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DOI

[10.1163/016738309X12537002674484](https://doi.org/10.1163/016738309X12537002674484)

Publication date

2009

Document Version

Final published version

Published in

Grotiana

[Link to publication](#)

Citation for published version (APA):

Schrijver, N., & Prislán, V. (2009). From Mare liberum to the global commons: Building on the Grotian heritage. *Grotiana*, 30(1), 168-206.

<https://doi.org/10.1163/016738309X12537002674484>

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From *Mare Liberum* to the Global Commons: Building on the Grotian Heritage*

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Abstract

This article addresses the heritage of Grotius's concept of common goods (*res communes*) as developed in his seminal work *Mare liberum*. This contribution identifies the basic tenets of Grotius's thinking on the nature of common property and identifies the relevance of these ideas for the present day management of global commons, i.e., the areas and natural resources beyond the limits of national jurisdiction. Successively, the article examines the regimes for: the deep seabed, the high seas, and marine mammals; outer space, particularly the moon; the two polar regions; and the atmosphere, in particular the ozone layer and the climate system. The article demonstrates how some of the original tenets of Grotius's concept of *res communis* – in particular the idea of inexhaustibility – can no longer be upheld and how the freedom of access to the global commons has become increasingly qualified and supplemented, if not replaced by a new law of international co-operation aimed at conservation and sustainable use of natural wealth and resources beyond the limits of national jurisdiction. The global commons function as laboratories for the testing of new principles of international law and new forms of international co-operation, which can be said to clearly build upon the Grotian heritage.

Keywords

Hugo Grotius, freedom of the seas, global commons, common goods, *res communis*, high seas deep seabed, outer space, Antarctica, Arctic region, atmosphere, ozone layer, climate system, United Nations

* This article builds on Chapter 4 of N.J. Schrijver, *Development without Destruction: The UN and Global Resource Management*, commissioned by the UN Intellectual History Project, New York, and forthcoming with Indiana University Press, Bloomington, 2010.

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*If in a thing so vast as the sea a man were to reserve to himself from general use nothing more than mere sovereignty, still he would be considered a seeker after unreasonable power. If a man were to enjoin other people from fishing, he would not escape the reproach of monstrous greed. But the man who even prevents navigation, a thing which means no loss to himself, what are we to say of him?*¹

Introduction

Ever since Hugo Grotius in his seminal *Mare liberum* (1609) opposed the claims on sovereignty over oceans advanced by Portugal, Spain, and some other countries of his time, there has been a tension between national claims over areas and resources hitherto not under the control of individual states, and the aspirations towards reserving them as *res communes*, that is, as common goods. While many of the planet's natural resources now belong to one of the 200 or so territorial units called states, some natural resources nevertheless have not been subject to national appropriation and continue to belong to the 'global commons'.

In old English and also Dutch law, the term 'commons' (*marken* in Dutch) denoted an arrangement under which property or resources were held in common and jointly exploited, such as the village square or shared grazing grounds.² By way of analogy to interstate relations, 'global commons' denote those natural resources that are not subject to the national jurisdiction of a particular state,³ but belong to the international community as a whole and all nations have equal legal access to them.⁴ As a result, no single decision-making unit holds exclusive title to these resources.⁵ In that they belong to everyone and yet are from no one, global commons in many ways resemble the concept of 'common goods', upon which Grotius relied to defend the Dutch claims for the free seas. Four hundred years after the publication of *Mare liberum*,

¹ H. Grotius, *Mare liberum* (1609), translation in R.D. Magoffin, *The freedom of the seas, or the right which belongs to the Dutch to take part in the East Indian trade* (New York: Oxford University Press, 1916), p. 38. References to *Mare liberum* in this article refer to this edition.

² In the terminology of property law, 'commons' represent those resource domains in which 'common pool resources' are found – in the sense that access to them, or the exploitation thereof, cannot be efficiently limited to a 'pool' of users.

³ For example, the Organisation for Economic Co-operation and Development (OECD) defines global commons as 'natural assets outside national jurisdiction.' See the OECD Glossary of Statistical Terms, available at <<http://stats.oecd.org/glossary/index.htm>>.

⁴ See S.J. Buck, *The Global Commons: An Introduction* (Washington, D.C.: Island Press, 1998).

⁵ See P.M. Wijkman, 'Managing the global commons', *International organization* 36 (1982), pp. 511-536, at p. 512.

it therefore seems appropriate to re-examine Grotius's thinking on common property and draw some parallels between his concept of common goods and the current management of global commons. After all, many of the arguments developed by Grotius with respect to common goods retain some of their validity today.

After examining Grotius's concept of common goods, the article presents the evolving regime for deep seabed exploitation and the regulation of the exploitation and conservation of the living resources of the high seas – fisheries, as well as whales and seals. Next, it presents the management regime applicable to the resources of outer space, particularly the moon and perhaps of other celestial bodies. It then, thirdly, addresses the management of the natural resources in the two polar regions. Furthermore, the article also discusses the problems involved with the management of atmospheric resources, in particular the ozone layer and the climate system. The lessons learned from these management regimes might provide important insights as to the state of the art of global natural resource management in contemporary international law and are taken up in the final section of this article.

Grotius's concept of *res communis*

The booklet anonymously published under the title of *Mare liberum* was part of the legal brief that Grotius prepared for the United Dutch East India Company (VOC) to defend the seizure of the Portuguese carrack *Sta. Catarina* and its rich cargo by the Dutch Admiral Jakob van Heemskerck in February 1603.⁶ Grotius's work was thus neither a 'philosophic exercise',⁷ nor a work 'of pure and unbiased juristic science',⁸ but rather a work of advocacy and, in a sense, a product of particular national desires. Yet, this fact does not diminish the value of *Mare liberum*. The reasoning developed therein remains exemplary. Before turning to the specific case of the Portuguese, Grotius devotes at every step a considerable part of his manuscript to questions of principle, elaborating

⁶ For a recent account of this incident, see P. Borschberg, 'The Seizure of the *Sta. Catarina* Revisited: The Portuguese Empire in Asia, VOC Politics and the Origins of the Dutch-Johor Alliance (1602-c.1616)', *Journal of Southeast Asian Studies*, 33 (2002), 31-62. For the geo-political consequences of this incident and generally on the expansion of the VOC in Asia, see J.A. Somers and C.G. Roelofsen, '*Mare Liberum* and the Dutch East India Company', *Grotiana* 24/25 (2003/2004), 67-76.

⁷ See J.B. Scott, 'Introductory note', in *The freedom of the seas, or the right which belongs to the Dutch to take part in the East Indian trade* (New York: Oxford University Press, 1916), at p. vi.

⁸ See the commentary on the works of Selden and Grotius by P.B. Potter, in *The freedom of the seas in history, law and politics* (London: Longmans, Green, 1924), p. 61.

at great length upon certain general propositions. He builds his arguments by reference to the works of poets, philosophers and jurists from the past, skilfully combining the opinions of Cicero, Seneca, Thucydides, Avienus, as well as Horace, Vergil and Ovid, and all those ‘whose natural judgment admittedly is held in the highest esteem’,⁹ including the Spanish scholastics. It is on the basis of this method that he then systematically refutes the various claims of the Portuguese, who sought to exercise the right of excluding all foreigners from navigating or entering the waters of the Atlantic and the Indian Oceans.

After dealing initially with a number of arguments that could have been advanced to defend the Portuguese dominion over the seas, including claims based on prescription and custom, papal donation, and war title, Grotius then turns in Chapter V to a more fundamental issue, that is, whether the seas can be occupied. It is in this chapter that Grotius develops his own understanding of the idea of common property,¹⁰ an understanding that remains of particular interest for the discussion of the present-day management of the global commons. Grotius begins his arguments by observing that, in the phraseology of the Law of Nations, the sea has been differently identified as the property of no one (*res nullius*), a common possession (*res communis*), or public property (*res publica*). Since each of these terms has different legal connotations, Grotius embarks – in order to prove that the sea was common property, which cannot belong to the Portuguese or Spanish, or any other nation – upon an extensive discussion on the origins and limits of property and gives a historical account of the evolution of the concept of property itself.

The history of this development, according to Grotius, starts in the primitive law of nations, sometimes called natural law, where no particular right of property existed, for ‘nature knows no sovereignty’.¹¹ In that primitive state of affairs, all things were held in common, that is shared and undivided; and this kind of common possession related to use.¹² With the passing of time, however, the transition towards the distinction of ownerships took place: property was invented, and the law of property was established ‘to imitate nature’.¹³ This, according to Grotius’s narrative, ‘did not come violently, but gradually, nature herself pointing out the way’.¹⁴ Property was initially limited to

⁹ *Mare liberum*, p. 22.

¹⁰ Cf. R. Perruso, ‘The Development of the Doctrine of *Res Communes* in Medieval and Early Modern Europe’, *Tijdschrift voor rechtsgeschiedenis*, 70 (2002), 69–94, at p. 90.

¹¹ *Mare liberum*, p. 23.

¹² *Ibid.*, pp. 23–24. As Grotius explains there, not even the fields were delimited by boundary lines, nor was there commercial intercourse.

¹³ *Ibid.*, p. 25.

¹⁴ *Ibid.*, p. 24.

particular things or movables, but – as Grotius points out with a certain sense of inevitability – ‘[w]hen that had come about, not even immovables, such, for instance, as fields, could remain unapportioned. For although their use does not consist merely in consumption, nevertheless it is bound up with subsequent consumption’.¹⁵

As Grotius explains, property of individuals was established by taking possession.¹⁶ In the case of movable things possession was to be effected by seizure, whereas in the case of immovables it was created either by the erection of buildings or by some determination of boundaries, such as fencing in.¹⁷ However, private property was not the only property that had been ‘wrested away from early ownership in common’. In Grotius’s view, the establishment of states – which came about the same time as the gradual transition towards private property – brought with it also the category of public ownership for those things that were the property of the people. This arises in the same way as private property, namely out of occupation.¹⁸

Grotius then draws two conclusions regarding the nature of property – which essentially define his understanding of the concept of common property:

The first is, that that which *cannot be occupied*, or which never has been occupied, cannot be the property of any one, because all property has arisen from occupation. The second is, that all that which has been *so constituted by nature that although serving some one person it still suffices for the common use of all other persons*, is today and ought in perpetuity to remain in the same condition as when it was first created by nature.... All things which can be used without loss to any one else come under this category.¹⁹

Thus, according to Grotius, common property consists of those things which either cannot be reduced to possession or are in infinite supply and thus suffice for the common use of all persons. It appears that for Grotius it is not so much the inexhaustibility of things that is of defining character, but their susceptibility to universal use. Common property cannot be occupied ‘either by nature or on grounds of public utility’.²⁰ In Grotius’s view the susceptibility

¹⁵ *Ibid.*, pp. 24–25.

¹⁶ *Ibid.*, p. 25.

¹⁷ *Ibid.*, pp. 25–26. As Grotius at the same point explains, in the case of things ‘which resist seizure,’ like wild animals, occupation must be uninterrupted or perpetually maintained, while in the case of other things, it is sufficient that the intention to possess is maintained after physical possession is once taken. *Ibid.*

¹⁸ *Ibid.*, p. 26. At another place Grotius states: ‘public territory arises out of the occupation of nations, just as private property arises out of the occupation of individuals’ *Ibid.*, p. 34.

¹⁹ *Ibid.*, p. 27, emphasis added.

²⁰ *Ibid.*, p. 37.

to universal use distinguishes common property (*res communis*) – that is, property which belongs to all and thus ‘cannot be taken away from all by any one person any more than what is mine can be taken away from me by you’ – from property belonging to no one (*res nullius*).²¹

Grotius’s concept of common property is therefore defined by a rather novel legal formula, one essentially comprised of a two-tiered (nature/public utility) test, which he then applies to a number of things that ancient writers considered to be common to all mankind. The first considered by Grotius to fall into this category of property is the air, because it is not susceptible of occupation and its common use is destined for all men. For the same reasons, Grotius considers the sea to be common to all, ‘because it is so limitless that it cannot become a possession of any one, and because it is adapted for the use of all, whether we consider it from the point of view of navigation or of fisheries’,²² or as he puts it elsewhere, ‘because nature not only allows but enjoins its common use’.²³ The same applies by extension to ‘things which the sea has carried away from other uses and made its own, such for example as the sands of the sea, of which the portion adjoining the land is called the coast or shore’.²⁴

The treatment by Grotius of the shore as common property is far from unproblematic, for the coast can in principle be occupied as any other territory. This fact forces him to eventually concede that in specific circumstances the shore can become private or public property as well.²⁵ When it comes to the sea, however, the situation is different, he says, ‘because the sea, except for

²¹ As Grotius points out with regard to things open to common use, ‘although those things are with reason said to be *res nullius*, so far as private ownership is concerned, still they differ very much from those things which, though also *res nullius*, have not been marked out for common use, such for example as wild animals, fish, and birds. For if any one seizes those things and assumes possession of them, they can become objects of private ownership, but the things in the former category by the consensus of opinion of all mankind are forever exempt from such private ownership on account of their susceptibility to universal use; and as they belong to all they cannot be taken away from all by any one person any more than what is mine can be taken away from me by you.’ *Ibid.*, p. 29.

²² *Mare liberum*, p. 28. However, Grotius’s position with regard to fisheries appears to be somewhat inconsistent, as at a later point he claims that ‘in a way it can be maintained that fish are exhaustible’ *Ibid.*, at p. 43.

²³ *Ibid.*, p. 30.

²⁴ *Ibid.*, p. 28,

²⁵ Grotius considers this possible only insofar as such occupation does not affect its common use: ‘his ownership lasts no longer than his occupation lasts, inasmuch as the sea seems by nature to resist ownership. For just as a wild animal, if it shall have escaped and thus recovered its natural liberty, is no longer the property of its captor, so also the sea may recover its

a very restricted space, can neither easily be built upon, nor inclosed; if the contrary were true yet this could hardly happen without hindrance to the general use'.²⁶ Irrespective of that, Grotius carefully admits that some small parts of the sea may very well be occupied.²⁷ Furthermore, he also skilfully qualifies other cases when states exercised certain rights of *imperium* (sovereign rights) over the sea.²⁸

Having thus dwelled with certain exceptions that would point against the common nature of the sea, Grotius concludes that 'neither a nation nor an individual can establish any right of private ownership over the sea itself (I except inlets of the sea), inasmuch as its occupation is not permissible either by nature or on grounds of public utility', and thence, 'the Portuguese have not established private ownership over the sea by which people go to the East Indies'.²⁹ For, as he argues, his test for common property is 'in

possession of the shore', *Mare liberum*, p. 30. Grotius notes that in the Roman empire, the shore was considered property of the Roman people. Hence, he also concedes that the entire shore could be claimed as the property of the state (*ibid.*, p. 31). As Perruso comments, Grotius apparently treats the shore as a hybrid between public and common property. Perruso, 'Doctrine of *Res Communes*', p. 92.

²⁶ *Mare liberum*, p. 31.

²⁷ In Grotius's view, 'if any small portion of the sea can be thus occupied, the occupation is recognized', *Mare liberum*, p. 31. As examples of such occupation, Grotius refers to situations where piles were driven into the sea, where a breakwater was built, or where an inlet of the sea was fenced off to make a fish pond (see *ibid.*, pp. 31-33). In his later treatise, *De iure belli ac pacis*, Grotius expands this exception by conceding that 'the sea also can be acquired by him who holds the lands on both sides, even though it may extend above as a bay, or above and below as a strait, provided that the part of the sea in question is not so large that, when compared with the lands on both sides, it does not seem a part of them', II.3.8. At a later point in *Mare liberum*, Grotius also contrasts the case of the sea from that of the river: 'Hence it follows, to speak strictly, that no part of the sea can be considered as the territory of any people whatsoever. ... If it were otherwise there would be no difference between the things which are "common to all", and those which are strictly termed "public"; no difference, that is, between the sea and a river. A nation can take possession of a river, as it is inclosed within their boundaries, with the sea, they cannot do so', *Mare liberum*, p. 34. At another place, he reconsiders this difference also in the context of acquired rights: 'The case of the sea is not the same as that of a river, for as a river is the property of a nation, the right to fish in it can be passed or leased by the nation or by the ruler, in such a way (and the like is true with the ancients) that the lessee enjoys the operation of the injunction *de loco publico fruendo* ... Such a condition cannot arise in respect to the sea', *Ibid.*, p. 36.

²⁸ In this respect, Grotius notes, for example, that the right of the Romans over the seas did not extend beyond protection and jurisdiction (*Mare liberum*, p. 35), and acknowledges the fact that revenues were being levied on maritime fisheries which were held to belong to the Crown, but notices, at the same time, that these rights do not bind the sea itself or the fisheries, but only the persons engaged in fishing (*ibid.*, p. 36).

²⁹ *Ibid.*, pp. 36-37.

this case infinitely more powerful than in all others'.³⁰ First of all, he notes that the Portuguese claims do not relate to what may be called an 'inner sea', surrounded on all sides by the land and not even exceeding a river in breadth:

No! The question at issue is the OUTER SEA, the OCEAN, that expanse of water which antiquity describes as the immense, the infinite, bounded only by the heavens, parent of all things; the ocean which the ancients believed was perpetually supplied with water not only by fountains, rivers, and seas, but by the clouds, and by the very stars of heaven themselves; the ocean which, although surrounding this earth, the home of the human race, with the ebb and flow of its tides, can be neither seized nor inclosed; nay, which rather possesses the earth than is by it possessed.³¹

Yet, Grotius finds no evidence of corporal possession or physical appropriation of this extensive 'outer sea', since the Portuguese have neither covered the ocean,³² nor have they occupied it by sailing over – for, 'a ship sailing through the sea leaves behind it no more legal right than it does a track'.³³ Neither have they brought it under control by holding in their power the ports and shores to the East Indies.³⁴

Secondly, in no way was according to Grotius the use of this ocean prejudicial to the use by others.³⁵ Even if the Portuguese had had dominion over the

³⁰ See *ibid.*, pp. 36–37. And he adds to this: 'That which in other cases seems difficult, is here absolutely impossible; and what in other cases we recognize as unjust is here most barbarous and inhuman', *Ibid.*

³¹ *Mare liberum*, p. 37. And he adds: 'Further, the question at issue does not concern a gulf or a strait in this ocean, nor even all the expanse of sea which is visible from the shore', *Ibid.*

³² As he observes: 'But have the Portuguese completely covered the ocean, as we are wont to do on land, by laying out estates on it in such a way that they have the right to exclude from that ocean whom they will? Not at all!', *Mare liberum*, p. 39.

³³ *Ibid.*, p. 40. As Grotius also reasons: 'But if the Portuguese call *occupying* the sea merely to have sailed over it before other people, and to have, as it were, opened the way, could anything in the world be more ridiculous? For, as there is no part of the sea on which some person has not already sailed, it will necessarily follow that every route of navigation is occupied by some one', *Ibid.*, p. 39.

³⁴ 'Therefore the Portuguese have neither just reason nor respectable authority to support their position, for all those persons who assume that the sea can be subjected to the sovereignty of any one assign it to him who holds in his power the nearest ports and the circumjacent shores. But in all that great extent of coast line reaching to the East Indies the Portuguese have nothing which they can call their own except a few fortified posts', *Ibid.*, p. 43.

³⁵ 'Why then,' Grotius asks, 'when it can be done without any prejudice to his own interests, will not one person share with another things which are useful to the recipient, and no loss to the giver?', *Ibid.*, p. 38.

sea, they would not have been able to ‘take away anything from its common use’. For, had it been possible to prohibit any of those activities which were otherwise permitted by the law of nations, like fishing for example (‘for in a way it can be maintained that fish are exhaustible’, he reasons), it still would not have been possible to prohibit navigation, ‘for the sea is not exhausted by that use’.³⁶ He explains:

inasmuch as one and the same thing is susceptible by nature to different uses, the nations seem on the one hand to have apportioned among themselves that use which cannot be maintained conveniently apart from private ownership; but on the other hand to have reserved that use through the exercise of which the condition of the owner would not be impaired.³⁷

Grotius’s argument that the use of oceans was not prejudicial to the use by others would have to be seriously qualified today. In his time, ships indeed left no more than a track. This does no longer hold true for modern maritime transport which warrants extensive regulation and anti-pollution control. And even if the sea might still be considered inexhaustible for purposes of navigation, the argument does certainly not apply to the case of fisheries or the exploitation of other marine resources. This was not obvious to Grotius, since in his time the exploitation of the seas was limited to a few users. However, the improvements in fishing techniques and the growing world population progressively resulted in over-exploitation of marine resources. This also brought to the fore the limitations of the Grotian concept of common goods, and with it the principle of the freedom of the seas.

Throughout the twentieth century these ‘limitations’ were used as arguments in favour of extending the sovereignty of coastal states over extensive maritime areas, thereby supplanting the freedom of access with national control over those resources. Similar arguments were also used in the tendency to gain control over other natural resources, such as those of the deep seabed and the polar regions. These tensions have been accommodated and solved differently. The next sections demonstrate that in some cases freedom of access was preserved, albeit qualified with specific obligations; in other cases, complex management regimes were established, sometimes fundamentally limiting the freedom of access to those resources.

³⁶ *Ibid.*, p. 43.

³⁷ *Ibid.*, p. 44.

The oceans as the original global commons: management of the resources of the deep seabed and the high seas

The 1982 UN Convention on the Law of the Sea laid down a comprehensive legal framework governing the exploitation and conservation of marine natural resources in areas both within and beyond the limits of national jurisdiction.³⁸ On the one hand, it codified the enormous expansion of maritime areas which came under national economic jurisdiction, through a 12 nautical miles territorial sea, a 200 nautical miles Exclusive Economic Zone (EEZ), and an extended continental shelf which under certain circumstances can even stretch up to 350 nautical miles from the baselines on the coast.³⁹ On the other hand, it preserved the resources of the deep seabed and the high seas as common goods, beyond the jurisdiction of any state.

The natural resources of the ocean floor beyond national jurisdiction

That the great ocean depths contain valuable resources was discovered as early as in 1873, when the *Challenger* expedition revealed the presence of polymetallic (manganese) nodules on the deep seabed.⁴⁰ These potato-shaped, dark-colored, rock-like formations, which are rich in valuable metals such as nickel, manganese, copper, and cobalt, were subject of increased interest especially in the 1960s and 1970s, when great economic advantages were expected to be gained from their extensive deposits – by some accounts estimated to be of the order of thousands of millions of tons, and in concentrations richer than in many land-based deposits. Since the end of the 1970s, two other types of resources have been discovered on the deep seabed: polymetallic sulfides and cobalt-rich ferromanganese crusts, the latter particularly rich with such minerals as copper, iron, zinc, silver and gold, as well as cobalt.⁴¹ In spite of these differences, all three types of resources are now subject to the complex and

³⁸ United Nations Convention on the Law of the Sea (UNCLOS), Montego Bay, 10 December 1982, entered into force on 16 November 1994; *UN Doc. A/CONF.62/122* (UNCLOS); 1833 UNTS 3; 21 ILM 1261 (1982).

³⁹ On this N.J. Schrijver, *Sovereignty over Natural Resources: Balancing Rights and Duties* (Cambridge: Cambridge University Press, 1997; paperback re-issue 2008), pp. 202–230.

⁴⁰ More on the expedition, A.L. Rice, ‘The *Challenger* Expedition: The end of an era or a new beginning?’, in *Understanding the oceans*, ed. by M. Deacon, A.L. Rice, and C. P. Summerhayes (London: Routledge, 2001), pp. 27–48.

⁴¹ For more information on these resources, see the essential information brochure on Marine Mineral Resources, available at <<http://www.isa.org.jm/files/documents/EN/Brochures/ENG6.pdf>>.

detailed provisions of Part XI on the deep sea-bed area of the 1982 Law of the Sea Convention.

Building on the 1970 Declaration of Principles Governing the Sea-bed Beyond the Limits of National Jurisdiction,⁴² the Convention on the Law of the Sea proclaimed ‘the Area’ – defined as ‘the sea-bed and ocean floor and the subsoil thereof, beyond the limits of national jurisdiction’ – and its resources to be ‘the common heritage of mankind’ and laid down a complex international regime regulating future deep sea bed mining, together with an appropriate international machinery.⁴³ Yet, many provisions of this new regime proved to be controversial already at the time of the Convention’s adoption in 1982. Although it soon became clear that commercial deep sea bed mining was not likely to take place soon, controversies were not fading away and served as a reason for industrializing States not to ratify the convention. Owing to fierce ideological resistance particularly from the United States, the United Kingdom, and Germany, the political fate of the Convention remained uncertain for quite some time.

For these reasons, the United Nations Secretariat initiated in the late 1980s a series of informal consultations aimed at achieving a universally acceptable regime. In 1994, an agreement was finally reached on various adjustments to the 1982 Convention which substantially accommodated the US and other Western nation’s objections to the deep sea bed mining regime.⁴⁴ Although this was called a supplementary agreement, it *de facto* amounted to a substantive amendment of Part XI of UNCLOS, thereby watering down its controversial provisions on compulsory transfer of technology and compensation to land-based producing countries, as well as significantly restraining the role of the envisaged supranational mining company, the UN Enterprise.⁴⁵ With the adoption of the agreement – which was intended to respond to political and economic changes which occurred since 1982, in particular ‘a growing reliance on market principles’ and ‘the growing concern for the global environment’,⁴⁶ the Convention could quickly enter into force.

⁴² ‘Declaration of Principles Governing the Sea-Bed and the Ocean Floor, and the Subsoil Thereof, beyond the Limits of National Jurisdiction’, General Assembly resolution 2749 (XXV), 17 December 1970.

⁴³ UNCLOS Article 136 and Part XI.

⁴⁴ Agreement relating to the implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982; *UN Doc. A/RES/48/263*, 17 August 1994; 33 ILM 1309 (1994).

⁴⁵ See UNCLOS Article 170(1).

⁴⁶ See Y. Li, *Transfer of Technology for Deep Sea-Bed Mining: the 1982 Convention and Beyond* (Dordrecht: Kluwer, 1994).

The international regime laid down in Part XI of the Convention, now modified by the 1994 Agreement, governs all resource-related activities in the international seabed area.⁴⁷ In spite of the amendments, the guiding principles of the system of exploitation remain the same. First of all, the resources⁴⁸ of the international seabed area shall be the common heritage of humankind, not subject to appropriation by any State. Second, all rights in these resources shall be vested in humankind as a whole and the economic benefits from deep seabed mining are to be shared on a non-discriminatory basis for the benefit of all humankind.⁴⁹ Third, the International Seabed Authority, which came into existence in 1994 with the entry into force of the Convention, shall organize and control the activities in the Area. This entails not only the administration of the resources of the Area, but also the promotion and encouragement of the conduct of marine scientific research in the international area.⁵⁰

The International Seabed Authority (ISA) is composed of all State parties to the Convention and plays a central role in the functioning of the international regime of the Area. The exploration and mining in the Area can be carried out only under a contract issued by the Authority. These contracts may be issued to companies, as well as to states. The Authority also devises regulations regarding exploration and exploitation of the seabed. In 2000, the Regulations on Prospecting and Exploration for Polymetallic Nodules in the Area were thus adopted,⁵¹ which made it possible to issue the first contracts. Since 2002, the ISA has also been preparing similar regulations covering polymetallic sulfides and cobalt-rich ferromanganese crusts. Once mining becomes profitable, the contractors are to pay royalties to the Authority, which is then required to distribute those receipts equitably. In doing that, the Authority has to take into account the interests and needs of developing countries.⁵² Last but not least, the Convention also established a commercial arm of the Authority, which is called the Enterprise and will come into operation only when seabed mining becomes feasible on a commercial scale. Until then, the functions of the Enterprise are to be carried out by the Secretariat of the Authority.⁵³

⁴⁷ UNCLOS Article 134.

⁴⁸ According to UNCLOS Article 133(a), ‘resources’ means all solid, liquid or gaseous mineral resources *in situ* in the Area at or beneath the seabed, including polymetallic nodules.

⁴⁹ Article 137.

⁵⁰ Article 157.

⁵¹ Doc. ISBA/6/A/18. These regulations set out the legal rules that contractors and the Authority must follow in any future work to locate and evaluate nodules and incorporate provisions to protect the marine environment against possible harm from seabed activities.

⁵² UNCLOS Articles 156–165 and 1994 Agreement.

⁵³ Article 170.

The seabed regime became operational in 2001 when the ISA signed the first contracts for exploration of polymetallic nodules in the international seabed area. By 2009, the number of contractors has risen to eight.⁵⁴ They have obtained a license to explore for polymetallic nodules in specified parts of the deep oceans outside national jurisdiction. Their contracts are valid for 15 years. Nevertheless, it is still quite uncertain whether the actual exploitation of nodules will ever take place on a commercial basis. The existing contractors have so far concentrated most of their efforts on research and development activities and long-term environmental studies. So far, a number of factors have inhibited progress towards commercial exploitation. Some of these are attributable to technical difficulties related to retrieving and lifting nodules from great ocean depths, others are connected with the high costs of technological research and development. Yet, should the world markets witness increased demand for most metals that could be derived from seabed resources, the economic conditions for seabed mining could become increasingly promising. It is too early to predict the impact of the current economic recession on the future demand for seabed minerals. In addition, the increased awareness of the fragility of the fauna and flora of the deep seabed, as well as the marine environment in general, may lead many States to have second thoughts on the wisdom of the UN authorizing deep seabed mining.

The living resources of the high seas

In contrast to the principle of common heritage of humankind which governs the international regime for the management of the resources of the Area, the centuries old Grotian principle of open access remains the starting point of the 1982 Convention on the Law of the Sea for the management of the living resources of the high seas.⁵⁵ These include stocks living permanently in the high seas, stocks that migrate large portions of the oceans (highly-migratory stocks), or high seas portions or life stages of stocks that straddle

⁵⁴ The list of contractors includes: China Ocean Mineral Resources Research and Development Association (2001), the Japanese Deep Ocean Resources Development Company (2001), the Government of India (2002), The Government of the Republic of Korea (2001), the Institut français de recherche pour l'exploitation de la mer (2001), the Interoceanmetal Joint Organization (2001), the Russian Yuzhmorgeologiya (2001), and the Federal Institute for Geosciences and Natural Resources of the Federal Republic of Germany (2006). Information on these contractors is available at: <<http://www.isa.org/jm/files/documents/EN/Brochures/ENG3.pdf>>.

⁵⁵ According to UNCLOS Article 86, the high seas comprise 'all parts of the sea that are not included in the exclusive economic zone, in the territorial sea or in the internal waters of a State, or in the archipelagic waters of an archipelagic State.'

the boundaries of coastal states' EEZs and the high seas (straddling stocks). This essentially means that high seas resources can be exploited on a first come-first served basis, unless states establish, on the basis of an international agreement, a different regime for their management. But while the 1982 Convention thus maintained the traditional freedoms of the high seas for all states, whether coastal or land-locked, including the freedom of fishing, it subjected these freedoms to the general proviso that they 'shall be exercised by all States with due regard for the interests of other States in their exercise of the freedom of the high seas'.⁵⁶ In this regard, the Convention builds on the dictum of the International Court of Justice in the 1974 *Fisheries Jurisdiction* cases between the United Kingdom and Germany and Iceland, in which it was noted that 'the former *laissez faire* treatment of the living resources of the sea in the high seas has been replaced by a recognition of a duty to have due regard to the rights of other States and the needs of conservation for the benefit of all'.⁵⁷

Furthermore, the Law of the Sea Convention subjected the freedom of fishing to duties as regards the conservation and management of the living resources of the high seas. These are spelled out in Part VII of the Convention and constitute a progressive step forward from the traditional law of the sea codified in the 1958 Geneva Convention on the High Seas. The 1982 Convention now provides that 'All States have the right for their nationals to engage in fishing on the high seas', but counterbalances this right by also imposing on States the duty to take such measures for their nationals as may be necessary for the conservation of the living resources of the high seas, and cooperate with other states on that matter, if appropriate, by establishing fisheries organizations.⁵⁸ The right to fish is, moreover, subject to other treaty obligations, as well as the rights, duties and interests of coastal states with regard to straddling, highly-migratory, anadromous and catadromous stocks and marine mammals occurring in their EEZs.⁵⁹ The Law of the Sea Convention then supplements this general framework by laying down the general objectives of fisheries management on the high seas. It provides that States, in determining the allowable catch and establishing other conservation measures for the living resources in the high seas, shall 'take measures which are designed, on the best scientific evidence available to the States concerned, to maintain

⁵⁶ UNCLOS Article 87.

⁵⁷ *Fisheries Jurisdiction* cases (*United Kingdom v. Iceland; Federal Republic of Germany v. Iceland*), Merits, Judgments of 25 July 1974, ICJ Reports 1974, p. 3, para. 72, and ICJ Reports 1974, p. 175, para. 64.

⁵⁸ UNCLOS Articles 117 and 118.

⁵⁹ UNCLOS Article 116.

or restore populations of harvested species at levels which can produce the maximum sustainable yield, as qualified by relevant environmental and economic factors, including the special requirements of developing States, and taking into account fishing patterns, the interdependence of stocks and any generally recommended international minimum standards, whether subregional, regional or global'. In addition to this, States shall also consider the effects of fishing on associated or dependent species.⁶⁰

This management regime failed to prevent the overexploitation and depletion of a large number of the living resources of the high seas. Among the first issues that attracted international attention was the problem of large-scale pelagic driftnet fishing and its negative impacts on the living marine resources of the high seas. After the first steps in addressing the problem were taken by Pacific states,⁶¹ the question was eventually considered by the UN General Assembly, which in 1989 adopted a resolution imposing a moratorium on large-scale pelagic driftnet fishing.⁶² Considerable problems also remained with the management of straddling and highly migratory fish stocks, which in some cases led to serious disputes.⁶³ In the 1990s, steps were taken to address these problems, particularly in view of the commitments made at the Rio Summit on Environment and Development in 1992.⁶⁴

Soon after the 1992 Summit, an intergovernmental conference was convened under the auspices of the UN on the issue of straddling and highly migratory fish stocks. This resulted in the adoption in 1995 of the Fish Stocks Agreement,⁶⁵ an implementing agreement of the 1982 Law of the Sea Convention that aims to improve the conservation and management regime

⁶⁰ UNCLOS Article 119(1). To ensure the availability of 'best scientific evidence', UNCLOS also lays down the duty to exchange available scientific information, catch and fishing effort statistics, and other data relevant to the conservation of fish stocks; Article 119(2).

⁶¹ See Convention for the Prohibition of Fishing with Long Driftnets in the South Pacific, Wellington, 24 November 1989, in force since 17 May 1991; 29 ILM 1454 (1990).

⁶² UN Doc. A/RES/44/225, 22 December 1989. See also UN Doc. A/RES/46/215, 20 December 1991.

⁶³ Note the *Estai* incident and the proceedings before the ICJ in the *Fisheries Jurisdiction (Spain v. Canada)*, Jurisdiction of the Court, Judgment of 4 December 1998, ICJ Reports 1998, p. 432.

⁶⁴ See UN Doc. A/CONF. 151/26. The most important documents are also included in 31 ILM (1992), pp. 814–73. See also the report on the Rio Conference in *United Nations Yearbook* (1992), pp. 670–81.

⁶⁵ 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, New York, 4 August 1995, entered into force on 11 December 2001; 2167 UNTS 3. The Agreement was negotiated as a follow-up on the mandate of Chapter 17 of Agenda 21.

of straddling and highly migratory fish stocks on the high seas and to a certain extent within the areas under national jurisdiction.⁶⁶ This Agreement provides for a broad range of measures intended to ensure the long-term sustainability of these stocks. Among other novel provisions, it requires states to apply the precautionary approach in adopting conservation measures and ecosystem considerations in assessing the impacts on target stocks and other species, and calls upon coastal States and States fishing on the high seas to cooperate for the purpose of achieving compatible conservation and management measures taken in EEZs and the high seas.⁶⁷ It also calls for more effective enforcement by flag states, port states, and coastal states of the conservation and management measures adopted for such stocks. The Agreement also envisages a significant role for various Regional Fisheries Management Organizations and Institutionalized Arrangements.⁶⁸

Apart from the Fish Stocks Agreement, instruments for the management of high seas fisheries have also been adopted under the auspices of the Food and Agriculture Organisation of the United Nations (FAO). One of them is the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas of 1993, which created a detailed framework of responsibilities for fishing vessels on the high seas.⁶⁹ The other one is the Code of Conduct for Responsible Fisheries of 1995, which establishes principles and standards applicable to the conservation, management, and development of all fisheries. Covering not only the capture, but also processing and trade in fish and fishery products, fishing operations, aquaculture, fisheries research, and the integration of fisheries into coastal area management, the Code forms a comprehensive document, aimed

⁶⁶ Articles 2 and 3.

⁶⁷ See particularly Articles 5–7.

⁶⁸ Articles 8–10. This role has not been limited only to existing organizations, inasmuch as the FSA also calls for the creation of new organizations in areas where none as yet exist. As a result, the number of these organizations has expanded considerably in the last decade. Their tasks range from collection of fishery statistics, assessment of the state of resources, analyses of management options and provision of scientific advice for management, to the actual taking of management decisions, and monitoring. For an overview of regional fisheries bodies, see <<http://www.fao.org/fishery/rfb/search/en>>.

⁶⁹ Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, Rome, 24 November 1993, entered into force on 24 April 2003; 33 ILM 968 (1994). The agreement mandates, *inter alia*, the adoption of measures to prevent re-flagging of fishing vessels as a means of avoiding compliance and provides for strengthened international cooperation, particularly in the exchange of information on high seas fishing. The agreement notes in its preamble that ‘States commit themselves to the conservation and sustainable use of marine living resources on the high seas’.

at long-term conservation and sustainable use of fishery resources.⁷⁰ Albeit voluntary in nature, the Code is of global application and provides a necessary framework for national and international efforts to ensure sustainable exploitation of aquatic living resources in harmony with the environment.⁷¹

In spite of the considerable progress in fishery governance that has taken place in the 1990s, a number of problems remain of concern for fishery management. These are especially over-exploitation, illegal, unregulated and unreported fishing, as well as destructive fishing practices which continue in many areas of the high seas. While restrictions to open access represent an essential condition for combating these problems, they are not always sufficient for effective fishery governance. Incentives need to be created to encourage the limiting of fishing effort to what is consistent with the long-term sustainable productivity of fishery resources (particularly by addressing the problem of fishing overcapacity). These incentives must then be coupled with effective monitoring, control, and surveillance mechanisms.⁷² Yet, the management of high seas fisheries also needs to address broader issues, such as the conservation of biodiversity.⁷³

The management of marine mammals

While also falling under the broad category of marine living resources, marine mammals such as whales, dolphins, seals, and walruses, are subject to a different management regime than high seas fisheries. This has partly to do with the fact that marine mammals have much slower reproduction rates than most fish stocks, which makes them particularly vulnerable to over-exploitation. Moreover, as typical examples of ‘charismatic megafauna’, their protection and conservation has been a matter of increased public concern, which explains why most of those species are now protected from overt commercial

⁷⁰ Code of Conduct for Responsible Fisheries, adopted on 31 October 1995 by the FAO Conference, available at <<ftp://ftp.fao.org/docrep/fao/005/v9878e/v9878e00.pdf>>.

⁷¹ The Code endorses, as the general and overriding objectives of fishery management, the long-term conservation and sustainable use of fishery resources, while it also provides, at the same time, that fishery management should promote the maintenance of the quality, diversity, and availability of fishery resources in sufficient quantities for present and future generations in the context of food security, poverty alleviation, and sustainable development.

⁷² See UN Doc. A/RES/60/31, 10 March 2006.

⁷³ In this respect, discussions have already been taking place about the necessity to adopt a new global instrument regulating the establishment of marine protected areas in the high seas. For an overview of current issues, see *Oceans and the law of the sea*, Report of the Secretary-General, UN Doc. A/63/63, 10 March 2008.

exploitation. The 1982 Law of the Sea Convention envisaged a separate treatment of marine mammals by explicitly providing that their exploitation might be prohibited, limited, or regulated more strictly than the exploitation of other living resources, not only in the EEZs of coastal states, but also on the high seas.⁷⁴ Moreover, the Convention subjected states to the duty to ‘cooperate with a view to the conservation of marine mammals and in the case of cetaceans...in particular work through the appropriate international organizations for their conservation, management and study.’⁷⁵

A leading example of such an international organization is the International Whaling Commission (IWC).⁷⁶ Created in 1946 with the adoption of the International Convention for the Regulation of Whaling (ICRW),⁷⁷ the IWC was foreseen as the main body to regulate the whaling activities of the signatory states.⁷⁸ The desire of the Convention was ‘to establish a system of international regulation for the whale fisheries to ensure proper and effective conservation and development of whale stocks’.⁷⁹ But while the Convention recognized ‘the interest of the nations of the world in safeguarding for future generations the great natural resources represented by the whale stocks’,⁸⁰ it was also clear that its aim is ‘to provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry’.⁸¹ With its current membership at 88 states,⁸² the IWC is now considered the principal body through which states cooperate in the management of cetaceans as required by UNCLOS,⁸³ although the emphasis of this cooperation

⁷⁴ See UNCLOS Articles 65 and 120. Some marine mammals are also listed as highly-migratory species and thus covered by Article 64, but Article 65 provides for a more general protection for all marine mammals.

⁷⁵ UNCLOS Article 65.

⁷⁶ See generally, P. Birnie, ‘International Legal Issues in the Management and Protection of the Whale: A Review of Four Decades of Experience’, *Natural Resources Journal* 29 (1989), 903–34.

⁷⁷ International Convention for the Regulation of Whaling (ICRW), Washington, 2 December 1946, entered into force on 10 November 1948; 161 UNTS 72.

⁷⁸ Pursuant to Article I, paragraph 2, the Convention applies ‘to factory ships, land stations, and whale catchers under the jurisdiction of the Contracting Governments, and to all waters in which whaling is prosecuted by such factory ships, land stations, and whale catchers.’

⁷⁹ See Preamble.

⁸⁰ In a sense, pre-dating the concept of sustainable use of natural resources that would later evolve into an essential element of the concept of sustainable development.

⁸¹ Preamble.

⁸² For an updated list, see <<http://www.iwcoffice.org/commission/members.htm>>.

⁸³ See also P. Birnie and A. Boyle, *International Law and the Environment*, 2nd edn (Oxford: Oxford University Press, 2002), p. 667.

has now shifted from conservation and orderly exploitation to one primarily of conservation.⁸⁴

The IWC may adopt various regulatory measures which are binding upon all members, unless a state objects to a specific amendment to the Schedule, thereby exempting itself from the application of that amendment. This ‘objection procedure’ has the potential to severely weaken conservation measures, as it allows members to opt out of a quota or moratorium. Furthermore, the IWC has no authority or means to enforce these measures, although an international observer scheme was established in 1971 by which the IWC was granted limited powers of observation. This explains why the early history of the management of whaling resources by the IWC was not really one of great success.

In 1982, the IWC, after an increase in its membership by a number of non-whaling nations, managed to impose a moratorium on commercial whaling by setting catch limits to zero. The moratorium appeared to be the only way to reverse the ineffective management by the IWC, which had allowed the whaling industry excessive quotas for many years, resulting in continued overexploitation and depletion of whale stocks. Taking fully effect in 1986, the moratorium has so far remained in force. However, pro-whaling states, such as Japan, Iceland, Norway, and the USSR, lodged objections to the moratorium, but most of them removed their objections under threat of potential trade sanctions.⁸⁵ However, regardless of the moratorium, limited whaling operations have continued under the exemptions provided for non-commercial whaling intended to satisfy ‘aboriginal subsistence needs’⁸⁶ and for whaling conducted for scientific purposes. While explicitly allowed under the ICRW,⁸⁷ scientific whaling continues to generate great public

⁸⁴ In fact, the Convention’s Preamble recognizes that ‘the whale stocks are susceptible of natural increases if whaling is properly regulated, and that increases in the size of whale stocks will permit increases in the number of whales which may be captured without endangering these natural resources.’

⁸⁵ For an account, see D.D. Caron, ‘The International Whaling Commission and the North Atlantic Marine Mammal Commission: the institutional risks of coercion in consensual structures’, *American Journal of International Law* 89 (1995), 154–174.

⁸⁶ See Article 13 of the ICRW Schedule. In 2007, the Commission renewed for a further five years the catch limits for the bowhead whales of the Bering-Chukchi-Beaufort Seas Stock, the Eastern North Pacific gray whales, the humpback whales taken by Saint Vincent and the Grenadines, the West Greenland fin whales, West and East Greenland common minke whales, and West Greenland bowhead whales. See UN Doc. A/62/66/Add.1, paragraph 138.

⁸⁷ Article VIII of the ICRW provides: ‘Notwithstanding anything contained in this Convention any Contracting Government may grant to any of its nationals a special permit authorizing that national to kill, take and treat whales for purposes of scientific research subject

criticism and condemnation, particularly by environmentalist groups. These scientific programs have often been considered simply as a way to circumvent the IWC's moratorium, and in the past were often resorted to by the whaling countries. Recently, they have been maintained mainly by Japan which by some estimates has since 1987 killed almost 10,000 whales in its Antarctic and North Pacific scientific whaling programs.⁸⁸ In the meanwhile, other pro-whaling states, such as Canada and Iceland, sought to circumvent the moratorium by leaving the IWC, although Iceland re-acceded in 2002, attaching a reservation to the moratorium.⁸⁹ Norway, on the other hand, is the only remaining member that preserved the original objection to the moratorium.

Today, the IWC remains a battleground between a large anti-whaling coalition of like-minded states insisting on the moratorium and the considerably smaller group of pro-whaling states and their supporters advocating for sustainable whaling subject to scientifically based regulation. It remains to be seen whether any progress will be made in achieving a reconciliation between the anti-whaling members who see the prohibition of whaling as a moral and ethical question, and the pro-whaling members who view whaling primarily through the lenses of traditional food customs and, as such, a question of cultural relativism. What looms large, however, is the inherent danger that totally uncontrolled whaling might develop if the IWC would break down completely.

The natural resources of outer space, the moon and other celestial bodies

The natural resources of outer space, the Moon and other celestial bodies have obviously not figured among the things that Grotius considered to be 'common to all mankind', as their exploitation was unimaginable at his time. It was only with the successful launch of the Sputnik in 1957, which inaugurated actual space exploration, that their potential exploitation became a distant possibility. This soon pointed to the need for elaborating the basic legal principles governing the activities of states in the exploration and use of outer

to such restrictions as to number and subject to such other conditions as the Contracting Government thinks fit'. Moreover, 'the killing, taking, and treating of whales in accordance with the provisions of this Article shall be exempt from the operation of this Convention.'

⁸⁸ See <http://www.iwcoffice.org/conservation/table_permit.htm> and P.J. Clapham, et al., 'The Whaling Issue: Conservation, Confusion and Casuistry', *Marine Policy* 31 (2007), 314–319.

⁸⁹ See <<http://www.iwcoffice.org/conservation/iceland.htm>>.

space, including the moon and other celestial bodies – a task taken upon by the United Nations, and in particular its Committee on the Peaceful Uses of Outer Space.⁹⁰ This work then culminated in the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, unanimously adopted by the General Assembly in 1962,⁹¹ and later in the Outer Space Treaty of 1967, which incorporated those principles in an internationally binding agreement. While in itself a remarkable achievement during the period of the Cold War, the Outer Space Treaty did not lay down specific provisions on the exploitation of natural resources. Its importance is rather in the fact that it provided that the ‘exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind’, as well as that: ‘Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means’.⁹² These basic principles have a particular bearing on the management of natural resources of the outer space.

Yet, of much greater importance for the potential exploitation and management of the natural resources of outer space is the 1979 Moon Agreement, drafted by the UN Committee on the Peaceful Uses of Outer Space and subsequently adopted by the General Assembly. This closes any possible legal gaps that could arise with regard to the appropriation of natural resources,⁹³ unequivocally providing that: ‘The Moon and its natural resources are the common heritage of mankind’. It also reaffirms that the Moon is ‘not subject to national appropriation by any claim of sovereignty, by means of use or

⁹⁰ In 1958, the question of the peaceful use of outer space was included on the agenda of the General Assembly. See *United Nations Yearbook* (1958), p. 19. In 1959, the Committee on the Peaceful Uses of Outer Space was established by the General Assembly. UN Doc. GA Res. 1472 (XIV), 12 December 1959.

⁹¹ UN Doc. GA Res. 1962 (XVIII), 13 December 1963. The Declaration provided *inter alia* that the exploration and use of outer space shall be carried on for the benefit and in the interests of all mankind and that the outer space and celestial bodies are free for exploration and use by all States on a basis of equality and are not subject to national appropriation by claim of sovereignty.

⁹² Treaty on principles governing the activities of States in the exploration and use of outer space, including the moon and other celestial bodies (‘Outer Space Treaty’), opened for signature at Moscow, London and Washington, 27 January 1967, entered into force on 10 October 1967; 610 UNTS 205; Articles I and II.

⁹³ These provisions apply ‘to other celestial bodies within the solar system, other than the Earth’, but not ‘to extraterrestrial materials which reach the surface of the Earth by natural means’ (Article 1).

occupation, or by any other means' and that 'Neither the surface nor the sub-surface of the Moon, nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person'.⁹⁴ The exploration and use of the moon and other celestial bodies shall not occur on a 'first come, first served' basis, but shall be 'the province of all mankind' and 'carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development', whereas due regard shall also be paid to 'the interests of present and future generations as well as to the need to promote higher standards of living and conditions of economic and social progress and development'.⁹⁵ As emphasized in the Agreement, states have 'the right to exploration and use of the moon without discrimination of any kind' and on the basis of equality.⁹⁶

The Agreement does not lay down a specific institutional structure, including any specific procedures, to govern exploitation. This is to be established only 'as such exploitation is about to become feasible'.⁹⁷ Nevertheless, it provides that the main purposes of a future international regime of exploitation shall be the orderly and safe development of the natural resources of the Moon, their rational management, the expansion of opportunities in their use, and the equitable sharing by all states parties in the benefits derived from them.⁹⁸ The Agreement also makes clear that all the activities with respect to the natural resources of the moon (except for the collection and removal of mineral and other substances for scientific research) shall be carried out in a manner compatible with these purposes.⁹⁹

During the last decade a renewed interest in outer space and its natural resources has emerged, in part generated by the recent exploration of Mars. Until today, however, technical progress has not allowed and economic

⁹⁴ Agreement governing the Activities of States on the Moon and Other Celestial Bodies ('Moon Treaty'), New York, 5 December 1979, entered into force on 11 July 1984; UN Doc. A/34/664, 12 November 1979; 1363 UNTS 3; 18 ILM 1434 (1979); Article 11, paragraphs 1–3.

⁹⁵ Article 4.

⁹⁶ Article 11, paragraph 4.

⁹⁷ In order to facilitate the establishment of such an international regime, the Agreement also provides that States shall inform the United Nations Secretary-General, the public and the international scientific community of any natural resources they may discover on the moon (Article 11, paragraph 6).

⁹⁸ Article 11, paragraphs 5 and 7. With regard to the latter, the interests and needs of the developing countries, as well as the efforts of those countries which have contributed either directly or indirectly to the exploration of the Moon, shall be given special consideration.

⁹⁹ Article 11, paragraph 8. Cf. also Article 6, paragraph 2.

interests have not triggered any resource exploitation activities in the outer space. As a result, no international exploitation regime has yet been put in place. Moreover, the Moon Agreement has been ratified by very few states, none of which are capable of space exploitation.¹⁰⁰ This is a serious handicap for the moon regime that erodes its status and general acceptance, although its essential feature of non-appropriation has not been openly contested by space-faring nations. Nevertheless, the Moon Agreement remains important because it de-legitimizes any unilateral action by interested states.

The two polar regions

The natural resources of the two polar regions are governed by different international regimes, a situation reflecting the different physical, as well as political conditions of Antarctica and the Arctic region. Antarctica is a continent with a huge landmass and part of it is claimed by states, whereas the Arctic region consists mainly of ice-covered sea. They have in common that their governance takes place principally outside of the United Nations system, although proposals have frequently been put forward to bring Antarctica under the aegis of the UN. Similarly, it has been advocated to proclaim Antarctica and its natural resources as a common heritage of humankind. But in recent years these attempts have faded away and a more practical *modus vivendi* between the Antarctic system and the United Nations has emerged. As regards the Arctic region, it can be expected that with the further melting of the ice caps a new discussion on the management of the area and its resources will soon emerge.

Antarctica

In 1959, an international regime for the area south of 60° South Latitude was created through the adoption of the Antarctic Treaty. This designated Antarctica as an area, which shall be used only for peaceful purposes, including scientific investigation.¹⁰¹ The Treaty ‘froze’ the existing claims of states to sovereignty over parts of the continent,¹⁰² thereby placing the natural resources

¹⁰⁰ Only 13 states have ratified the Moon Agreement so far, among which no important space-faring nations.

¹⁰¹ Antarctic Treaty, Washington, 1 December 1959, entered into force on 23 June 1961; 402 UNTS 71; see Articles I–II.

¹⁰² While the parties to the Antarctic Treaty did not renounce their previously asserted rights or claims to territorial sovereignty in Antarctica, or basis of claims therefore, they neither can rely

of the South Pole in a special position. All activities relating to natural resource management would now have to be agreed upon by the parties having consultative status under the treaty.¹⁰³ While the 1959 Treaty itself did not prescribe substantive rules relating to the natural resources of Antarctica, it established a procedural framework in the form of Antarctic Treaty Consultative Meetings, under which a number of legally binding recommendations were adopted – also with regard to natural resource management.¹⁰⁴ An example of these were the 1964 Agreed Measures for the Conservation of Antarctic Fauna and Flora,¹⁰⁵ under which the killing, wounding, capturing, or molesting of any native mammal or native bird was prohibited, except in accordance with permits issued for limited purposes. Thereby, a system of ‘Special Protected Areas’ was established and Antarctica was declared a ‘Special Conservation Area’.

The Antarctic Treaty laid down the initial framework for an international regime that was further developed and elaborated with the adoption of special conventions. The first to be added to this framework was the 1972 Convention for the Conservation of Antarctic Seals,¹⁰⁶ which laid down permissible catches

on the acts or activities taking place on the basis of the treaty as a basis for asserting, supporting or denying a claim to territorial sovereignty or any other rights of sovereignty over Antarctica (Article IV).

¹⁰³ The Consultative Parties comprise the original Parties to the Treaty (i.e., the 12 nations active in the Antarctic during the International Geophysical Year (1957–58)) and a further sixteen States that have become Consultative Parties by acceding to the Treaty and demonstrating their interest in Antarctica by carrying out substantial scientific activity there. The original parties to the Treaty were the United Kingdom, South Africa, Belgium, Japan, United States, Norway, France, New Zealand, USSR, Argentina, Australia, and Chile. Since then, Poland, Germany, Brazil, India, China, Uruguay, Italy, Spain, Sweden, Finland, Peru, South Korea, Ecuador, Netherlands, Bulgaria, and Ukraine have obtained consultative status. In addition to these, 18 other States are parties to the Antarctic Treaty, but these do not enjoy consultative status and thus cannot participate in the decision-making at the Consultative Meetings.

¹⁰⁴ The Parties to the Treaty shall meet at regular intervals, ‘for the purpose of exchanging information, consulting together on matters of common interest pertaining to Antarctica, and formulating and considering, and recommending...measures in furtherance of the principles and objectives of the Treaty’, including measures regarding ‘preservation and conservation of living resources in Antarctica’ (Article IX(1)(f)).

¹⁰⁵ Adopted in Brussels, 2 June 1964; reproduced in *Treaties and Other International Acts Series* (Washington, D.C.: US Government Printing Office, 1964), no. 6058.

¹⁰⁶ Convention for the Conservation of Antarctic Seals (‘Antarctic Seals Convention’), London, 1 June 1972, entered into force on 11 March 1978; 11 ILM 251 and 417 (1972). The Convention’s preamble recognizes ‘the general concern about the vulnerability of Antarctic seals to commercial exploitation and the consequent need for effective conservation measures’, ‘that the stocks of Antarctic seals are an important living resource in the marine environment which requires an international agreement for its effective conservation’, and ‘that this resource should not be depleted by over-exploitation, and hence that any harvesting should be regulated so as not to exceed the levels of the optimum sustainable yield’.

for certain seal species and prohibited catches of other seal species, and established closed seasons, sealing zones and sealing reserves, as well as provided for specific obligations regarding exchange of information.¹⁰⁷ The next element in the development of this framework was added with the adoption of the Convention on the Conservation of Antarctic Marine Living Resources in 1980,¹⁰⁸ which aims at the conservation of Antarctic marine living resources, that is, the populations of fin fish, molluscs, crustaceans, and all other species of living organisms, including birds, found in the Antarctic Convergence zone. This does not exclude harvesting (and associated activities), as long as such harvesting is carried out in a rational and sustainable manner, and due consideration is also paid to ecosystem considerations. These provisions – which make the Convention one of the first instruments to have adopted an ‘ecosystem approach’ to natural resource management – are then coupled with a system of observation and inspection, including boarding procedures, to ensure compliance.

A third instrument which was aimed at further developing the 1959 Antarctic Treaty framework was the Convention on the Regulation of Antarctic Mineral Resource Activities adopted in 1988.¹⁰⁹ This was intended to provide a legal basis for assessing the possible impact on the environment of Antarctic mineral resource activities, determining whether such activities were acceptable, and eventually governing their conduct.¹¹⁰ However, the Convention attracted worldwide protest from many environmental NGOs, which viewed it as an instrument to plunder Antarctica’s mineral resources and to destroy its fragile environment. As a result, it is unlikely that the Convention will ever be brought into force. Instead, a fifty-year moratorium on Antarctic mineral resource activities was established with the adoption in Madrid of the 1991 Antarctic Environmental Protocol, which now prohibits ‘any activity relating

¹⁰⁷ By being applicable to the whole sea area regulated by the Antarctic Treaty, the Convention also addressed the defects of the 1964 agreed measures, under which the seals were only protected while on land, but not while on ice or in the sea.

¹⁰⁸ Convention on the Conservation of Antarctic Marine Living Resources (‘CCAMLR’), Canberra, 20 May 1980, entered into force on 7 April 1982; 19 ILM 841 (1980). The Convention was adopted in response to concerns that an increase in krill catches in the Southern Ocean could have a serious effect on populations of krill and other marine life.

¹⁰⁹ Convention on the Regulation of Antarctic Mineral Resource Activities (‘CRAMRA’), Wellington, 2 June 1988, not in force; 27 ILM 868 (1988).

¹¹⁰ Article 2. For that purpose, the Convention elaborated a number of measures designed to ensure environmental protection, requiring particularly that decisions on mineral resource activities were to be based on adequate information and on the precautionary approach. It also provided for a comprehensive environmental impact assessment procedure and incorporated novel provisions on compliance, liability, and dispute settlement. See Articles 7, 8, 11–12, 55–59.

to mineral resources, other than scientific research'.¹¹¹ The objective of the Protocol is to achieve a 'comprehensive protection of the Antarctic environment and dependent and associated ecosystems', and to that end, the Protocol sets out an elaborate list of principles and measures for the planning and conduct of all activities in the Antarctic Treaty area, including provisions on environmental impact assessments. The Protocol thereby established one of the most comprehensive environmental protection regimes, and designated Antarctica as 'a natural reserve, devoted to peace and science'.¹¹²

Apart from conventions specifically developed with the Antarctic Treaty system, other global conventions contain specific provisions on the Antarctic region or otherwise retain relevance for the management of the natural resources in the South Pole. This undoubtedly includes the International Convention on the Regulation of Whaling, as the conservation measures adopted under its framework apply also to the Antarctic area. In fact, the moratorium on commercial whaling adopted by the IWC provides an important component of the regime for the management of Antarctic marine mammals, which is additionally strengthened by the whale sanctuary established for the Southern Ocean in 1994.¹¹³ Other important treaties include the 1982 Law of the Sea Convention and various marine protection treaties, such as the 1972 London Convention and 1973/78 MARPOL, which all have a bearing on the management of Antarctic natural resources. Together with the specific Antarctic Treaty system, they provide for a comprehensive and elaborate legal regime.

The Arctic region

A great portion of the Arctic region is subject to the undisputed jurisdiction of eight states neighbouring the area, forming part of either the land territory or maritime area of Canada, Denmark (via Greenland), Finland, Iceland, Norway, Sweden, Russia, and USA. The rest of the area consists of the Arctic ocean, a sea much of which is still permanently covered with ice. In contrast to

¹¹¹ Protocol on Environmental Protection to the Antarctic Treaty ('Antarctic Environment Protocol'), Madrid, 4 October 1991, entered into force on 14 January 1998; 30 ILM 1461 (1991), Article 7.

¹¹² Articles II, III, and VIII.

¹¹³ In 2004, the IWC decided to maintain the Southern Ocean Sanctuary for another ten years, after a proposal by Japan to change the status of the sanctuary failed to reach the required majority in the commission. The positive impact of these conservation measures has been recently demonstrated by the evidence of increases in abundance of several of the stocks of blue and right whales in the Southern Hemisphere, although still far from their pre-whaling levels. See UN Doc. A/62/66/Add.1, paragraph 137.

Antarctica, which is a continent surrounded by oceans, the Arctic region consists of an ocean surrounded by continents, which partly explains why there is no special international legal regime in place for the North Pole and its surrounding area, akin to the one in Antarctica. The lack of a specialized international legal regime, however, does not mean that there is no legal framework regulating the activities of states in the Arctic region. Considering that a large part of the area consists of the Arctic Ocean, a comprehensive set of rules is provided by the 1982 UN Convention on the Law of the Sea, which lays down important rights and obligations concerning the exploration, exploitation, conservation, and management of natural resources, the delineation of the maritime limits in the area, the protection of the marine environment (including ice-covered areas¹¹⁴), as well as freedom of navigation, marine scientific research, and other uses of the sea. The resources of the Arctic Ocean are thus subject to public authority, in that they either form part of the territorial seas, exclusive economic zones, and continental shelves of the neighbouring coastal states, or belong to the high seas or the deep seabed area, the natural resources of which belong to the common heritage of humankind.

The only multilateral agreement specifically adopted for the Arctic region is the 1973 Agreement on the Conservation of Polar Bears,¹¹⁵ which commits the signatories to manage polar bear populations in accordance with sound conservation practices, and therefore prohibits the hunting, killing, and capturing of these bears except for limited purposes (e.g., exceptions are provided for aboriginal taking) and by limited methods,¹¹⁶ and commits all parties to protect the ecosystems of polar bears, especially denning and feeding areas and migration corridors. The 1987 Agreement on the Conservation of the Porcupine Caribou Herd¹¹⁷ is, on the other hand, one of the few bilateral agreements aiming at the regulation of an arctic natural resource.

Other multilateral treaties are also relevant for the Arctic area. For example, the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora and the 1979 Convention on the Conservation of Migratory Species of Wild Animals, specifically protect some arctic species. Likewise, the 1971 Convention on Wetlands of International Importance Especially as

¹¹⁴ With regard to ice-covered areas, see Article 234 of the Law of the Sea Convention.

¹¹⁵ Agreement on the Conservation of Polar Bears ('Polar Bear Agreement'), Oslo, 15 November 1973, entered into force on 26 May 1976; 13 ILM 13 (1974).

¹¹⁶ In any event, according to Article 3, the skins of bears and other items of value resulting from taking of bears shall not be made available for commercial purposes.

¹¹⁷ Agreement between the Government of the United States of America and the Government of Canada on the conservation of the Porcupine Caribou Herd, Ottawa, adopted and entered into force on 17 July 1987; 2174 UNTS 268.

Waterfowl Habitat, the 1972 Convention concerning the Protection of the World Cultural and Natural Heritage, and the UNESCO Biosphere Reserve System contain important provisions for the Arctic region, since many of the sites protected by these instruments are located in the Arctic region. With regard to the management of whales in the Arctic, an important role has also been played by the ICRW. Last but not least, provisions of more general multilateral treaties remain applicable to the Arctic, such as those of the 1992 Convention on Biodiversity, and various treaties protecting the marine environment.

The international regime for the Arctic region has been further developed on the basis of soft law instruments. An important step in this regard was the adoption in 1991 of the Arctic Environmental Protection Strategy (AEPS)¹¹⁸ aimed at the protection of the Arctic ecosystem, including human populations, as well as the protection, enhancement, and restoration of environmental quality and the sustainable utilization of natural resources, including their use by local populations and indigenous peoples in the Arctic. The next major step in the development of the Arctic regime was the creation in 1996 of the Arctic Council, a high level forum intended to provide *inter alia* 'a means for promoting cooperation, coordination and interaction among the Arctic States, with the involvement of the Arctic indigenous communities and other Arctic inhabitants on common arctic issues, in particular issues of sustainable development and environmental protection in the Arctic'.¹¹⁹ While the primary emphasis of AEPS was on environmental protection, the Arctic Council's objectives now also include the achievement of sustainable development in the Arctic region. Among the important achievements of the Council in this regard was the development of Arctic Offshore Oil and Gas Guidelines.¹²⁰ Building on the precautionary approach, the guidelines are intended to define a set of recommended practices for consideration by those responsible for regulation of planning, exploration, and development of offshore oil and gas activities in the Arctic (including transportation and related onshore activities).

¹¹⁸ Arctic Environmental Protection Strategy, 14 June 1991, 30 ILM 1624 (1991).

¹¹⁹ Declaration on the Establishment of the Arctic Council, Ottawa, 19 September 1996; reprinted in 35 ILM 1382 (1996). The Council's other objectives are to oversee and coordinate the programs established under the AEPS, to adopt terms of reference for and oversee and coordinate a sustainable development program, and to disseminate information, encourage education and promote interest in Arctic-related issues.

¹²⁰ Arctic Offshore Oil and Gas Guidelines, 10 October 2002; available at <<http://old.pame.is/sidur/uploads/ArcticGuidelines.pdf>>.

The Arctic Council has remained the most important intergovernmental initiative in the Arctic area. However, it is only a loose institutional structure and a need may arise for creating a comprehensive legal framework. Climate change and the melting of ice will have a potential impact on vulnerable ecosystems, the livelihoods of local inhabitants and indigenous communities, and the potential exploitation of natural resources of the Arctic area. These impacts may be negative – as, for example, with the likely changes in the distribution of fish stocks, which will potentially have significant effects on commercial fisheries – as well as positive – inasmuch as global warming may also bring in its wake new economic opportunities through the opening of new Arctic sea routes. All these challenges will need to be addressed. In the recently adopted Ilulissat Declaration of 2008, the Arctic states recognized that the Arctic Ocean stands at the threshold of significant changes, but reaffirmed their commitment to the legal framework of the 1982 Law of the Sea Convention, seeing ‘no need to develop a new comprehensive international legal regime to govern the Arctic Ocean’.¹²¹ In this indirect way the Arctic States have indicated their willingness to operate within a multilateral framework. At the same time, they have shown to date little appetite for an ‘Arctic Treaty System’ or to have the United Nations directly involved in discussing and meeting the challenges which currently confront the Arctic region.

The atmosphere

By the atmosphere, we refer to the resources of the air-mass surrounding the planet Earth, extending roughly up to 150 kilometers. Atmospheric resources comprise gases and aerosol (both solid or liquid) that fluctuate in the lower (troposphere) and upper (stratosphere) layers of the atmosphere, mostly nitrogen and oxygen, but also argon, water vapor, carbon dioxide, nitrous oxide, the ozone, sulfur dioxide, nitrogen dioxide, and other gases. Wind and solar radiation should also be considered as an atmospheric resource. However, atmospheric resources should not be equated with the resources of outer space, although no definite boundary exists between the latter and the atmosphere.

While sharing many characteristics with the natural resources in international areas, atmospheric resources are *stricto sensu* not global commons in

¹²¹ The Ilulissat Declaration, 28 May 2008, adopted in Ilulissat, Greenland, available at <<http://arctic-council.org/filearchive/Ilulissat-declaration.pdf>>.

the legal sense. When situated above areas beyond national jurisdiction of states, such as the high seas and the exclusive economic zones,¹²² atmospheric resources can be treated as common property, or *res communis* as denoted by the Latin term. However, when found above land territory, they are subject to the sovereignty of states. Of course, this does not mean that states do restrict access to atmospheric resources (after all, breathing is still free), but rather that states can regulate their exploitation, particularly by imposing measures for their protection. Nevertheless, until relatively recently the atmosphere provided a completely free waste disposal system for a whole range of anthropogenic pollutants and has been often abused as a ‘common sink’.

Since the air mass does not remain confined to a certain territory, but crosses state boundaries and fluctuates freely in the atmosphere, the natural resources of the atmosphere in practice do function like true global commons. As a result, their management is exposed to similar problems as the global commons, particularly as regards the problems of collective action and ‘free-riding’ (e.g., when states not participating in the management of atmospheric resources undermine the measures of those states participating in a collective management regime). This is most evident in the case of air pollution, which usually does not remain limited to one state, but may affect other states as well.¹²³

In some situations, as in the case of transboundary air pollution, it would suffice to treat atmospheric resources as shared resources, thereby implying the duty of states to co-operate with regard to their conservation and harmonious and equitable utilization¹²⁴ and hence requiring action on a bilateral or regional level. However, in other situations, such as with regard to the problems of ozone depletion or global warming, atmospheric resources need to be treated as a global unity, requiring joint action by all states. In these latter situations, atmospheric resources have come to be regarded as the ‘common concern of humankind’.¹²⁵ In spite of the interconnectedness of these problems and the unity of atmospheric resources, their protection is not governed by a

¹²² Note that, in the exclusive economic zone (EEZ), states have sovereign rights for the purpose of exploring and exploiting, conserving and managing (living or non-living) natural resources of the waters superjacent to the seabed and of the seabed and its subsoil, but not of the airspace above the EEZ (Article 56 UNCLOS).

¹²³ On atmospheric resources as global commons, see John Vogler, ‘Future Directions: The Atmosphere as a Global Commons’, *Atmospheric Environment* 35 (2001), 2427–2428.

¹²⁴ See Principle 1 of UNEP Environmental Law Guidelines and Principles on Shared Natural Resources (1978).

¹²⁵ See for example UN Doc. A/RES/43/54, 6 December 1988.

comprehensive legal regime.¹²⁶ Instead, separate rules have been gradually put in place for the prevention and control of transboundary air pollution, for the elimination of ozone-depleting substances and, most recently, for the reduction of emissions of gases that contribute to global warming. Two particular fundamental pillars of the international regime protecting the atmospheric commons are discussed in this section, i.e., those relating to the protection of the ozone layer and the climate system.

The ozone layer

The thin layer of ozone¹²⁷ is essential to life on the planet, since it shields the Earth from the harmful ultraviolet-B and ultraviolet-C radiation from the sun. In the 1970s, scientific findings detected a steady thinning of the ozone layer, which was attributable in particular to a group of chemicals known as chlorofluorocarbons (CFCs).¹²⁸ These findings became the subject of increased international concern, as they made apparent that the depletion of the ozone layer would lead to increased ultraviolet radiation at the surface of the Earth, with potentially harmful effects on human health, animals, plants, microorganisms, and materials – effects that would not affect just any one country, but possibly all of them. As a result, the problem of the ozone layer became increasingly discussed in a number of specialized agencies of the United Nations,¹²⁹ but it was not until the early 1980s that negotiations on a treaty to protect the ozone layer actually started.

¹²⁶ See the plea of A.H. Westing for a Convention on the Law of the Air, akin to the UN Convention on the Law of the Sea, in A.H. Westing, 'Law of the Air', *Environment* 31 (1989), 3–4.

¹²⁷ The ozone is a gas with a molecular structure of three oxygen atoms (O₃) which is located in the upper-part of the atmosphere, in the lower stratosphere (about twenty to thirty kilometres up).

¹²⁸ In 1970, scientist Paul J. Crutzen suggested that nitrogen oxides from fertilizers and supersonic aircraft could catalyze the destruction of ozone (See P.J. Crutzen, 'The influence of nitrogen oxides on the atmospheric ozone content', *Quarterly Journal of the Royal Meteorological Society* 96 (1970), 320–325). Soon thereafter, chemists Frank Sherwood Rowland and Mario Molina discovered that the molecules of chlorofluorocarbons (CFCs), a group of chemicals until then widely used for refrigeration, foams, and industrial cleaning, were able to remain in the atmosphere and eventually reach the lower stratosphere, where they were broken apart by ultraviolet radiation, in turn breaking down large amounts of stratospheric ozone. In 1995, Crutzen, Molina and Rowland were awarded the Nobel Prize for Chemistry for their findings.

¹²⁹ The Governing Council of UN Environment Programme (UNEP) was the first to discuss in 1976 the issue of ozone depletion and soon thereafter UNEP and the World Meteorological Organization established the Coordinating Committee of the Ozone Layer to periodically assess ozone depletion.

After four years of arduous negotiations, the Vienna Convention on the Protection of the Ozone Layer was finally adopted in March 1985.¹³⁰ This framework Convention spelled out a general commitment to take ‘appropriate measures ...to protect human health and the environment against adverse effects resulting or likely to result from human activities which modify or are likely to modify the ozone layer’,¹³¹ but did not lay down any concrete measures to reduce the production or consumption of ozone-depleting substances. Nevertheless, it represented an important first step in response to the thinning of the ozone layer, recognizing ‘the potentially harmful impact on human health and the environment through modification of the ozone layer’.

Soon after the adoption of the 1985 Convention, negotiations were convened on a protocol that would include actual control measures for ozone-depleting substances. Prompted by the finding by the British Antarctic Survey in 1987 of an ‘ozone hole’ in the Antarctic stratosphere which showed a decline in polar ozone far larger than anyone had anticipated, a scientific consensus was reached that action was necessary to stop the deterioration of the ozone. The result was the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, which set forth a reduction formula based upon a gradual phase-down of global emissions. This required parties to make cuts in the production and consumption of a number of CFCs and halons (according to a timetable with interim targets),¹³² while at the same time allowing developing countries to delay their compliance with the reduction schedule. The Protocol also provided the possibility for the phase-out schedules to be revised on the basis of periodical scientific and technological assessments. On the basis of such assessments, the Protocol was adjusted and amended on several occasions, accelerating and further reducing the production and consumption of controlled substances, introducing other kinds of control measures, and bringing under

¹³⁰ Convention on the Protection of the Ozone Layer, Vienna, 22 March 1985, entered into force on 22 September 1988; 1513 UNTS 293; 26 ILM 1529 (1985). Article 1(1) defines the ozone layer as ‘the layer of atmospheric ozone above the planetary boundary layer.’

¹³¹ Article 2(1). The Convention included provisions encouraging intergovernmental cooperation on scientific research, systematic observation of the ozone layer, monitoring of CFC production and emissions, and the exchange of information.

¹³² The Protocol required parties to make fifty percent cuts from 1986 levels in the production and consumption (the latter meaning ‘production plus imports minus exports’) of a number of CFCs by 1999 and to freeze the production and consumption of the three main halons at 1986 levels by 1993. For a background on the negotiations and an initial assessment of the Protocol, see J. Brunnée, *Acid rain and ozone layer depletion: international law and regulation* (Dobbs Ferry, NY: Transnational Publishers, 1988), pp. 242–53.

control additional substances.¹³³ Presently, the Montreal Protocol controls ninety-six chemicals and sets forth a detailed schedule for their phase-out with differing deadlines for developed and developing countries.

The 1987 Montreal Protocol has been hailed as an example of exceptional international co-operation. Former UN Secretary-General Kofi Annan even described it as ‘perhaps the single most successful international agreement to date’.¹³⁴ By 2006, it had resulted in the phasing out of over ninety-six per cent of all ozone-depleting substances (ODS) globally and the total consumption of CFCs worldwide has fallen to 3.2 percent of the levels of 1986. In terms of environmental effects, recent reports also confirm that the ozone layer shows some initial signs of recovery, although the adverse impacts of stratospheric ozone depletion are expected to persist during at least the next decade, while the ozone layer is generally not expected to recover earlier than by 2050.¹³⁵ Part of the Protocol’s success is attributable to the innovative trade measures introduced by the Protocol, such as the ban on imports of controlled substances and provisions discouraging the export of technology for producing or utilizing ODS, as well as its detailed reporting requirements and non-compliance procedures. But the success of the Protocol has also been possible because the opposition to the phasing-out of ODS largely collapsed when confronted with convincing scientific evidence of the linkage between ozone depletion and CFCs, leading the industry to start concentrating resources on the development and commercialization of non-ozone depleting alternatives to CFCs. Moreover, widespread support of the Protocol could have been secured by providing for differentiated obligations for developing countries.

The climate system

The warming of the climate system is now unequivocal, as demonstrated by the increases in global average air and ocean temperatures, widespread melting of snow and ice, rising global average sea level. There is increased consensus that these phenomena are attributable to the increases in anthropogenic

¹³³ This has been done by amendments adopted in London (1990), Copenhagen (1992), Vienna (1995), Montreal (1997), Beijing (1999), and again Montreal (2007), by which amongst others carbon tetrachloride, methyl chloroform, methyl bromide, and hydrochlorofluorocarbons (HCFCs) were brought under control.

¹³⁴ UNEP, *A Success in the Making: The Montreal Protocol on Substances that Deplete the Ozone Layer* (2007), available at <http://ozone.unep.org/Publications/MP_A_Success_in_the_making-E.pdf>, at p. 11.

¹³⁵ See Synthesis report, UN Doc. UNEP/OzL.Pro.WG.1/27/3, 22 February 2007.

greenhouse gas concentrations.¹³⁶ The scientific evidence for this was brought forward for the first time at the 1979 World Climate Conference, organized by the World Meteorological Organization, which spurred increased public awareness and governmental concern about climate issues in the years that followed. The UN General Assembly articulated this concern for the first time in Resolution 43/53 of 1988, which recognized ‘that climate change is a common concern of mankind, since climate is an essential condition which sustains life on earth’. In the same year, the Intergovernmental Panel on Climate Change (IPCC) was established to provide the decision-makers and the interested public with an objective source of information about climate change.¹³⁷ In its First Assessment Report published in 1990, the IPCC confirmed that the threat of climate change was real. This resulted in the UN General Assembly launching negotiations on a convention on climate change.¹³⁸

After just fifteen months of negotiations, the United Nations Framework Convention on Climate Change (UNFCCC)¹³⁹ was adopted and opened for signature at the Earth Summit in Rio (1992). This has as its ‘ultimate objective’ the stabilization of greenhouse gases ‘at a level that would prevent dangerous anthropogenic interference with the climate system’, providing that such stabilization ‘should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner’.¹⁴⁰ The Convention requires all parties to ‘protect the climate

¹³⁶ In particular, the emissions of carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) have increased markedly as a result of human activities since about 1850, exceeding now by far the pre-industrial values determined from ice cores spanning many thousands of years. Merely between 1970 and 2004, global greenhouse gas emissions attributable to human activities increased by seventy per cent. This is attributable mostly to the burning of fossil fuels, but also to the manufacturing of cement and land-use changes, particularly tropical forest clearance. See IPCC, *Fourth Report* (2007).

¹³⁷ The IPCC was established ‘to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation.’ See Principles Governing IPCC Work, approved at the Fourteenth Session on 1 October 1998, as amended at the Twenty-first Session (6–7 November 2003) and at the Twenty-fifth Session (26–28 April 2006); available at: <<http://www.ipcc.ch/pdf/ipcc-principles/ipcc-principles.pdf>>.

¹³⁸ See UN Doc. A/RES/45/212, 21 December 1990.

¹³⁹ United Nations Framework Convention on Climate Change (UNFCCC), New York, 9 May 1992, entered into force on 21 March 1994; 1771 UNTS 107; 31 ILM 851 (1992).

¹⁴⁰ Article 2. This objective captures the core of the multifaceted concept of sustainable development rather well. Article 1(2) of the Convention defines climate change as ‘a change of climate which is attributed directly or indirectly to human activity that alters the composition of the

system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities' and lays down, for that purpose, a number of general commitments to respond to climate change.¹⁴¹ However, considering that 'the largest share of historical and current global emissions of greenhouse gases has originated in developed countries', the Convention requires the developed countries to 'take the lead in combating climate change and the adverse effects thereof'.¹⁴² In particular, it requires industrialized countries to provide financial resources, and to promote, facilitate and finance the transfer of environmentally sound technologies and know-how to developing countries.¹⁴³ In contrast, developing countries were not charged with special obligations, albeit countries with low-lying coastal areas and those prone to desertification and drought were additionally recognized as being especially vulnerable to the adverse impacts of climate change.

While the Convention entered into force soon after its adoption in 1994 (having achieved, in the meanwhile, almost universal participation),¹⁴⁴ it was also quickly evident that its provisions in itself would not be sufficient to tackle climate change in all its aspects. In 1995, a new round of negotiations was therefore launched to arrive at more detailed commitments for industrialized countries and, after more than two years of intensive negotiations,

global atmosphere and which is in addition to natural climate variability observed over comparable time periods'.

¹⁴¹ Article 4(1).

¹⁴² Article 3(1); see also Preamble. The Convention imposes specific commitments on so-called Annex I parties, which consist of industrialized countries members of the OECD together with countries with economies in transition. These are required to 'adopt national policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases and protecting and enhancing its greenhouse gas sinks and reservoirs', and thereby to demonstrate that they 'are taking the lead in modifying longer-term trends in anthropogenic emissions' (Article 4(2)(a)). The countries with economies in transition, however, are granted a certain degree of flexibility in fulfilling these obligations.

¹⁴³ The Convention also imposes additional commitments on so-called Annex II parties, which consist only of developed OECD member states. These are required to 'provide new and additional financial resources' to enable developing countries to undertake emission reduction activities, as well as to 'assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects'. They shall also take 'all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties'. Articles 4(3), 4(4) and 4(5).

¹⁴⁴ The text of the Convention was adopted at the United Nations Headquarters, New York on the 9 May 1992. The Convention entered into force on 21 March 1994 and has currently received 193 ratifications.

a legally binding protocol was adopted in December 1997 in Kyoto.¹⁴⁵ The Kyoto Protocol now lays down binding commitments for industrialized countries to limit or reduce their collective emissions of six greenhouse gases by the period 2008–2012.¹⁴⁶ In order to achieve these commitments, it requires parties to implement and/or further elaborate a number of policies and measures aimed at, amongst other things, the enhancement of energy efficiency, the protection and enhancement of sinks and reservoirs of greenhouse gases (through, for example, the promotion of sustainable forest management practices and reforestation), and the promotion of sustainable forms of agriculture.¹⁴⁷ It also introduces a number of mechanisms which allow for a greater degree of flexibility in achieving the agreed targets,¹⁴⁸ including through joint action,¹⁴⁹ joint projects,¹⁵⁰ as well as through the use of ‘carbon sinks’,¹⁵¹ the Clean Development Mechanism,¹⁵² and an emission trading system.¹⁵³

¹⁴⁵ Kyoto Protocol to the United Nations Framework Convention on Climate Change (‘Kyoto Protocol’), Kyoto, 11 December 1997, entered into force on 16 February 2005; UN Doc. FCCC/CP/L.7/Add.1, 10 December 1997; 37 ILM 32 (1998). For a general commentary of the protocol, see P.G.G. Davies, ‘Global Warming and the Kyoto Protocol’, *International and Comparative Law Quarterly* 47 (1998), 446–461.

¹⁴⁶ Annex 1 countries have to reduce (by at least five percent by the period 2008–2012 when compared to their 1990 emission levels) their collective emissions of carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride from sources and sectors listed in Annex A. In Annex B to the protocol, the limitation or reduction targets are listed for each of the 38 developed countries and for the European Community as a whole. See Article 3(1). The economies in transition are allowed to select a base year other than 1990 (Article 3(5)).

¹⁴⁷ Article 2(1).

¹⁴⁸ The use of these mechanisms has to be ‘supplemental to domestic action’, meaning that domestic policies and measures of the industrialized states have to constitute ‘a significant element’ of efforts to meet their commitments. See decisions adopted by Conference of the Parties on its seventh session, held at Marrakesh, 29 October–10 November 2001; Report in FCCC/CP/2001/13/Add.1, 21 January 2002.

¹⁴⁹ Article 3(1). The possibility to take joint action, for example, permits the member states of the European Community to redistribute their reduction targets among themselves (known as the ‘EU bubble’).

¹⁵⁰ The Protocol allows developed countries to pursue joint projects that reduce emissions or increase removals using sinks. This is also called joint implementation.

¹⁵¹ Article 3(3) and 3(4). These ‘carbon sinks’ may result from direct human-induced land-use change and forestry activities, although they are limited to afforestation or reforestation since 1990.

¹⁵² Article 12. The Clean Development Mechanism (CDM) allows developed countries to invest in emission reduction projects or afforestation or reforestation projects in developing countries and receive credit for the emission reductions or removals achieved.

¹⁵³ Article 6; see also 3(10)). Annex I countries are allowed to transfer to, or acquire from, other Annex I parties emission reduction units and thereby to pursue cheaper opportunities to

The 1997 Kyoto Protocol stimulated an array of national policies and led in the twenty-first century to the creation of an international carbon market and new institutional mechanisms that may provide the foundation for future mitigation efforts. Its adoption therefore beyond doubt represents an important step in reducing the potentially devastating impact of climate change. However, this is far from enough. There is much evidence that global emissions of greenhouse gases will continue to grow over the next few decades, which will cause further warming and induce many changes in the global climate system. It is thus particularly worrisome that the Protocol, which entered into force only in 2005, has so far attracted fewer parties than the Convention and that even today its effectiveness remains undermined by the fact that it still does not have onboard the largest emitters of carbon dioxide, the United States and China.¹⁵⁴ Moreover, it is regrettable that no additional commitments were taken to further limit and reduce emissions of greenhouse gases.¹⁵⁵

Summary and assessment

Since the publication of *Mare liberum* and especially during the twentieth century, an enormous expansion of state economic sovereignty took place over maritime areas and to a lesser extent over airspace at the cost of the Grotian common goods. This resulted in bringing under ‘national’ control the management of many natural resources which were hitherto in areas beyond national jurisdiction. This notwithstanding, states are not free to do whatever they like with ‘their’ natural resources. In contemporary international law, sovereignty over natural resources has come to entail, apart from rights, a considerable number of duties, including duties to preserve the natural environment and to take world interests into account. Such duties emanate in particular from the law of the sea, international environmental law,

curb emissions or increase removals wherever those opportunities exist. However, Article 17 provides that ‘Any such trading shall be supplemental to domestic actions for the purpose of meeting quantified emission limitation and reduction commitments under that Article.’

¹⁵⁴ Pending ratification by at least 55 parties to the Convention, including a sufficient number of industrialized (Annex I) countries to encompass 55 per cent of that group’s carbon dioxide emissions in 1990, the Kyoto Protocol entered into force only on 16 February 2005, after the Russian Federation ratified it in 2004. In subsequent years, also Japan (2005) and Australia (2008) joined.

¹⁵⁵ The thirteenth Conference of the Parties that met at Bali (2007) produced only an Action Plan with a mandate, a road map, and a time table for negotiating a post-Kyoto regime. See Document FCCC/CP/2007/6/Add. 1, p. 3.

human rights law (including with respect to indigenous peoples), and general international law.¹⁵⁶

The twentieth century also witnessed the emergence of international regimes for areas and natural resources that remained beyond the limits of national jurisdiction. These global commons now comprise the high seas and their living resources, the deep sea-bed, outer space (including the moon and other celestial bodies), the two polar regions, and the atmosphere (in particular the ozone layer and the climate system). As regards the high seas, the principle of the freedom of access – and with it Grotius's idea of *mare liberum* – has been maintained, although it has become increasingly qualified by obligations to properly manage fish stocks and prevent their overexploitation. The marine mammals, as examples of 'charismatic megafauna', have become additionally protected under various international legal instruments. The deep seabed and its mineral resources, in turn, have been proclaimed as the common heritage of humankind, a relatively new and potentially far-reaching principle – which, moreover, also applies to the moon and its natural resources. The international regimes for the two polar regions have remained very different, reflecting also the very different geophysical as well as political conditions of Antarctica and the Arctic region. But they have in common that both regions are crucial to the global environment, fragile, and therefore increasingly the object of specific international regulation aimed at co-operation for nature conservation. As regards the management of atmospheric resources, both the ozone layer and the climate system have been declared 'common concern of humankind'. Obviously, this new concept is much vaguer and has fewer legal implications than 'common heritage of humankind', but still implies a strong international dimension and the need to take into consideration the interests of future generations.

In addition to the rules that are specific to each of these regimes, global commons are also subject to general principles and rules embodied in important multilateral treaties, such as the 1982 UN Convention on the Law of the Sea, the 1992 Convention on Biological Diversity, and the 1992 UN Framework Convention on Climate Change. The period following the 1992 Earth Summit in Rio de Janeiro was marked by considerable progress in the field of international law-making with respect to conservation and sustainable use of natural wealth and resources – both through treaty-making and soft law instruments, such as the 1995 FAO Code of Conduct for Responsible

¹⁵⁶ See on this Chapter 10 of N.J. Schrijver, *Sovereignty over Natural Resources: Balancing Rights and Duties* (Cambridge: Cambridge University Press, 1997).

Fisheries. A central role in these developments has been played by various United Nations organs and specialized agencies. As a result, a host of relatively new principles and concepts of contemporary international law apply to the distinct international regimes governing the global commons, albeit still emerging, fragmented, and incomplete. Apart from common heritage and common concern of humankind, these principles include the precautionary principle, sustainable use of natural resources, intergenerational equity, common but differentiated responsibilities, and the principle of interrelatedness and integration.¹⁵⁷ The specific rights and duties derived from these principles have still not fully crystallized, but this does not affect their now firm status in modern international law.

The international regimes that have emerged for the management of global commons created different institutional structures and various systems for monitoring compliance. Some provide for institutionalized consultation, others established standing international organizations. In some cases, groundbreaking regulatory innovations were introduced (such as the imposition of a moratorium on whaling or the penalties on production and use of ozone-depleting substances) and novel solutions were devised for resolving and avoiding conflicts (for example, by freezing the claims to sovereignty over Antarctica). These varied situations illustrate the fragmented and inchoate structure of global natural resource management. Yet, what these management regimes do have in common is that they all build upon Grotius's idea of *Mare liberum* – an idea that aimed to preserve the freedom of access for the benefit of all. This idea later digressed into 'first come, first served' advantages for industrialized nations, but was subsequently increasingly qualified and supplemented, if not replaced, by a new law of international co-operation and protection of natural wealth and resources beyond the limits of national jurisdiction. The global commons have thus served as the laboratories for the testing of new legal principles whereby the rights and corollary duties emanating from such principles build on the Grotian heritage.

¹⁵⁷ For an analysis of these principles, see N.J. Schrijver, *The Evolution of Sustainable Development in International Law: Inception, Meaning and Status* (Leiden: Martinus Nijhoff Publishers, 2008), 276 pp. (also published in *Recueil des Cours de l'Académie de droit international de la Haye*, Vol. 329 (2007), pp. 217–412).