ A similar scheme was subsequently adopted for damage caused by hazardous and noxious substances carried by ship, although it is yet to enter into force.¹²⁷ However, no international liability and compensation schemes have been adopted for other sources of pollution, nor does the writer know to what extent national schemes have been developed, as called for by Article 235.

Finally, to sum up briefly the significance of the LOSC for the prevention, reduction and control of marine pollution: the LOSC appears to have had little or no impact on the development of international rules and standards to prevent, reduce and control marine pollution, except in relation to activities in the Area, or on the establishment of international schemes dealing with liability and compensation for damage caused by marine pollution. It is not known, and it would be very difficult to discover, what influence the LOSC has had on the adoption of national legislation to control marine pollution. Undoubtedly, the most important contribution of the LOSC has been to establish a clear framework for the exercise of legislative and enforcement jurisdiction by States to prevent, reduce and control marine pollution.

6. CLIMATE CHANGE

Increased emissions of greenhouse gases over past decades have had and are continuing to have a number of adverse consequences for the marine environment, including

¹²⁵ *Oceans and Law of the Sea: Report of the Secretary-General*, UN Doc. A/58/65 (3 March 2003), 21.

¹²⁶ See International Convention on Civil Liability for Oil Pollution Damage (adopted 27 November 1992, entered into force 30 May 1996) 1956 UNTS 255, replacing an earlier Convention with the same title of 1969; and 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, replacing an earlier Convention with the same title of 1971.

¹²⁷ See 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 *International Legal Materials* 1415.

greater acidification of sea water, higher water temperatures and rises in sea levels.¹²⁸ One would expect a contemporary marine environmental treaty to say something about climate change, even if only to acknowledge its existence and effects. The LOSC, however, makes no mention of climate change. That is scarcely surprising. While the greenhouse effect had been known about for a long time, climate change was not put on to the international political and legal agenda until the late 1980s, well after the adoption of the LOSC. Greenhouse gas emissions fall within the LOSC's definition of marine pollution and on that basis could be addressed through the provisions of the LOSC, including Article 194(1), which calls on States to take measures to 'prevent, reduce and control pollution of the marine environment from any source'; Article 222 on atmospheric pollution (discussed in the previous section); and the general obligation on all States to 'protect and preserve the marine environment' set out in Article 192 (also discussed earlier). However, in practice the control of greenhouse gas emissions and the adoption of possible measures to mitigate their effects are not being addressed within the framework of the LOSC at all, but in other fora. Thus, international efforts to control emissions are centred on the Conference of the Parties to the United Nations Framework Convention on Climate Change¹²⁹ and the International Maritime Organization (IMO) in the case of emissions from ships (a not insignificant source of greenhouse gas emissions); while mitigation measures, such as carbon sequestration and storage and ocean fertilization, are being addressed through the London Convention and some regional dumping regimes and the CBD.¹³⁰

7. CONCLUSIONS

The LOSC was adopted at a time when international environmental law was less well developed than today and a number of significant principles as guides to the taking of action to protect the environment, including the precautionary approach/principle, sustainable development and the ecosystem approach, had yet to emerge. It was also a time when there was less awareness and knowledge of environmental matters, particularly global climate change and its consequences for the marine environment, and the existence and significance of deep sea environments such as seamounts, cold-water coral reefs and hydrothermal vents and their associated ecosystems and biodiversity. Nevertheless, even taking those factors into account, it is hard to resist the conclusion that the LOSC has serious deficiencies, especially when compared with the ideal contemporary marine environmental treaty posited at the beginning of this chapter. Above all, it has various normative weaknesses. It either contains no substantive norms of its own (for example, as regards marine pollution), mainly because of the prior existence of a variety of relevant treaties, or, where it does contain substantive norms, they are too imprecise, qualified or ambiguous to be effective (for

¹²⁸ On ocean acidification, see further Tim Stephens, 'Ocean acidification', Chapter 20 in this volume.

¹²⁹ Opened for signature 9 May 1992, entered into force 21 March 1994. 1771 UNTS 165.

¹³⁰ On geoengineering, see further Karen N. Scott, 'Geoengineering and the marine environment', Chapter 21 in this volume.

example, as regards the conservation of species and the protection of marine habitats). A few of these normative deficiencies have to some extent been made good through the second implementing agreement, the Fish Stocks Agreement, concerning straddling and highly migratory fish stocks, and could be further made good if a third implementing agreement, on the conservation of marine biodiversity beyond the limits of national jurisdiction, were eventually adopted. The ITLOS (and other courts and tribunals) also have the potential to strengthen the environmental provisions of the LOSC through interpretation. Overall, however, it is a weakness of the LOSC that it does not provide more straightforwardly for its normative development. In this respect it compares unfavourably with many multilateral environmental treaties which have provided the conferences/meetings of their parties with the powers to drive those agreements normatively forward.

The LOSC calls for the development of international rules to prevent, reduce and control marine pollution and to provide for liability and compensation schemes where damage from pollution occurs. Although many such rules now exist, there is little evidence that the LOSC has had much influence on their adoption. The exception is in relation to mining in the Area, where the LOSC has established the International Seabed Authority and endowed it with the responsibility and powers to adopt and enforce rules to protect the marine environment from harm caused by deep sea mining, powers that the Authority has already exercised to a considerable degree. The LOSC also requires national laws to be adopted to implement international rules. What impact that aspect of the LOSC has had is not known and is a question that would benefit from further research.

The most significant contribution of the LOSC to the protection of the marine environment has been to establish a clear jurisdictional framework for the adoption and enforcement of national measures to protect the marine environment. Before the conclusion of the LOSC, this was a matter where there had been much uncertainty and conflict. It is probably also the case that the negotiation and existence of the LOSC have helped to raise awareness of marine environmental issues. That is also a significant contribution. How much influence the LOSC has had on the practice of States, both in concluding treaties relating to protection of the marine environment and in adopting national legislation, is uncertain, and a matter where further research would be desirable. Such research would contribute to our generally rather limited knowledge of the influence of treaties on the behaviour of States.