International environmental obligations and liabilities in deep seabed mining

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1 Common Heritage of Mankind and the Protection of the Marine Environment

1 Introduction

The concept of the common heritage of mankind ('CHM') has dominated international discussions about the subject of deep seabed mining ('DSM') within the UN since the very beginning. It was formally introduced by Malta's proposal to the forum of the twenty-second session of the UN General Assembly on 17 August 1967[1] and further articulated by Malta's ambassador Mr Pardo on 1 November 1967 [2]. Pardo's speech caused a sensation within the UN General Assembly.[3] On 17 December 1970, the General Assembly adopted the Declaration of Principles Governing the Sea Bed and Ocean Floor, and the Subsoil Thereof, Beyond the Limits of National Jurisdiction (the '1970 Declaration of Principles').[4] The contents of the 1970 Declaration of Principles were later incorporated into the 1982 UNCLOS. With the adoption of the UNCLOS, CHM turned into an overarching legal principle governing all aspects of the DSM legal regime, including the protection of the marine environment. Indeed, as Li put it:

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1 Declaration and treaty concerning the reservation exclusively for peaceful purposes of the sea-bed and of the ocean floor, underlying the seas beyond the limits of present national jurisdiction, and the use of their resources in the interests of mankind. UN Doc. A/6695.

2 For an historical account of the context of the speech, see Surabhi Ranganathan, 'Global Commons' (2016) 27 EJIL 693-717.

3 The reaction by the UN General Assembly was immediate. On 18 December 1967, the UN General Assembly adopted Resolution 2340 (XXII) to establish an *Ad Hoc* Sea-bed Committee to study the peaceful uses of the sea-bed and the ocean floor beyond the limits of national jurisdiction. A year later, on 21 December 1968, upon adoption of Resolution 2467 A (XXIII), the General Assembly established a permanent Sea-Bed Committee on which the same mandate as its predecessor was conferred. Upon adoption of Resolution 2750 (XXV) on 17 December 1970, the Committee's mandate was expanded to include preparation for the third Law of the Sea Conference to be convened in 1973. Correspondingly, the Sea-Bed Committee was reformed. Since then, the mandate concerning the peaceful uses of the sea-bed and the ocean floor beyond the limits of national jurisdiction had been under the trust of Subcommittee I of the Sea-Bed Committee until the completion of the draft of the UNCLOS. Reference to: Yuwen Li, *Transfer of Technology for Deep Sea-Bed Mining: the 1982 Law of the Sea Convention and Beyond* (Martinus Nijhoff 1994).

4 UN. G.A. Resolution 2749 (XXV).

'the principle of CHM constitutes the essence of the [DSM legal] regime in the sense that it is the starting point as well as legal basis for the regime.'[5]

This research does not cover all aspects of the DSM legal regime, but focuses only on environmental aspects. Nevertheless, since marine environmental protection is both an integral element of and closely connected to other elements of the principle of CHM, this Chapter starts with an examination of the full legal meaning of CHM in the context of DSM (section 2). In this respect, I argue that CHM is not a myth;[6] on the contrary, 'Part XI of the Convention gives precise legal meaning to this term'.[7] To further the understanding of CHM, I then compare CHM in the context of DSM with that in the contexts of outer space and the Antarctic and examine the notion of 'common interest of international community as a whole' ('community interest') in general international law (section 3). Next, I investigate whether the principle of CHM as prescribed in the UNCLOS and the DSM legal regime built upon the principle is binding on third parties to the UNCLOS, such as the United States. (section 4). Thereafter, the focus of the investigation is narrowed down to one specific element of CHM – the protection of the marine environment in DSM (section 5). Section 5 serves only to make some general observations about the topic of marine environmental protection in DSM before entering into the thorough examination of the two major issues of the topic in the following Chapters – international environmental obligations and liabilities of the participants in DSM.

2 Elements of the common heritage of mankind in the context of deep seabed mining

Article 136 of the UNCLOS states that 'the Area and its resources are the common heritage of mankind'. Section 2 of Part XI, the UNCLOS elaborates on the meaning of CHM in the context of DSM. Specifically, Article 137 prescribes the global commons status and international control of the Area and its resources. Articles 140, 143, 144 and 148 touch upon the idea of distributive justice[8] which has four components, namely DSM for the benefit of mankind as a whole, equitable sharing of economic benefits arising from DSM, preferential treatment of developing countries, and marine scientific research (MSR) for the benefit of mankind as a whole. Articles 141 and 145

5 Yuwen Li, *Transfer of Technology for Deep Sea-Bed Mining: the 1982 Law of the Sea Convention and Beyond* (Martinus Nijhoff 1994) 38.

6 M. C. W. Pinto, 'Common Heritage of Mankind: From Metaphor to Myth, and The Consequences of Constructive Ambiguity' in Jerzy Makarczyk and Krzysztof Skubiszewski (eds), *Theory of International Law At the Threshold of the 21st Century: Essays in Honour of Krzysztof Skubiszewski* (Kluwer 1996).

7 Michael Lodge, 'The Common Heritage of Mankind' (2012) 27 IJMCL 733-742.

8 Edwin Egede, *Africa and the Deep Seabed Regime: Politics and International Law of the Common Heritage of Mankind* (Springer 2011) 244.

depict the requirements on the peaceful use of the Area and its resources, and the protection of the marine environment respectively.

2.1 The Area and its resources as global commons subject to international administration

Article 137 of the UNCLOS reads as follows:

> 1. No state shall claim or exercise sovereignty or sovereign rights over any part of the Area or its resources, nor shall any State or natural or juridical person appropriate any part thereof. No such claim or exercise of sovereignty or sovereign rights nor such appropriation shall be recognized.
> 2. All rights in the resources of the Area are vested in mankind as a whole, on whose behalf the Authority shall act. These resources are not subject to alienation. The minerals recovered from the Area, however, may only be alienated in accordance with this Part and the rules, regulations and procedures of the Authority.
> 3. No State or natural or juridical person shall claim, acquire or exercise rights with respect to the minerals recovered from the Area except in accordance with this Part. Otherwise, no such claim, acquisition or exercise of such rights shall be recognized.

From the first paragraph, it is clear that the Area, like the high seas, Antarctica, or celestial bodies in outer space, is considered as *res communis (omnium)* which means 'things of the (entire) community'[9] or are usually called 'global commons' since they are beyond the sovereignty of any State and can be subject to no-appropriation. In Schrijver's view, global commons resembles in many ways the concept of common goods/common property as explained by Hugo Grotius in his seminal work on *mare liberum*.[10] Grotius argued that because common goods such as the high seas by nature cannot be subject to anyone's possession and they are for the public utility, they shall be open to the free access of all.[11] This argumentation led to the pronouncement of one of most fundamental principles of the law of the sea: the freedom of the seas.

However, the Area as global commons under Article 137 of the UNCLOS is different from the seas as common goods under Grotius's *mare liberum*. From the second and third paragraphs of Article 137, it is seen that 'these resources [in the Area] are not subject to alienation', that any access to and utilization of the resources in the Area must be through the ISA which shall act on behalf of 'mankind as a whole', and that rights to 'minerals recovered from the Area' cannot not be legally recognized unless in accordance with Part XI of the UNCLOS. Pursuant to Article 137, paragraphs 2 and 3, access to the Area and utilization of its resources are subject to the international administration. This is one of the critical differences between the principles

9 Aaron Fellmeth and Maurice Horwitz, *Guide to Latin in International Law* (OUP 2009) 250

10 Nico Schrijver, 'Managing the Global Commons: Common Good or Common Sink?' (2016) 37(7) Third World Quarterly, 2.

11 Ibid.

of CHM and freedom of the seas: internationally controlled access and utilization versus free access and utilization of the global commons.

Scholars attempted to provide justification or a theoretical explanation for such an evolution. Schijver observes that '[o]ver time this [the over-exploitation of marine resources] has 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.'[12] And since 'some original tenets of Grotius's concept of *res communis*, in particular the idea of inexhaustibility, can no longer be upheld', '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'.[13] To some extent, the principle of CHM can be seen as the result of a long evolution from the principle of the freedom of the seas with a purpose to counter the limitations of the latter.

Hardin offered a theoretical explanation as to why freedom with respect to commons should be restricted or abandoned in his well-known publication *The Tragedy of the Commons*.[14] In the article, Hardin demonstrated that rational individuals are driven by self-interest to maximize their own gains, while the resources of the world are limited. Thus, an unlimited freedom towards the commons will inevitably bring ruin to all. In his words, 'the inherent logic of the commons remorselessly generates tragedy.'[15] Originally being an article by a biologist addressing the problem of overpopulation, 'the tragedy of the commons' has been transformed into a widely accepted theory which can provide justification for public control (typically through legislation or regulation) over the commons. The Area and its resources are just such a pertinent example: international control over the access and utilization of the Area and its resources can be justified by the theory of 'the tragedy of the commons'.

To avoid the dismal scenario of the tragedy of the commons, there is a need for regulation. In the context of DSM, the primary task of Part XI of the UNCLOS is to establish an international regulatory system governing the Area and its resources. The ISA was created to exercise international authority with the purpose of safeguarding the interests of mankind as a

12 Nico Schrijver, 'Managing the Global Commons: Common Good or Common Sink?' (2016) 37(7) Third World Quarterly, 3.

13 Nico Schrijver and Vid Prislan, 'From Mare Liberum to the Global Commons: Building on the Grotian Heritage' (2009) 30 Grotiana 168.

14 Garrett Hardin, 'The Tragedy of the Commons' (1968) 162 Science 3859, 1243-1248. Ranganathan analyses the context and subcontext of Hardin's 'Tragedy of the Commons' and compares these with those of Pardo's 'CHM'. She concludes that although both concepts seemingly emerged from different world views, they revealed both parochial and cosmopolitan tendencies, and both had illiberal and imperial dimensions. And the integrative approach played a critical role in the production and impact of both concepts. See Surabhi Ranganathan, 'Global Commons' (2016) 27 EJIL 693-717.

15 Garrett Hardin, 'The Tragedy of the Commons' (1968) 162 Science 3859, 1244.

whole. Indeed, the ISA as the institutional arrangement is so important for the operationalization of the principle of CHM that 30 out of the 59 provisions of Part XI of the UNCLOS are concerned with the ISA. To sum up, Article 137 presents two elements of the principle of CHM: first, the Area and its resources as global commons and, second, the international administration by the ISA over the Area and its resources. The element of international administration by the ISA is a departure from the principle of freedom of the seas under CHM.

2.2 Common interest, benefit-sharing and preferential treatment of developing States

The principle of CHM also reflects the idea of distributive justice. In the context of DSM, four elements of CHM are related to the idea of distributive justice: DSM and marine scientific research ('MSR') activities in the Area for the benefit of mankind as a whole, equitable sharing of economic benefits arising out of DSM, and preferential treatment of developing States.

Article 140(1) and Article 143(1) UNCLOS adopt the same 'for-the-benefit-of-mankind-as-a-whole' model for both DSM and MSR activities in the Area.[16] For this reason, the principle of CHM is distinguished further from the principle of the freedom of the seas since the latter works on the first-come first-served basis which encourages self-interest. Yet, although both DSM and MSR are required to be carried out for the benefit of mankind as a whole, the ISA plays different roles in the sharing of the benefits generated from these two activities: the ISA is empowered to distribute the economic benefits generated from DSM (Article 140(2)), but it is only entrusted to encourage and promote the dissemination of the scientific knowledge and information generated from MSR (Article 143(2)). Furthermore, DSM and MSR activities in the Area are not equally regulated. In contrast to the international administration by the ISA with respect to DSM activity, the 'freedom of scientific research' as depicted in Article 87(1)(f) is still in principle applicable to MSR in the Area.

Article 140(2) UNCLOS addresses the issue of the distribution of the economic benefits generated from DSM activities. It prescribes that:

> The Authority shall provide for the equitable sharing of financial and other economic benefits derived from activities in the Area through any appropriate mechanism, on a non-discriminatory basis, in accordance with article 160, paragraph 2(f)(1).

16 Article 140(1) prescribes that: Activities in the Area shall, as specifically provided for in this Part, be carried out for the benefit of mankind as a whole, irrespective of the geographical location of States, whether coastal or land-locked, and taking into particular consideration the interests and needs of developing States […]. Article 143(1) states that: Marine scientific research in the Area shall be carried out exclusively for peaceful purposes and for the benefit of mankind as a whole.

This provision conveys two messages. First, 'the equitable sharing' is chosen as the governing principle over the distribution of economic benefits among States. Second, the ISA is entrusted with the duty of designing and implementing concrete mechanisms for the equitable sharing of economic benefits.

Moreover, the idea of distributive justice is reflected not only in the principle of the distribution of the economic benefit but also in the exploitation system. Article 153 UNCLOS establishes a parallel exploitation system. On the one hand, the Enterprise is designed as an operational arm of ISA to conduct DSM on behalf of and for the benefit of mankind directly.[17] On the other hand, States and entities (under the sponsorship of States) are also eligible to conduct DSM. For the latter scenario, special attention is given to ensuring the equal participation of all States, including in particular the developing State.

Based on the realistic consideration of the unequal capacities between developed and developing States with regard to DSM, the UNCLOS accords preferential treatment to developing States. The latter part of Article 140(1) stipulates that 'the interests and needs of developing States' shall be taken into particular consideration. Moreover, Article 148 states that

> The effective participation of developing States in activities in the Area shall be promoted as specifically provided in this Part, having due regard to their special interests and needs, and in particular to the special need of land-locked and geographically disadvantaged among them to overcome obstacles arising from their disadvantaged location, including remoteness from the Area and difficulty of access to and from it.

To ensure the effective participation of developing States, Article 144(2) prescribes that training opportunities in marine science and technology shall be provided to nationals from the developing States.[18] Annex III, Article 15 UNCLOS specifies the contractor as the party obliged to provide and fund training opportunities. This obligation of the contractor is further elaborated in Exploration Regulations, and incorporated into every contract the contractor signs with the ISA.[19]

In practice, developing States have so far benefited most from the training opportunities under Article 144(2). Since the first contract granted by ISA in 2001, many training programmes have been implemented in the past 16 years. It is one of the main tasks of the Secretariat of ISA to negotiate with each of the contractors and their sponsoring States on the training programmes, and to supervise, review and assess the implementation of

17 Article 170, UNCLOS; Section 2, Annex to the 1994 Implementation Agreement. At the time of publication, the Enterprise is still not functioning. However, as will be shown in Chapter 2, the functioning of the Enterprise is already under discussion within ISA.

18 The compulsory transfer of technology requirement as depicted in Article 144(1) is repealed by Section 5, Annex to the 1994 Implementation Agreement.

19 Regulation 27 of nodules exploration regulations (ISBA/19/C/17, 2013) and Schedule 3 of exploration contracts.

those training programmes. Developing States have also benefited significantly from Annex III, Articles 8 and 9 UNCLOS which accords privileges to developing States concerning Activities in the reserved area. To date, there are six contracts under the sponsorship of developing States that cover the reserved area in the Area.[20]

The author notes, however, that the preferential treatment of developing States is not a purpose in itself; rather, it is a means to achieving the goal of the equal participation in DSM. The SDC highlights that, except for the preferential treatment accorded by specific provisions, developing States shall engage in activities in the Area on equal footing with developed States.[21] Particularly, there shall be no preferential treatment accorded to developing States when it comes to the liability issue of the sponsoring State.[22]

But why was the idea of distributive justice associated with the principle of CHM? To understand the underlying reasons, it is important to turn to the historical background of the formation of CHM. Pinto observed that:

> It [the principle of CHM] was an inspiring vision offered to a world at a time when it seemed feasible to establish a "new international economic order" founded on distributive justice and co-operation that would replace an old order of exploitative relationships based essentially on power disparities and competition.[23]

Indeed, the provisions of Part XI of the UNCLOS identified in this subsection reflect the tenets of the international movement for a New International Economic Order ('NIEO')[24] which are fully demonstrated in the 1974 Declaration on the Establishment of a New International Economic Order (the '1974 NIEO Declaration') and the Charter of Economic Rights and Duties of States (CERDS).[25] The third paragraph of the preamble to the 1974 NIEO Declaration expresses the aspirations of the developing States for 'the establishment of a New International Economic Order based on equity, sovereign equality, interdependence, common interest and cooperation among all States'. Article 4 of the 1974 NIEO Declaration stipulates that 'the new international economic order should be founded on full respect

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20 These six developing sponsoring States and the dates for the conclusion of the corresponding exploration contracts are – Nauru (22 July 2011), Tonga (11 January 2012), Kiribati (19 January 2015), Singapore (22 January 2015), Cook Islands (15 July 2016) and China (the application was approved during the 21st session of ISA in July 2015, the contract has not yet been signed).

21 ITLOS, Advisory Opinion of 2011 (No. 17 case), para. 158.

22 Section 3.2(c) of Chapter 8 elucidates this point in detail.

23 M. C. W. Pinto, 'The Common Heritage of Mankind: Then and Now' (2012) 361 RdC 113.

24 The NIEO also found its way into the fifth paragraph of the preamble to the UNCLOS which states that: [The UNCLOS intends to contribute to] the realization of a just and equitable international economic order which takes into account the interests and needs of mankind as a whole and, in particular, the special interests and needs of developing countries, whether coastal and land-locked.

25 UN Doc. A/RES/S-6/3201, 1 May 1974 and GA Res. 3281 (XXIX), 12 December 1974.

for the following principles: […] (c) full and effective participation on the basis of equality of all countries in the solving of world economic problems in the common interest of all countries […]'. Now, in spite of the disappearance of the NIEO movement, the related elements of the principle of CHM by and large stand. This is certainly in part because law, unlike the political movement, is more stable. But the more fundamental reason is that those elements are consistent with a broader trend in developments in international law – the community interests, which are examined in section 3.3.

2.3 Peaceful use of the Area and its resources

The principle of CHM also reflects developments in international law in areas other than the law of the sea. Two such examples are the requirements that 'the Area shall be open to use exclusively for peaceful purposes by all States' (Article 141) and that 'necessary measures shall be taken to ensure effective protection for the marine environment' (Article 145).

The origin of Article 141 of the UNCLOS can be traced back to Article 1 of the 1959 Antarctic Treaty and Article IV of the 1967 Outer Space Treaty.[26] Furthermore, the development of Article 141 was closely connected to the historical background of the arms race in the Cold War. Particularly, it has to do with the negotiation of two treaties: the 1963 Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water and the 1971 Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Sea-bed and the Ocean Floor and in the Subsoil thereof.[27] But above all, the element of peaceful use of the Area and its resources can be seen as a corollary of the principle of prohibition of the threat or use of force as enshrined in Article 2(4) of UN Charter and also incorporated in Article 301, UNCLOS. Nowadays, peaceful use of the Area and its resources is well accepted and observed.

2.4 Protection of the marine environment

Like Article 141, Article 145 of the UNCLOS is by no means unprecedented. The protection of the marine environment became an international legal issue since early on. Far before the milestone Stockholm Conference in 1972, there were the 1954 International Convention for the Prevention of Pollution of the Sea by Oil[28] and the 1969 International Convention on Civil Liability for Oil Pollution Damage (the '1969 CLC'). At about the same time

26 Yuwen Li, *Transfer of Technology for Deep Sea-Bed Mining: the 1982 Law of the Sea Convention and Beyond* (Martinus Nijhoff 1994) 40.

27 Commentary to Article 141, para. 141(2), Satya N. Nandan, Michael Lodge and Shabtai Rosenne (eds), *United Nations Convention on the Law of the Sea 1982: A Commentary (Vol. VI)* (Martinus Nijhoff 2002).

28 Adopted on 12 May 1954, entered into force on 26 July 1958.

as the 1972 Stockholm Declaration, the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matters was adopted (the '1972 London Convention')[29]. Very soon after the 1972 London Convention, another convention was under negotiation – the 1973 International Convention for the Prevention of Pollution from Ships (the 'MARPOL')[30]. The MARPOL took into consideration the 1972 UN Conference on the Human Environment, particularly Annex III on General Principles for Assessment and Control of Marine Pollution.[31] It also took into account the Third Conference for the Law of the Sea Convention, particularly the discussion on the protection of the marine environment. Part XII of the UNCLOS prescribes a comprehensive international legal framework on the protection and preservation of the marine environment. Moreover, beyond maritime laws and the law of the sea, the requirement of the protection of the marine environment has developed alongside similar requirements of environmental protection in other fields.

Yet, marine environmental protection in DSM is a complex issue. The problem is not whether but how the marine environment should be protected against detrimental effects of the lawful use of the Area and its resources. This is the overarching research question of this research.

2.5 Conclusions

To summarize, the principle of CHM in the context of DSM implies not only rights or benefits but also obligations or burdens. It embodies eight elements: (1) the status of the Area and its resources as the global commons (Article 137); (2) international administration by the ISA over DSM activities (Articles 137, 157); (3) the common interest of international community in DSM activities in the Area (Article 140(1)); (4) common interest of the international community in MSR in the Area (Article 143); (5) equitable sharing of the economic benefits arising from DSM among States (Articles 140(2), 148, 144); (6) preferential treatment of developing States (Articles 143(3), 144(1), 144(2), 152, 160, 162 and Articles 8 and 9 of Annex III); (7) peaceful use of the

29 Adopted on 13 November 1972, entered into force on 30 August 1975. The 1996 Protocol to the 1972 London Convention (entry into force on 24 March 2006) created a simplified but more stringent system with respect to dumping at the sea. Now the two systems under the 1972 London Convention and the 1996 Protocol are coexistent, each with its own States Parties. Yet, the 1972 London Convention and the 1996 Protocol share the same secretariat – Office of London Convention/Protocol and Ocean Affairs of IMO. Moreover, eventually the 1996 Protocol will replace the 1972 London Convention, thereby merging the two systems.

30 Adopted on 2 November 1973, amended by the 1978 Protocol before its entry into force. The MARPOL 73/78 entered into force on 2 October 1983. Upon its entry into force, it replaced the 1954 International Convention for the Prevention of Pollution of the Sea by Oil.

31 Report of the UN Conference on the Human Environment, Stockholm, 5-16 June 1972, A/CONF. 48/14/Rev.1, 73-74.

Area and its resources (Article 141); and (8) protection of the marine environment in DSM (Article 145). Individually, these elements are not unique to CHM. It is the combination of all these elements that makes the principle of CHM in the context of DSM unique. To understand the principle as a whole, one should examine the total of the parts, otherwise, one would get into a situation like 'the blind men and the elephant'.

The elements of the principle of CHM carry different weights and they are interconnected. The most fundamental element is the Area and its resources as the global commons; it constitutes the prerequisite for all the other elements. Closely related is the element of international administration of the Area and its resources – the international regime centred on the ISA. This element is the key to the operationalization of the principle of CHM. The elements of peaceful use of the Area and its resources and protection of the marine environment are integrated into the principle of CHM which constitute restraints on the use of the Area and its resources from two different angles. Particularly, DSM must be balanced against the consideration of marine environmental protection. The contrast of weights between the two sides of the balance determines principally the direction of the development of the principle of CHM and the international DSM legal regime in the future. The four elements relating to distributive justice are not as generally acknowledged as the other four elements beyond the context of DSM.

3 Common heritage of mankind in comparison with related concepts and in related fields

In this section I examine concepts related to CHM beyond the context of DSM. CHM is first compared with the concepts of 'common interest/heritage of mankind' in the context of outer space (section 3.1) and with the 'common interest of mankind' in Antarctica (section 3.2) respectively. Then, CHM is compared with the notion of 'community interest' in international law (section 3.3).

3.1 Common interest/heritage of mankind in outer space

'Ever since the first human-made satellite orbited the Earth in 1957, the UN has been committed to space being used for peaceful purposes'.[32] In 1958, the United Nations Office for Outer Space Affairs ('UNOOSA') was created within the UN Secretariat. In 1959, the General Assembly of the UN established the permanent Committee on the Peaceful Uses of Outer Space ('COPUOS'). In 1961 the General Assembly adopted Resolution 1721 (XVI)

32 United Nations Office for Outer Space Affairs: <http://www.unoosa.org/oosa/en/ourwork/copuos/history.html>.

on the International Cooperation in the Peaceful Uses of Outer Space. It recognized 'the common interest of mankind in furthering the peaceful uses of outer space and the urgent need to strengthen international cooperation in this important field'[33] and declared that 'outer space and celestial bodies are free for exploration and use by all States in conformity with international law and are not subject to national appropriation'[34]. These principles have been repeatedly endorsed by all the sequential legal instruments in this field.[35]

The 1979 Moon Agreement took a considerable step further: Article 11 declares that 'the Moon and its natural resources are the common heritage of mankind'. The article also gives meaning to the concept of CHM. Paragraphs 2 and 3 affirm the prohibition of appropriation of the Moon and its resources. Paragraph 4 asserts the equality in the exploration and use of the Moon. In addition, paragraphs 5, 6 and 7 touch upon the to-be established international regime. Paragraph 5 stresses the necessity of the establishment of an international regime. Paragraph 6 states that in order to facilitate the establishment of the international regime, States Parties are required to inform the Secretary-General of the UN of related information. Paragraph 7 describes the purposes of the international regime, which are to secure the orderly and safe development and rational management of the natural resources of the Moon, expand the opportunities in the use of those resources, and enable all States Parties to equally share the benefits derived from those resources, while the interests and needs of the developing countries shall be given special consideration.

CHM as prescribed in Article 11 of the 1979 Moon Agreement is very similar to that under the DSM legal regime. Nevertheless, a distinctive difference is that: in the context of DSM, not only a full-fledged international regime has been established but it had already been in operation for more than two decades. Whereas in the context of the 1979 Moon Agreement, it is noted that so far the international regime envisaged is still to be established.

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33 Preamble, para.1, UN General Assembly Resolution 1721 (XVI) on the International Cooperation in the Peaceful Uses of Outer Space (adopted on 4 December 1961).

34 Ibid., Preamble, para. 2(1)(b).

35 To date, there are five legal instruments adopted by the General Assembly in this field: The 1963 Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space (UN GA Res. 1962(XVIII) of 13 December 1963); the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Adoption by UN GA Res. 2222(XXI) on 19 December 1966, entry into force on 10 October 1967); the 1972 Convention on International Liability for Damage Caused by Space Objects (Adoption by UN GA Res. 2777(XXVI) of 29 November 1971, entry into force on 1 September 1972); the 1974 Convention on Registration of Objects Launched into Outer Space (Adoption by UN GA Res. 3235(XXIX) on 12 November 1974, entry into force on 15 September 1976); and the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies ('the 1979 Moon Agreement') (Adoption by UN GA Res.34/68 on 18 December 1979, entry into force on 11 July 1984. As of 19 April 2017, it has 17 parties).

In the absence of the international regime, the concept of CHM cannot be operationalized. Moreover, in practice there are only a few spacefaring nations and this can be done only at considerable cost.

Also, the principle of CHM in both contexts faces a similar challenge. Recently, the U.S. Congress adopted the 2015 U.S. Commercial Space Launch Competitiveness Act.[36] The Act acknowledges in Section 403 that:

> It is the sense of Congress that by the enactment of this Act, the United States does not thereby assert sovereignty or sovereign or exclusive rights or jurisdiction over, or the ownership of, any celestial body.

However, in accordance with subsection 51303:

> A United States citizen engaged in commercial recovery of an asteroid resource or a space resource under this chapter shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use, and sell the asteroid resource or space resource obtained in accordance with applicable law, including the international obligations of the United States.[37]

Therefore, the United States approved the concept of common interest of mankind but rejected the concept of CHM as envisaged in the 1979 Moon Agreement. What the Act upholds is the ideas of the free access and first-come first-served, but not the ideas of international control and equal sharing of benefits. Due to the fact that the international regime to implement CHM under the 1979 Moon Agreement is still to be established, there is no international body to react to the denial of CHM by the United States. Furthermore, even if the international regime is in existence, considering that the United States is not a State party to the 1979 Moon Agreement, a question arises: can the CHM envisaged in the 1979 Moon Agreement be binding on a third party such as the United States? The very same question arises also in the context of DSM which will be addressed in section 4 of this Chapter.

To conclude, 'common interest of mankind' is the basic concept of the outer space legal system. This concept embodies three elements: (1) the global commons status of the outer space (including the free access to and non-appropriation of the outer space); (2) the use of outer space for peaceful purposes; and (3) international cooperation in the use of outer space. The 1979 Moon Agreement transforms the concept of 'common interest of mankind' into 'common heritage of mankind'. In comparison with the concept of common interest of mankind, CHM also include the

36 Public Law No: 114-90 (11/25/2015), source from U.S. Congress: <https://www.congress.gov/bill/114th-congress/house-bill/2262/text>.

37 The term 'space resources' means an abiotic resource in situ in outer space, including water and minerals (subsection 51301 of the 2015 U.S. Commercial Space Launch Competitiveness Act).

elements of non-appropriation, for peaceful purposes and international cooperation. Yet, it substitutes the element of free access with international control over the access to and the use of the resources. In addition, it requires equal sharing of the economic and other benefits therefrom. There are certain institutional arrangements, the UNOOSA and the COPUOS, to safeguard the global commons status and the peaceful use of outer space, and to promote international cooperation in the field. Yet, such institutional arrangements are insufficient to operationalize the principle of CHM as envisaged in the 1979 Moon Agreement. The absence of an international regime is the main reason which sets CHM in the context of outer space apart from that in the context of DSM.

3.2 Common interest of mankind in Antarctica

Like outer space, Antarctica is also seen as an area in which mankind has a common interest. The 1959 Antarctic Treaty declares that:

> It is in the interest of all mankind that Antarctica shall continue forever to be used exclusively for peaceful purposes and shall not become the scene or object of international discord.[38]

The 1980 Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR)[39] and the 1988 Convention on the Regulation of Antarctic Mineral Resource Activities (CRAMRA),[40] both have similar statements. Thus the peaceful use of Antarctica is one element of common interest of mankind in Antarctica.

Another element of the concept of common interest of mankind in Antarctica is the protection of the Antarctic environment and dependent and associated ecosystems. As the 1991 Protocol on Environmental Protection to the Antarctic Treaty (the '1991 Environmental Protocol') states:

> [T]he development of a comprehensive regime for the protection of the Antarctic environment and dependent and associated ecosystems is in the interest of mankind as a whole.[41]

38 Preamble, paragraph 1 of the Antarctic Treaty (adopted on 1 December 1959, entered into force on 23 June 1961).

39 Preamble, paragraph 9, the 1980 CCAMLR (adopted on 20 May 1980, entered into force on 7 April 1982).

40 Preamble, paragraph 2, the 1988 CRAMRA (adopted on 2 June 1988, it became obsolete before entry into force).

41 Preamble, paragraph 8 of the 1991 Protocol (adopted on 4 October 1991, entered into force on 14 January 1998).

Environmental protection as a common interest of mankind has been increasingly accepted. This point is elaborated on in section 5.1 of this Chapter. Here in the context of Antarctica, it is clear that with the adoption of the 1972 Convention for the Conservation of Antarctic Seals (CCAS),[42] the 1980 CCAMLR and, in particular, the 1991 Environmental Protocol, environmental protection constitutes a main pillar of the Antarctic Treaty System – all agreements made by the States to coordinate activities and relations on the Antarctic continent.

The environmental protection regimes within the Antarctic Treaty System provide illustrative examples of how environmental protection as the common interest of mankind is safeguarded. The environmental consideration was already included in the 1959 Antarctic Treaty: Article 5(1) prescribes that 'any nuclear explosions in Antarctica and the disposal there of radioactive waste material shall be prohibited'. Article 4 of the 1988 CRAMRA prescribes that mineral resources activities may only be taken if assessments show that they would not have significant detrimental impact on the Antarctic environment and dependent or associated ecosystems. However, as a consequence of the protest against mineral resources activities in Antarctica, the 1988 CRAMRA was soon revoked by the 1991 Environmental Protocol.[43] The 1991 Protocol establishes a comprehensive environmental regime. Under Article 2, Antarctica is designated 'as a natural reserve, devoted to peace and science'. Article 3 states that 'the protection of the Antarctic environment and dependent and associated ecosystems and the intrinsic value of Antarctica […] shall be fundamental considerations in the planning and conduct of all activities in the Antarctic Treaty area'. According to Articles 11 and 12, the Committee for Environmental Protection was established for the purpose of providing advice and formulating recommendations to the Parties on the fulfilment of their environmental obligations. Under Article 14 of the 1991 Protocol, activities undertaken in Antarctica must be subject to the inspections arranged by the Antarctic Treaty Consultative Meetings ('ATCM').[44] Last, but not least, the

42 Convention for the Conservation of Antarctic Seals (adopted on 1 June 1972, entered into force on 11 March 1978).

43 It was exactly due to environmental considerations that Article 7 of the 1991 Environmental Protocol bans 'any activity relating to mineral resources, other than scientific research'.

44 The activities are mostly scientific investigations, but there are also tourism and some other activities such as bioprospecting. It is phrased as follows: 'Any activities undertaken in the Antarctic Treaty area pursuant to scientific research programmes, tourism and all other governmental and non-governmental activities in the Antarctic Treaty area for which advance notice is required under Article VII(5) of the Antarctic Treaty, including associated logistic support activities'. See also Article 3(4) and Article 8(2) of the 1959 Antarctic Treaty, Article 15 of the 1991 Protocol, and Annexes III and IV of the 1991 Protocol.

1991 Protocol includes six Annexes which focus on several critical aspects of the Antarctic environment.[45]

Still another basic tenet of the concept of common interest in Antarctica is the freedom of scientific investigation. Article 2 of the Antarctic Treaty prescribes that:

> Freedom of scientific investigation in Antarctica and cooperation toward that end, as applied during the International Geophysical Year, shall continue, subject to the provisions of the present Treaty.

Moreover, Article 3 stipulates that scientific observations and results from Antarctica shall be exchanged and made freely available. However, it should be noted that although the Antarctic Treaty area is open to all for scientific investigation, it is not free access, like the high seas. According to Article 7, prior notification is required. In addition, as already mentioned, all activities in Antarctica, including scientific investigation, shall be subject to inspections by the designated observers.

To conclude, strictly speaking, Antarctica does not secure a status as global commons because Article 4 of the 1959 Antarctic Treaty creates an interim regime to maintain the *status quo* of Antarctica by freezing the territorial claims by States in the area. Nevertheless, since Antarctica is open to all States and since the Antarctic Treaty System is devoted exclusively to the common interest of mankind in the protection of the Antarctic environment and dependent and associated ecosystems, treating Antarctica as global commons does make sense. There are three elements of common interest of mankind in Antarctica: (1) the use of Antarctica for exclusively peaceful purposes; (2) environmental protection and (3) the freedom of scientific investigation. An international regulating regime overseen by the Antarctic Treaty Consultative Meeting (ATCM) exists for the purpose of safeguarding common interests in Antarctica.

In comparison, the concepts of common interest of mankind and common heritage of mankind in the contexts of outer space, Antarctica and DSM have common elements; they all imply the (quasi-) global commons status and the use of outer space and resources for peaceful purposes. For this reason, many people employ the same concept of CHM in these three contexts. But there are also differences. The main difference between CHM in the context of DSM and common interest/heritage of mankind in outer space is that a strong international organization is established to operationalize the principle of CHM in the former but not in the latter. This shows that the legal regimes in the two contexts are at different stages of

45 Annex I: environmental impact assessment; Annex II: conservation of Antarctic fauna and flora; Annex III: waste disposal and waste management; Annex IV: prevention of marine pollution; Annex V: area protection and management; and Annex VI: liability arising from environmental emergencies. The Annexes form an integral part of the 1991 Protocol (Article 9 of the 1991 Protocol).

development. The main difference between common interest of mankind in the context of Antarctica and CHM in DSM is that, although international arrangements exist in both contexts, in the context of Antarctica it is for the protection of the Antarctic environment and the freedom of scientific investigation, while in the DSM context there are triple purposes, namely the utilization of mineral resources, marine environmental protection and marine scientific research for the benefit of mankind. This shows the different policy orientation of the two legal frameworks.[46] Yet, the implications of the concepts in different contexts should not be viewed statically. In the long run, outer space law could develop into a more advanced stage. For instance, an international mining regime in outer space could be established at a later stage, and such a regime could model itself on the DSM regime. Also, the DSM regime could shift in the same direction as the Antarctic regime if the contrast of weight between environmental consideration and economic benefits of DSM overwhelmingly tilts towards the environment side.

But irrespective of contexts and time, the essence of CHM cannot be reduced or changed. In the next subsection, I attempt to grasp the essence of CHM by placing it against a broader intellectual background – common interests of the international community as a whole in international law ('community interests').

3.3 Common interests of the international community as a whole in international law

The existence of community interests is increasingly acknowledged in general international law. Advocating for community interests has become a salient feature of the scholarly identities of some established international lawyers. Jessup proposed in 1948 that 'the notion of community interest should be realized in the revised international legal order in the future'.[47] Jenks wrote in 1958 that

46 As a consequence of Article 7 of the 1991 Protocol on Environmental Protection to the Antarctic Treaty, the Antarctica regime transformed 'from a regime essentially designed for the exploitation of mineral resources into a legal framework for the protection of the Antarctic environment' (Bruno Simma, 'From Bilateralism to Community Interests in International Law' (1994/VI) 250 RdC 217–384, 363); In contrast, the DSM legal regime adopts 'a primarily utilization-oriented approach' and addresses environmental problems only incidentally' (Ulrich Beyerlin, 'State Community Interests and Institution-Building in International Environmental Law' (1996) 56 ZaoRV 602-627, 610).

47 Philip Jessup, *A Modern Law of Nations* (Macmillan 1948) 2.

> Contemporary international law can no longer be reasonably presented in the framework of the classical exposition of international law as the law governing the relations between States, but must be regarded as the common law of mankind in an early stage of development.[48]

Community interests in international law has been a recurring theme for a series of lectures at The Hague Academy. Friedman was famous for the distinction between 'international law of coexistence' and 'international law of cooperation'.[49] He argued that the emergence of international law of co-operation brought a vertical structure of the international legal order. He further emphasized international cooperation for the realization of common interests.[50] Mosler looked at international law from the point of view of international society as a legal community. He emphasized that:

> International law cannot be defined solely in terms of bilateral or plurilateral relations between subjects who possess legal capacity. The collection of subjects participating in the international legal order constitutes a community, and all subjects of international law are its members.[51]

Based on the perspective of international society as a legal community, Mosler indicated that 'international public order' was a necessity for maintenance of the community. Like Friedman, he also identified the new phenomenon of international law of cooperation; he saw international organizations as institutionalised international cooperation. In the 1990s, a series of lectures was given at The Hague Academy on the same topic of community interests in international law, albeit on different aspects. Tomuschat discussed 'obligations arising for states without or against their will'[52], Frowein explored 'reactions by not directly affected states to breaches of public international law'[53], while Simma delved into the doctrinal expression of community interests and community interests in treaties.[54] A tentative definition of community interests was given by Simma as:

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48 C. Wilfred Jenks, *The Common Law of Mankind* (Stevens 1958), para. 1 of the Preface. Although the objective of this book was to highlight the new trend of 'the progress of universality', that is, the change of international law from a characteristic of European-centred to the inclusion of all civilizations, he did touch upon the notion of international community.

49 Wolfgang Friedmann, General Course at The Hague Academy (1969) 127(2) RdC 41-246.

50 Certainly not all common interests are community interests, but community interests are one kind of common interests.

51 Hermann Mosler, 'The international society as a legal community' (1973) 140(3) RdC 1-320, 11-12.

52 Christian Tomuschat, 'Obligations arising for states without or against their will' (1993) 241(4) RdC 199-374.

53 Jochen Frowein, 'Reactions by not directly affected states to breaches of public international law' (1994) 248(4) RdC 345-438.

54 Bruno Simma, 'From bilateralism to community interest in international law' (1994) 250(6) RdC 221-384.

> A consensus according to which respect for certain fundamental values is not to be left to the free disposition of States individually or inter se but is recognized and sanctioned by international law as a matter of concern to all States.[55]

Cançado Trindade argued for an international law for humankind.[56] This was an attempt to humanize as well as universalize international law. To construct such an international law for humankind, he resorted to the concepts of *jus cogens*, obligations *erga omnes*, international crime, common heritage of mankind and common concern of mankind,[57] all of which, in his opinion, are expressions of community interests.

Indeed, notions such as '*jus cogens*'[58], 'obligations *erga omnes*'[59], 'third-party invocation of State responsibility',[60] as well as 'common heritage of mankind' or 'common concern of mankind'[61] are manifestations of the community interests in international law. Such manifestations, in Villapando's observation, 'have arisen in a compartmentalized and asynchronous way'.[62] Namely, 'each of the manifestations described above has initially been tested in a limited and contained legal environment and developed independently'.[63] The concepts were consolidated and linked in legal theory and practice only at a later stage, which resulted in an emerging web of interconnected transformations of the international order being characteristic of the protection of community interests.[64]

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55 Ibid, 233.

56 Antônio Augusto Cançado Trindade, 'International law for humankind: towards a new *jus gentium*: general course on public international law' (2005) 316 RdC 9-439.

57 Ibid., Part V.

58 Article 53 of the 1969 Vienna Convention on the Law of Treaties defines a peremptory norm of general international law ('*jus cogens*') as 'a norm accepted and recognized by the international community of States as a whole as a norm from which no derogation is permitted and which can be modified only by subsequent norm of general international law having the same character'.

59 The famous obiter dictum of the ICJ in the 1970 *Barcelona Traction, Light and Power Company (Belgium v. Spain)* states as follows: An essential distinction should be drawn between the obligations of a State towards the international community as a whole, and those arising vis-à-vis another State in the field of diplomatic protection. By their very nature the former are the concern of all States. In view of the importance of the rights involved, all States can be held to have a legal interest in their protection; they are obligations *erga omnes*.

60 Article 48(1) of the 2001 Draft Articles on State Responsibility (the second reading) stipulates that Any State other than an injured State is entitled to invoke the responsibility of another State if 'the obligation breached is owed to 'the international community as a whole'.

61 This notion is often used in international environmental law. Section 5.1 of this Chapter discusses this notion preliminarily.

62 Santiago Villalpando, 'The Legal Dimension of the International Community: How Community Interests Are Protected in International Law' (2010) 21(2) EJIL 387-419, 408.

63 Ibid. 409.

64 Ibid.

Therefore, CHM is by no means an isolated concept; rather, it is an exemplary case of a new trend in international law, an eminent manifestation of community interests. The fundamental reason for the existence of CHM, as well as other types of community interests, is the changed nature of the international community. Specifically, it is because of the need for international cooperation and the consensus of the international community about certain fundamental values. This partly accounts for why the tenet of CHM could stand against the substantial change in the DSM regime by the 1994 Implementation Agreement: because of the need for international cooperation, the consensus of the international community in the field of DSM remained unchanged. A connection between the concepts of CHM and community interests provides a deeper understanding of where CHM stands in international law now and the direction in which it could head in the future.

Yet, the recognition of community interests in international law gives rise to a difficult question. That is, how to protect community interests? Villalpando commented that 'the protection of community interests in international law has been effected through the adaption, not abandonment, of existing legal regimes.'[65] On this point, CHM is special because a specialized international legal regime was created for the operationalization of CHM in the context of DSM. But what is the legal effect of the principle of CHM and the international DSM regime established on it? Can they have effect on third-parties to the UNCLOS because of the purpose of community interests? The next section delves into this problem. It first addresses the question of whether the purpose of community interests could serve as the basis for an argument of the third-party effect of the DSM regime.

4 Third-party effect of the principle of the Common Heritage of Mankind and the international DSM regime

4.1 Community interests as the bases of third-party effect of the international DSM regime

Third-party effect of a treaty regime is not without precedent; the 1995 Agreement on the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (the '1995 UN Fish Stocks Agreement')[66] is such an example. Two provisions are of particular relevance. Under Article 17, all States, including non-members of the regional fisheries management organizations (RFMOs) and non-participants to regional fisheries management arrangements (RFMAs), shall cooperate in order to

65 Ibid.

66 Adopted on 4 August 1995, entered into force on 11 December 2001.

ensure the effectiveness of conservation and management measures. Under Article 33, to ensure the effective implementation of the Agreement, States Parties can take measures against vessels flying the flag of non-parties. The 1995 UN Fish Stocks Agreement seems like 'true international legislation': it acts in such a way as to impose the standards of the treaty on non-parties.[67]

Furthermore, Simma argued that the Antarctic Treaty provided an 'objective regime' the binding force of which extends beyond the 'Antarctic Club'[68] to all States of the international community.[69] He tried three approaches to support this argument. One of them is the 'public law' approach. Under this approach, Simma argued that some territorial treaty regimes have *erga omnes* effect because in some circumstances parties to the treaties exercise a 'quasi-legislative' authority, and the parties justify the exercise of a 'quasi-legislative' authority on the basis of common interest. The argument of Simma is consistent with the reflection by von Bogdandy, Goldmann and Venzke in 'from public international law to international public law'.[70] According to von Bogdandy, Goldmann and Venzke, the core concern of the public law approach is the existence of international public authority,[71] and the purpose of the existence of international public authority is the pursuit of public interests.[72]

It seems that the 1995 UN Fish Stocks Agreement is an exact and practical example that endorses the public law approach.[73] What is the justification for the third-party effect of the regional management regime as prescribed in the 1995 UN Fish Stocks Agreement? The explanation given by the Agreement is the effectiveness of conservation and management measures. Indeed, the urgent need to take collective action against overfishing and the necessity of a universal application of the international standard as described in the 1995 UN Fish Stocks Agreement can provide solid justification. Yet, the existence of such an urgent need or necessity will not automatically lead to the third-party effect of a treaty. There should also be a consensus among

67 This observation draws on R.R. Baxter, 'Multilateral Treaties as Evidence of Customary International Law' (1965) 41 BYIL 275, 285. In his article, Baxter referred to the humanitarian treaty as true international legislation because the humanitarian treaty acts in such a way as to impose the standards of the treaty on non-parties. An analogy is made here between the 1995 UN Fish Stocks Agreement and the humanitarian treaty.

68 The 1959 Antarctic Treaty has so far 53 State Parties (29 consultative parties and 24 non-consultative parties). Source from Secretariat of the Antarctic Treaty: <http://www.ats.aq/devas/ats_parties.aspx?lang=e>.

69 Bruno Simma, 'The Antarctic Treaty as a Treaty Providing for an 'Objective Regime' (1986) 19 Cornell Int'L. J. 189.

70 Armin von Bogdandy, Matthias Goldmann and Ingo Venzke, 'From Public International to International Public Law: Translating World Opinion into International Public Authority', MPIL Research Paper No. 2016-02, available at: <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2770639>.

71 Ibid.,12.

72 Ibid., 25.

73 Adopted on 4 August 1995, entered into force on 11 December 2001, to date it has 85 Parties.

the international community that such a matter – in this case the protection of fish stocks – is of common concern and in the common interests of States. In other words, the public law approach in turn must find its fundamental basis on community interests.

Thus, the 1995 UN Fish Stocks Agreement and the scholarly reflections on the Antarctic Treaty regime and international public law show the possibility that community interests could serve as the fundamental basis for the third-party effect of an international treaty regime. Can such a line of argumentation be applicable to the DSM regime? Here, one needs to look into the specific community interests that are involved in each context. It is seen that in the context of fish stocks the community interest relates to the conservation and management of fish stocks; while in the context of Antarctica the community interest is the preservation and protection of the Antarctic environment and the freedom of scientific investigation. On the other hand, in the context of DSM, the community interests are the utilization of mineral resources in the Area, the protection of marine environment and marine scientific research. The community interests in these three contexts are comparable. If community interests could serve as a basis for an argument of third-party effect of the Antarctic Treaty regime and the Fish Stock regime, then one could argue tentatively that community interests could also serve as a basis for third-party effect of the international DSM regime.

Although the conclusion arrived at above is indeed very tentative because of the scarcity of supporting evidence,[74] the inquiry has both theoretical and practical significance. Theoretically, it transcends 'State consent' as the source of binding force of international obligations.[75] Alternatively, it attempted to base the binding force of international obligations on the 'consensus' of the international community. This approach is more in harmony with the very spirit of the principle of CHM since, as Baslar argued, 'the reappearance of mankind in international law constitutes a significant evidence of the demise of the positivist school.'[76] But more importantly, the enquiry has practical significance. It constitutes an attempt to answer the question of whether the ISA can exercise its authority vis-à-vis third parties, such as the United States. The next subsection continues to address this question through a customary international law approach.

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74 The 1995 Fish Stocks Agreement is just a rare example. Many other agreements for the purpose of community interests, such as the United Nations Framework Convention on Climate Change, are still not binding on third parties.

75 Emériс de Vattel, Law of Nations or Principles of the Law of Nature Applied to the Conduct and to the Affairs of Nations and Sovereigns (Liberty Fund 2008).

76 Kemal Baslar, *The Concept of the Common Heritage of Mankind in International Law* (Martinus Nijhoff 1998) 71.

4.2 Customary international law status of the principle of the Common Heritage of Mankind

It is recalled that Section 4, Part III of the 1969 Vienna Convention on the Law of the Treaties (the '1969 VCLT') entitled 'treaties and third States' codifies the existing rules on the issue of the third-party effect of treaties. The general rule is that 'a treaty does not create either obligations or rights for a third State without its consent' (Article 34). This is the principle of *pacta tertiis.* But there are exceptions: if the original States Parties to the treaty intend to create rights or obligations for third States and if that third State assents, the effect of the treaty could extend to that third State (Articles 35 and 36). These three provisions are the same in the sense that they all recognize State consent as the basis of binding force of a treaty. Article 38 on the other hand prescribes treaties as the codification of existing customary international law. It states that a treaty rule or principle could become binding on a third party if the rule or principle is recognized as customary international law. Here, the binding force of a treaty rule or principle on a third party comes from the customary international law status of the treaty rule or principle as such.

Insofar as the principle of CHM in the context of DSM is concerned, the author notes that the United States objected to several elements of the principle (such as the international administration of the ISA) around the time of the adoption of the UNCLOS and continued to do so after the entry into force of the UNCLOS. Currently, a U.S. company still holds rights to two pieces of area in the Clarion-Clipperton Fracture Zone of the Area for exploration on the basis of U.S. national legislation.[77] Thus, the consent of the United States to the CHM principle as prescribed in the UNCLOS does not exist. In accordance with Articles 34, 35 and 36 of the 1969 VCLT, the principle of CHM as prescribed in the UNCLOS is not binding on the United States. The following paragraphs take the approach under Article 38 of the 1969 VCLT, discussing whether the principle of CHM as prescribed in the UNCLOS constitutes customary international law and therefore is binding on the United State as a third party.

It is generally acknowledged that State practice and *opinio juris* are the two constituent elements of customary international law. To prove the customary international law status of an international rule or principle is thus to examine whether there is sufficient State practice and *opinio juris*

77 On the U.S. Seabed Mining agreements with other countries and the current status of U.S. Deep Seabed Claim see Steven Groves, 'The U.S. Can Mine the Deep Seabed Without Joining the U.N. Convention on the Law of the Sea' The Heritage Foundation 2012. Available at:
<http://www.heritage.org/research/reports/2012/12/the-us-can-mine-the-deep-seabed-without-joining-the-un-convention-on-the-law-of-the-sea?ac=1.> Or visit the website of the National Oceanic and Atmospheric Administration (NOAA): <http://www.gc.noaa.gov/gcil_seabed_management.html#mineral>.

concerning that international rule or principle. The element of *opinio juris* is to a large extent manifested by the element of State practice, but indispensable. With regard to the criterion for the establishment of the elements, the famous 1969 judgment of the ICJ in the *North Sea Continental Shelf* cases held that:

> State practice, including that of States whose interests are specially affected, should have been both extensive and virtually uniform in the sense of the provision invoked; and should moreover have occurred in such a way as to show a general recognition that a rule of law or legal obligation is involved. [78]

Therefore, the questions are: is there extensive and virtually uniform State practice with regard to CHM? Do States generally recognize the principle of CHM as having binding force? To answer these questions, one must conduct a thorough survey on related evidence. In this respect, the author notes that the ILC is currently working on the topic of 'identification of customary international law'.[79]

In this section, I will not embark on the task of conducting a thorough survey on evidence relating to CHM, and thus am unable to draw a definite conclusion that CHM principle is or is not customary international law. Nevertheless, two points are made below which could shed some light on this issue. First, one should be aware that the legal status of CHM changes with the passage of time. Second, the negotiations, drafting, adoption and entry into force of the UNCLOS affect the formation of CHM as customary international law.[80]

The binding force of CHM differs in different periods of its development. For the sake of the convenience of the analysis, the development of the principle of CHM could be divided into three periods: first period 1967-1982: the initiation and negotiation period; second period 1982-1994: between the periods of adoption and entry in force of the UNCLOS; and the third period post-1994: the period since the entry into force of the UNCLOS.

Around the first and second periods, Wolfrum considered CHM as part of customary international law, regardless of its incorporation into the UNCLOS.[81] In the second period, Li also argued for a customary

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78 ICJ, *North Sea Continental Shelf* Cases (Federal Republic of Germany/Denmark; Federal Republic of Germany/Netherlands), Judgment of 20 February 1969, para. 74.

79 In 2012, the ILC included the topic of 'formation and evidence of customary international law' in its programme work; Sir Michael Wood was appointed as the Special Rapporteur. In 2013, the title of the topic was changed to 'identification of customary international law'. The Special Rapporteur has so far submitted four reports, one each in 2013, 2014, 2015 and 2016 respectively.

80 On the relations between treaty and customary international law as two sources of international law, please see Mark Villiger, *Customary International Law and Treaties* (Brill, 2nd edn, 1997).

81 Rudiger Wolfrum, 'The Principle of the Common Heritage of Mankind' (1983) 43(2) Max-Planck-Institut für ausländisches 312-337, 314. Available at: <http://www.zaoerv.de/43_1983/43_1983_2_a_312_337.pdf> .

international law status of the principle, on the basis of a solid examination of State practice and *opinio juris* concerning the principle, in particular during the negotiation period within the UN.[82] However, there was an important difference between the opinions of Wolfrum in 1983 and Li in 1994.

In spite of the acknowledgement of the customary international law status of CHM, Wolfrum argued that the principle of CHM did not prohibit unilateral deep sea-bed activities under national legislation. On the contrary, Li vehemently opposed the unilateral DSM legislation by industrial States. She considered the practice illegal and that they brought havoc to the international regime. The different positions of the two authors reflected the different understandings of the legal meaning of CHM. For Li, international regime is a necessary element in the context of DSM, albeit the specific contents of the regime have to be agreed upon by treaty.[83] However, for Wolfrum by CHM was meant not that as prescribed in the UNCLOS but that in the context of outer space and of Antarctica. Yet, the concept of CHM is simply not referred to in any of the Antarctica legal documents; they employed the concept of the common interests of mankind. Furthermore, as has been shown in section 2, although the concept of CHM was accepted in the 1979 Moon Agreement, State practice concerning CHM in outer space is very scarce.

Owing to the fact that the principle of CHM is an overarching principle containing many elements, the proof of the principle's status as customary international law is much more complex than in the case of specific rules. When incorporated into the UNCLOS, the eight elements of CHM as identified in section 1 of this Chapter were recognized by States to a different extent. On the one hand, elements such as 'the Area and its resources as the global commons' (non-appropriation and no claim of sovereignty by States), 'peaceful use of the Area and its resources' and 'the protection of the marine environment' were generally accepted by States. These elements were the codification of existing customary international law. On the other hand, elements of 'international administration', 'common interest in activities in the Area', 'equitable sharing of economic benefits', 'preferential treatment of developing countries' and 'marine scientific research for the interest of mankind' were newly constituted. Not only could no precedent be found in other contexts, but there were also conflicting practices in these aspects. The national legislation concerning DSM by industrial countries in the 1980s were strong examples. Thus, before 1994 the binding force of different elements of the principle of CHM was divergent.

82 Yuwen Li, *Transfer of Technology for Deep Sea-Bed Mining: the 1982 Law of the Sea Convention and Beyond* (Martinus Nijhoff 1994) 59. However, Li acknowledged that, among scholars, 'whether or not CHM has gained the status of a norm of customary international law is a debatable issue'. Ibid, 54.

83 Ibid.

The situation changed with the entry into force of the UNCLOS; the principle of CHM entered into the third period of its development. Now the number of State Parties to the UNCLOS had reached 167.[84] Baxter was of the opinion that 'the treaty may be taken as evidence of State practice, and the weight that the treaty will carry is roughly proportionate to the number of parties to the treaty'.[85] Following this argument, the almost universal participation in the UNCLOS can serve as strong evidence of State practice in favour of the principle of CHM. Moreover, Article 311(6) of the UNCLOS, functioning in a very similar way as Article 103 of the UN Charter,[86] accords the primacy of obligations of State Parties emanating from the principle of CHM over any treaty obligations established subsequently. Under this provision, not only do all State Parties acknowledge the principle of CHM in its entirety, but they must conform with the obligations emanating from the principle of CHM with priority. Thus, during a course of more than two decades since 1994, there has been consistent and uniform State practice and general recognition concerning the principle of CHM. It is reasonable to conclude that an argument for a customary international law status of the principle of CHM in the context of DSM is significantly strengthened in comparison with the first and second periods. According to Article 38 of the 1969 VCLT, suppose that the customary international law status of CHM as described in the UNCLOS were confirmed, this would make the principle of CHM binding on the United States as a third party to the UNCLOS. Yet, there is the persistent objector rule which says that a State is not bound by a rule of customary international law if it persistently and consistently objects to the rule during its formation.[87] Questions then arise: is the persistent objector rule a well-established rule in international law? If affirmative, can the United States then qualify as a 'persistent objector' and therefore is exempt from the universal binding force of the principle of CHM as customary international law?

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84 All the eight industrial States who promulgated national legislation relating to DSM before the entry into force of the UNCLOS became parties to the UNCLOS except the United States.

85 R.R. Baxter, 'Multilateral Treaties as Evidence of Customary International Law' (1965) 41 BYIL 275, 277.

86 Article 311(6) of the UNCLOS stipulates as follows: 'States Parties agree that there shall be no amendments to the basic principle relating to the common heritage of mankind set forth in article 136 and that they shall not be party to any agreement in derogation thereof'. Similarly, Article 103 of the UN Charter states as follows: 'in the event of a conflict between the obligations of the Members of the United Nations under the present Charter and their obligations under any other international agreement, their obligations under the present Charter shall prevail.'

87 Ted Stein, 'The Approach of the Different Drummer: The Principle of the Persistent Objector in International Law' (1985) 26(2) HarvIntlLJ 457-482, 457; Jonathan I. Charney, 'The Persistent Objector Rule and the Development of Customary International Law' (1986) 56(1) BYIL 1-24, 3; see also in general the monography of James Green, *The Persistent Objector Rule in International Law* (OUP 2016).

Views are divided on the first question. For instance, Charney stated that the persistent objector rule is 'particularly difficult to reconcile with the view that consent is not required before a rule of customary international law can bind the State.'[88] He considered this rule to have 'no legitimate basis in the international legal system'.[89] Contrarily, Brownlie opined that 'whatever the theoretical underpinning of the principle, it [the persistent objector rule] is well recognized by international tribunals, and in the practice of States'.[90] Green argued that there is more than enough evidence to support the existence of the persistent objector rule today.[91] For the second question, there are no modalities for the establishment of persistent objector except the requirement that the objection should be made during the formation of the norm.[92] The author notes that the United States voted in favour of the 1970 Declaration of Principles the contents of which were later incorporated into the UNCLOS. Yet, it dissented from the principle of CHM during the very final stage of the negotiation period in 1981 when former US President Ronald Reagan took office and changed national policy. Thus, it seems that there is room to argue that the US could qualify as a persistent objector to CHM as described in the UNCLOS if the persistent objector rule is accepted.

To conclude, in this section I addressed two questions of whether the international DSM regime can argue for third-party effect on the basis of community interests and whether the principle of CHM has gained the customary international law status. To the first question, an affirmative answer was tentatively given. To the second question, three elements of CHM can be said to have gained the status of customary international law, namely the Area and its resources as global commons, the peaceful use of the Area and its resources, and the protection of the marine environment. Yet, it is still premature to draw a definitive conclusion that CHM as descripted in the UNCLOS in its entirety has done so. At this time, the US DSM regime is coexistent with the international DSM regime. Although this situation has not to date been problematic in practice, it is anticipated that, when DSM enters into the exploitation phase, the potential risks of the parallel existence of a national DSM regime with the international DSM regime will become problematic. For instance, the operation of exploitation activities in accordance with US national law outside the international regime would weaken the authority of the ISA, create inequality between State parties and non-State parties to the UNCLOS, and have detrimental effect on the principle of CHM.

88 Jonathan I. Charney, 'The Persistent Objector Rule and the Development of Customary International Law' (1986) 56(1) BYIL 1-24, 5.

89 Ibid, 21.

90 Ian Brownlie, *Public International Law* (OUP, 7th ed., 2008),11.

91 James Green, *The Persistent Objector Rule in International Law* (OUP 2016) 55.

92 Olufemi Elias, 'Persistent Objector' MPEPIL (last updated September 2016), para. 15.

5 Protection of the marine environment in deep seabed mining

As indicated in section 2, the marine environmental protection in DSM is an integral element of the principle of CHM, an element that is closely connected to the element of economic benefits arising from DSM, and an element the weight of which that could to a large extent determine the direction of the development of the principle of CHM and the DSM legal regime in the future. Since the marine environmental protection in DSM constitutes the topic of this entire research, this section focuses specifically on this element. I will make some general observations on this element at two levels. First, at the conceptual level, I argue that the requirements of marine environmental protection in DSM are obligations *erga omnes* imposed on all the participants in DSM (section 5.1). Second, at the operational level, I argue that the protection of the marine environment in DSM relies heavily on marine scientific knowledge (section 5.2).

5.1 The conceptual level: marine environmental protection as obligation *erga omnes*

Among the scholars mentioned in section 3.3 and many others, international environmental protection is widely accepted as one key example of 'community interests'. For instance, Simma commented that international concern for the environment 'provides a particularly impressive illustration of the movement from bilateralism to community concerns in international law.'[93] For Feichtner, environmental protection is recognized as a typical example of community interests, specifically the protection of common values.[94] Sand considered that the 'F4' Panel functioned as a guardian of community interest, and that environmental damage claims from the 1991 Gulf War are a way of protecting community interest.[95]

Besides 'community interests', the notion of 'common concern of humankind' is also employed to refer to the global environmental issues of 'climate change' and 'conservation and sustainable use of biological diversity'.[96] Take climate change as an illustrative example. In 1988, the UN

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93 Bruno Simma, 'From bilateralism to community interest in international law' (1994) 250(5) RdC 221-384, 238.

94 Feichtner categorizes community interests into four types: The protection and creation of common goods; The protection of common values; The internationalization of common spaces and Redistributive and intergenerational justice. Isabel Feichtner, 'Community Interest', MPEPIL (last updated February 2007).

95 Peter Sand, 'Environmental Damage Claims from the 1991 Gulf War: State Responsibility and Community Interests', in Fastenrath, Ulrich et al., (eds.), *From Bilateralism to Community Interest: Essays in Honour of Bruno Simma* (OUP 2011).

96 UNEP, The Meeting of the Group of Legal Experts to Examine the Concept of the Common Concern of Mankind in Relation to Global Environmental Issues (Co-Rapporteurs: A.A. Cançado Trindade and D. J. Attard), 1991. Available at: <http://historico.juridicas.unam.mx/publica/librev/rev/iidh/cont/13/doc/doc29.pdf> .

General Assembly declared in Resolution 43/53 that 'climate change is a common concern of mankind, since climate is an essential condition which sustains life on earth'. The 1992 UN Framework Convention on Climate Change ('UNFCCC') acknowledges that 'the change in the Earth's climate and its adverse effects are a common concern of humankind'.[97] In the 1997 Report of the Secretary-General of the UN, it is stated that 'the notion of common concern of humankind recognizes the legitimate interest of the international community to concern itself with certain issues and values which, by their nature, affect the community as a whole.'[98] The 2015 Paris Agreement to the UNFCCC reaffirms that 'climate change is a common concern of humankind'.[99]

What then is the meaning the concept of common concern of humankind? As explained in the ILC's work on the topic of 'the protection of the atmosphere', it means issues or problems that are no longer contained in 'the reserved domain of domestic jurisdiction', since they are 'matters of international concern'.[100] Shelton[101], as well as Castillo-Winckels,[102] stated that issues or problems of common concern not only transcend national boundaries but also require concerted or collective actions of all States to effectively address such issues or problems. Similarly, Bowling et al considered the concept of common concern of humankind as particularly suitable for environmental issues because environmental problems very often transcend national boundaries and 'at the very least, a common concern

97 Preamble, para. 1 to the 1992 UN Framework Convention in Climate Change (adopted on 9 May 1992, entered into force on 21 March 1994).

98 Report of the Secretary-General of the UN, Rio Declaration on the Environment and Development: application and implementation, E/CN.17/1997/8, para. 44.

99 Preamble, para. 11 to the Paris Agreement to the UNFCCC (adopted on 12 December 2015, entered into force on 5 October 2016).

100 International Law Commission, The first report on the protection of the atmosphere (Special Rapporteur Mr Shinya Murase), 2014, A/CN.4/667, para. 89. In 2015, however, the ILC decided to remove the concept of common concern of humankind from its Draft Guidelines on the Protection of the Atmosphere. As a response, Castillo-Winckels argued for the return of the concept to the work of the ILC on the atmosphere. Her argument was based on two reasons. First, she considered that since the concept is used in the context of climate change, it can also be applied by analogy in the context of the atmosphere. Second, the problem of atmospheric degradation is by nature issue of common concern and the return of the concept to the work of ILC would allow the ILC to elaborate on the meaning and scope of the concept. (Nadia Sanchez Castillo-Winckels, 'Why "Common Concern of Humankind" Should Return to the Work of the International Law Commission on the Atmosphere' (2016) 29 Geo. Envtl. L. Rev. 131).

101 Dinah Shelton, 'Common Concern of Humanity' (2009) 39(2) Environmental Law and Policy, 83.

102 Nadia Sanchez Castillo-Winckels, 'Why "Common Concern of Humankind" Should Return to the Work of the International Law Commission on the Atmosphere' (2016) 29 Geo. Envtl. L. Rev. 131, 134.

of humankind designation expresses the need for international cooperation through strong global institutions to face a shared problem.'[103]

In addition, a semantic check of the words can to some extent reveal the meaning of the concept. The word 'common' means 'of or relating to a community at large'.[104] It refers to the fact that humankind or the international community as a whole is collectively affected by issues such as climate change. The word 'concern' as a noun include meanings of 'feelings of worry or care'.[105] Taken together, the notion 'common concern of humankind' expresses collective feelings of 'care' about the climate change and of 'worry' about its detrimental effects. Logically, from these collective feelings, the need for concerted or collective actions would arise. In a similar vein, the marine environment relating to DSM can also be seen as a key example of 'common concern of humankind'.

Yet, the mere fact that climate change or the marine environment is a common concern of humankind or community interest does not in itself create international obligations. As the ILC states:

> It may be too early at present to interpret the concept of common concern as giving 'all States a legal interest, or standing, in the enforcement of rules concerning protection of the global atmosphere', in view of the absence of appropriate procedural law to implement such an interpretation. It may also be premature to consider the concept of common concern as creating rights for individuals and future generations.[106]

Here the notion of 'obligations *erga omnes*' should be turned to. The famous obiter dictum of the ICJ in 1970 spelled out two criteria for the identification of obligations *erga omnes*: the obligations must by their very nature be 'the concern of all States' and 'in view of the importance of the rights involved, all States can be held to have a legal interest in their protection'.[107] Thus the *erga omnes* character of the obligations originates from 'the fundamental values of the international community' which is normally termed as community interests.

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103 Chelsea Bowling, Elizabeth Pierson, Stephanie Ratte, 'The Common Concern of Humankind: A potential Framework for a New Internationally Legally Binding Instrument on the Conservation and Sustainable Use of Marine Biological Diversity in the High Seas' available at the UN Division for Ocean Affairs and the Law of the Sea: <http://www.un.org/depts/los/biodiversity/prepcom_files/BowlingPiersonandRatte_Common_Concern.pdf>.

104 Merriam-Webster dictionary: <https://www.merriam-webster.com/dictionary/common>.

105 Merriam-Webster dictionary: <https://www.merriam-webster.com/dictionary/concern>.

106 LTC, The first report of Special Rapporteur Mr Shinya Murase on the protection of the atmosphere, 2014, A/CN.4/667, para. 89.

107 ICJ, *Barcelona Traction, Light and Power Company (Belgium v. Spain)*, Judgment of 1970, paras. 52-53.

The focus of the notion of obligations *erga omnes* is on the legal effect:[108] The recognition of obligations *erga omnes* accords a right/an interest to all States in the observation of those obligations. This gives rise to the difficult issue of 'enforcement of obligations *erga omnes*',[109] just as the recognition of community interests raises a difficult question of how to protect community interests (as mentioned in section 3.3). Article 48(1) of the 2001 ASR touches specifically on this issue. The enforcement of obligations *erga omnes* in particular requires an innovative view on the procedural aspects of international law.

Insofar as environmental protection is concerned, the 'F4' Panel of the United Nations Compensation Commission (UNCC) repeatedly emphasized 'the common concern for the protection and conservation of the environment', which 'entails obligations towards the international community and future generations'.[110] Gaja observed that:

> The emergence in the second part of the 20th century of the category of obligations *erga omnes* under international law […] reflects what has been termed as the emergence of public interests in the international community: the growing concern for the protection of interests that States perceive as common and the consequent building of rules and institutions that are designed to protect those interests.[111]

The protection of the marine environment in DSM is exactly such an obligation that has an *erga omnes* character. As the IDI resolution states:

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108 Christian Tomuschat, reply to the first report of Giorgio Gaja, 'Obligations and Rights *Erga Omnes*: First Report (March 2002)' (2005) 71-I Yearbook of the Institute of International Law, 160-161. Weil criticized that the acknowledgement of such a notion as obligations *erga omnes* diluted the normativity system of international law (Prosper Weil, 'Towards Relative Normativity in International Law' (1983) 77 AJIL 413-442). Yet, Fastenrath and Villapando hold different positions. Fastenrath argued that relative normativity in international law is a conceptual reflection of reality of the international community (Ulrich Fastenrath, 'Relative Normativity in International Law' (1993) 4 EJIL 305-340). While Villalpando explained that the shift toward the protection of community interests in international law was the result of the objective existence and needs of certain common goods or values and the subjective awareness of such existence and needs by the international community (Santiago Villalpando, 'The Legal Dimension of the International Community: How Community Interests Are Protected in International Law' (2010) 21(2) EJIL 387-419, 390).

109 Christian Tams, *Enforcing Obligations Erga Omnes in International Law* (CUP 2005).

110 Peter Sand, 'Environmental Damage Claims from the 1991 Gulf War: State Responsibility and Community Interests', in Fastenrath, Ulrich et al., (eds.), *From Bilateralism to Community Interest: Essays in Honour of Bruno Simma* (OUP 2011).

111 Giorgio Gaja, 'Obligations and Rights Erga Omnes: First Report (March 2002)' (2005) 71-I Yearbook of the Institute of International Law, 119-151, 119.

> Under international law, certain obligations bind all subjects of international law for the purposes of maintaining the fundamental values of the international community. A wide consensus exists to the effect that […] obligations relating to the environment of common spaces are examples of obligations reflecting those fundamental values'[112]

The acknowledgement of marine environmental protection in DSM as obligations *erga omnes* has significant impact on the DSM liability regime. Particularly, it has impact on the question of 'who is entitled to invoke the liability'. This question will be taken up in Chapters 5, 6 and 7 of this dissertation.

5.2 The operational level: the significant role of marine sciences

On the operational level, this section argues that the environmental rules and policies should be science-based as assessments of whether the marine environment faces damage or risk of damage from DSM, and if so, what particular types of damage or risk entail and how they may best be prevented or remedied must all rely on scientific knowledge. It means that not only the making but also the implementation and compliance of the environmental rules should be based on scientific knowledge about the marine environment and the environmental impacts of DSM. As indicated, 'in appreciating what is involved in such issues [as the impact of mineral extraction etc.], let alone what might be done to avoid unwelcome consequences, accurate scientific knowledge of the sea is imperative.'[113]

What then is the current status of scientific knowledge about the marine environment? A brief answer is that there are great gaps owing mainly to the fact that oceanography is still at a nascent stage of its development. It is generally acknowledged that the *SMS Challenger* expeditions (1872-1876) marked the birth of modern oceanography because the expeditions standardized methods to collect data and investigated the physics, chemistry, biology, and geology of the ocean. It is also because the expeditions produced results which laid the foundation for oceanography.[114] Oceanography studies all aspects of the ocean. Yet, the physical, geological, biological

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112 Institut de Droit International (the Fifth Commission) Resolution: *Obligations and Rights Erga Omnes in International Law* (Rapporteur: Mr Giorgio Gaja), adopted at Karkow Session on August 27, 2005. Available at: <http://www.idi-iil.org/idiE/resolutionsE/2005_kra_01_en.pdf>, preambular paragraphs 1 and 2.

113 Margaret Deacon, Tony Rice and Colin Summerhayes (eds), *Understanding the Oceans: A Century of Ocean Exploration* (Routledge 2001) 1.

114 The Challenger expedition (1872-76) was the most ambitious and innovative scientific project ever attempted – a global survey of the deep ocean. The assignment of Challenger was to determine 'the conditions of the deep-sea throughout all the great oceanic basins'. The expedition, still the longest, covered nearly 70,000 nautical miles in 4 years, carried out almost 500 deep soundings and 133 dredgings and obtained various data from 362 stations (one every 200 miles). As a result of the expedition, 715 new genera and about 4,500 new species were described. James Kennett, *Marine Geology* (Prentice-Hall 1982) 5.

and chemical aspects of the oceans each constitutes the subject matter of a marine science. It was not until 1942 that the first comprehensive book on oceanography was published which attempted to integrate all marine sciences.[115] The book especially emphasized the close interrelationship and mutual dependence of the marine sciences. For instance, it was said that marine geology 'is dependent upon the results of nearly every other marine science'[116] and 'the contacts between marine biology and the chemistry of sea water are so intimate that it is difficult to indicate where the biology stops and the chemistry begins'.[117]

To assess the environmental impact of DSM requires investigation into all four aspects of the oceans.[118] Yet, since the goal of marine environmental protection in DSM focuses primarily on the health of the marine ecosystems,[119] and since an ecosystem is defined as 'a biotic assemblage and its associated physical environment in a specific space',[120] the following descriptions focus mainly on the physical and biological aspects of the marine ecosystems relating to specific types of mineral resources. Currently there are three types of mineral resources on the seabed the exploration for and exploitation of which are under the control of an international legal regime: polymetallic nodules (manganese nodules), polymetallic sulphides (SMS deposit) and cobalt-rich ferromanganese crusts.[121]

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115 H. U. Sverdrup, Martin W. Johnson, Richard Fleming, *The Oceans: Their Physics, Chemistry, and General Biology* (Prentice Hall, 1942). This book is called 'the Bible of Oceanography'.

116 Ibid., 5.

117 Ibid.

118 For instance, The SPC-EU deep seabed minerals project investigated the physical, biological, environmental and technical aspects of mining on Manganese Nodules, Sea-floor Massive Sulphides and Cobalt-rich Ferromanganese Crusts. The project was initiated in 2011 and ended in 2013. It was run at a budget of EUR 4.4 million. A primary objective of the project is to support informed and careful governance of any DSM activities in the Pacific Island countries. Source from: http://www.sopac.org/dsm/index.php.

119 For instance, it is said that 'conservation objectives should relate to the concept of ecosystem-based management and to the dynamic structure and function of the ecosystems' (ISA, 'Environmental Management of Deep-Sea Chemosynthetic Ecosystems: Justification of and Considerations for a Spatially-Based Approach', Technical Study No. 9 (2011), 29). It is also said that 'the MIDAS project aimed at helping the nascent deep-sea mining industry, regulators and civil society to understand the potential impacts of mining on deep-sea ecosystems.' (The final report of The Managing Impacts of Deep Sea Resource Exploitation project ('MIDAS') 2016, 5). In the UNCC 'F4' Panel report, it was stated that 'the aim of restoration would be to restore the overall ecological functioning […] of the marine ecosystem' (UNCC, the third "F4" report, 2003, para. 48).

120 Arthur Tansley first coined the term 'ecosystem' in 'The Use and Abuse of Vegetational Concepts and Terms' (1935) 16(3) Ecology 284-307. The definition used here is Tansley's as recited from: Hanling Wang, 'Ecosystem Management and its Application to Large Marine Ecosystem: Science, Law, and Politics' (2004) 35 OceanDev&IntlL 41-74, 41.

121 There are other mineral resources in the Area such as the natural gas hydrate and rare earth which are not covered by the current DSM legal regime. Yet this does not mean that they will not be included in the future.

Manganese nodules form at the vast, sediments-covered abyssal plains; the high concentrated nodules occur on the ocean floor at water depths of about 4,000 to 6,000m; and the nodules of economic interest are localized in the centre of the north central Pacific Ocean, the Peru Basin in the south-east Pacific Ocean and the centre of the north Indian Ocean.[122] Marine life is found both in the soft sediments and on the nodules themselves. To date, the biology associated with manganese nodules has been studied most intensively in the CCZ. It is estimated that the studies in the CCZ might be applicable to other abyssal plain habitats.[123] it is also estimated that different nodule regions sustain different levels of particulate organic carbon flux which could affect the levels of species diversity and faunal communities.[124] Nevertheless, it is acknowledged that the threat of nodule mining to biodiversity is still to a large extent unpredictable because of the very limited knowledge of species and their biogeographic distribution within the nodule province.[125]

SMS deposits form on and below the seabed from high temperature hydrothermal fluids emitted by volcanoes along ridges, island arcs, and in rifted back-arc basins behind subduction zones.[126] In 1977, the US manned submersible *Alvin* discovered deep-sea hydrothermal vents and biological communities living around the vents.[127] The discovery of life in the extreme environment of hydrothermal vents was definitely a revolutionary breakthrough in the field of marine biology.[128] The hydrothermal vents are called chemosynthetic ecosystems because marine life in this habitat uses chemical energy rather than photosynthesis to create organic matter.[129] The discov-

122 Enrico Bonatti and Y. Rammohanroy Nayudu, 'The Origin of Manganese Nodules on the Ocean Floor' (1965) 263(1) American Journal of Science 17-39; ISA, 'Brochure – Polymetallic Nodules'; Sven Peterson et al., 'News from the Seabed – Geological Characteristics and Resource Potential of Deep-Sea Mineral Resources' (2016) 70 Marine Policy 175-187, 176.

123 SPC-EU Deep Sea Minerals Project, 'Manganese Nodules: A Physical, Biological, Environmental, and Technical Review' (2013) 23. Available at: <http://dsm.gsd.spc.int/public/files/meetings/TrainingWorkshop4/UNEP_vol1B.pdf>.

124 Ibid., 22.

125 ISA, 'Biodiversity, Species Ranges and Gene Flow in the Abyssal Pacific Nodule Province: Predicting and Managing the Impacts of Deep Seabed Mining', Technical Study No.3 (2008), 2.

126 Sven Peterson et al., 'News from the Seabed – Geological Characteristics and Resource Potential of Deep-Sea Mineral Resources', (2016) 70 Marine Policy175-187, 180; Laurent Godet, Kevin A. Zelnio and Cindy L. Van Dover, 'Scientists as Stakeholders in Conservation of Hydrothermal Vents' (2011) 25(2) Conservation Biology 214.

127 Woods Hole Oceanographic Institution: <http://www.divediscover.whoi.edu/ventcd/vent_discovery/>.

128 Ibid.

129 C.L. Van Dover at al., 'Designating Networks of Chemosynthetic Ecosystem Reserves in the Deep Sea' (2012) 36 Marine Policy 378-381.

ery of chemosynthetic ecosystems was historic.[130] Since the discovery of chemosynthetic ecosystems, scientific research has been ongoing for more than three decades. Nevertheless, until now there are still critical gaps in knowledge about chemosynthetic ecosystems particularly with respect to the connectivity (genetic or demographic) of populations among sites, the special distribution of benthic fauna at SMS deposits, the resilience of vent and seep systems to cumulative disturbance, and the effectiveness of mitigation and restoration strategies.[131]As is exemplified in the Environmental Impact Statement of the Nautilus' copper-gold project, Solwara 1 under development in the territorial waters of PNG:

> The need to understand the biology and potential impacts of mining on the hydrothermal vent communities and the surrounding seafloor, where knowledge of the dynamics of recruitment, growth, diversity and geographic interrelationships is still under development, is one of the key environmental issues for this Project.[132]

In contrast with manganese nodules which form in (the diagenetic growth) or on the sediment (hydrogenous growth), cobalt-rich ferromanganese crusts precipitate onto rock surfaces free of sediment; they are found on the flanks of volcanic seamounts, ridges, guvots, and plateauxin at water depths ranging from 400 to 7000m.[133] To date, research on the marine environment of cobalt-rich ferromanganese crusts has been conducted mainly on seamounts. 'It is estimated that the distribution of animals varies considerably between areas.'[134] It is also estimated that 'depth, and to a lesser extent, locality, appear to be the main factors determining faunal distribu-

130 The historic discovery could to a large extent be attributed to the big theoretical innovations in marine geology, starting from the continental drift theory in 1920s (Alfred Wegener, *The Origin of Continents and Oceans* (John Biram tr, Dover 1966)) to the seafloor spreading theory in 1950s and to the theory of plate tectonics in 1960s (James Kennett, *Marine Geology* (Prentice-Hall 1982) 114-177).

131 R.E. Boschen, A.A. Rowden, M.R. Clark and J.P.A. Gardner, 'Mining of deep-sea seafloor massive sulfides: A review of the deposits, their benthic communities, impacts from mining, regulatory frameworks and management strategies' (2013) 84 Ocean Coast Manag. 54-67, 55; ISA, 'Environmental Management of Deep-Sea Chemosynthetic Ecosystems: Justification of and Considerations for a Spatially-Based Approach', Technical Study No. 9 (2011) 52.

132 Nautilus Minerals Niugini Limited, Environmental Impact Statement (Solwara 1 Project), Executive Summary 2008 (prepared by Coffey Natural Systems, September 2008) Available at: <http://www.nautilusminerals.com/irm/content/pdf/environment-reports/Environmental%20Impact%20Statement%20Executive%20Summary%20(English).pdf>.

133 Sven Peterson et al., 'News from the Seabed – Geological Characteristics and Resource Potential of Deep-Sea Mineral Resources', (2016) 70 Marine Policy 175-187, 178; ISA, 'Brochure- Cobalt-rich ferromanganese crusts': <https://www.isa.org.jm/files/documents/EN/Brochures/ENG9.pdf> .

134 The reports of the SPC-EU deep seabed minerals project, 'Cobalt-rich Ferromanganese Crusts: A Physical, Biological, Environmental, and Technical Review', 16. Available at: <http://dsm.gsd.spc.int/public/files/meetings/TrainingWorkshop4/UNEP_vol1C.pdf>.

tion pattern.'[135] Except that, very little is known about the communities that are found on seamounts, particularly those in the most likely regions for crust exploration and mining.[136]

It follows from the above that each of the three types of mineral resources occurs at a different topography of the seabed and is associated with a different biological community. Mineral resources either themselves constitute the habitats for marine life or are closely connected with marine life and their habitats. The issue of the marine environmental impacts of DSM thus concerns mainly the detrimental impact of mining activities on marine life, species, the biological community and further the overall functioning of ecosystems. However, the gaps in knowledge about marine life constitute the major obstacle for the assessment of the environmental impact of DSM.

Knowledge about marine life is still in the age of discovery.[137] Until 2000, when the first Census of Marine Life was carried out, oceanographers estimated that only 5 percent of the ocean had been systematically explored for life.[138] The ten-year programme of the Census of Marine Life advanced substantially the knowledge of the diversity, distribution and abundance of marine life.[139] It drew a baseline against which future changes in marine life can be measured. However, it is acknowledged that 'after all its work, the Census still could not reliably estimate the total number of species, the kinds of life, known and unknown, in the ocean'.[140] In the absence of adequate information about marine species, understanding of the functioning of the ecosystems is even poorer, let alone of the question of how ecosystems react to the impact of DSM. As is stated:

> For most deep-sea ecosystems, we lack basic information on species composition and distribution ranges, their natural variability and dynamics, dispersal distance, demographics, connectivity, and the many factors that affect community diversity.[141]

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135 ISA, 'Fauna of Cobalt-Rich Ferromanganese Crust Seamounts', Technical Study No. 8 (2011), 72.

136 ISA, 'Brochure – Cobalt-Rich Crusts'; ISA, 'Fauna of Cobalt-Rich Ferromanganese Crust Seamounts', Technical Study No.8 (2011).

137 First Census of Marine Life 2010: Highlights of a Decade of Discovery, 12. Available at: <http://www.coml.org/highlights-2010>.

138 Ibid, 6.

139 The Census of Marine Life started in 2000 and ended in 2010. It involved 2,700 marine scientists from more than 80 countries and was at the expenditure of USD 650 million. The Census covered the seas and oceans on a global scale. It found that 'rare species are common' in oceans and in marine habitats 'extreme is normal'. First Census of Marine Life 2010: Highlights of a Decade of Discovery. Available at: <http://www.coml.org/highlights-2010>.

140 Ibid, 3.

141 Kathryn J. Mengerink et al., 'A Call for Deep-Ocean Stewardship' (2014) 344 Science 696-698, 698.

In spite of the gaps in scientific knowledge, with the anticipation that DSM is heading toward the exploitation phase, the EU conducted the Managing Impacts of Deep Sea Resource Exploitation project ('MIDAS').[142] MIDAS covered the topics of 'geological and geochemical impacts', 'plumes in a dynamic environment', 'ecotoxicology', 'impacts on species connectivity', 'impacts on ecosystem function' and 'ecosystem resilience and recovery'. The examination of these topics showed that the environmental impacts of DSM have two levels. First, it has direct impacts which include (1) the mortality of benthic fauna, and (2) the modification or loss of the habitats for benthic living species. The second level of the impacts is the indirect impacts. That is, DSM activities would cause sediment plumes[143] and introduce toxic substances to deep-sea water which may bring about further detrimental effects on (3) the benthic biological community or (4) deep-sea ecosystems. It is acknowledged that the impacts, at both levels, were still poorly understood.

Indeed, although progress was made, the gaps in scientific knowledge were repeatedly acknowledged in the final report of MIDAS. For instance, in Section 2, it is stated that 'the impacts and effects of mining surrounding the directly mined area are poorly understood', that 'it is not possible at this stage to suggest effective thresholds for density of plumes and the distance of their spread away from the mined areas', and that 'current understanding of ecosystem functioning, recoverability, connectivity and recruitment in the deep sea is limited'. At Section 3.4.10, it is stated that 'baseline knowledge of the deep-sea in general, and in particular the CCZ and mid ocean ridges is still too incomplete to enable reasonable mitigation advice to be given with regard to connectivity and biogeography.' Section 3.6.9 indicates that 'in areas other than active vents, species distributions are poorly known in time and space'. And Section 3.8.3.4 is entitled 'gaps in existing knowledge'.

The gaps in existing marine scientific knowledge pose a serious obstacle to the making as well as the implementation of international environmental rules in DSM. These gaps include the answers to what are the substantive contents of the international environment obligations? What are the concrete criteria to judge whether such obligations are fulfilled or not? All in all, how should DSM participants act against the backdrop of these great gaps in knowledge?

142 The Managing Impacts of Deep Sea Resource Exploitation project ('MIDAS') is funded under the European Commission's Framework 7 programme, running at a budget of EUR 12 million. The project started on 1 November 2013 and lasted for a period of 3 years. The final report of the project entitled 'Report on the implications of MIDAS results for policy makers with recommendations for the future regulations to be adopted by the EU and the ISA' was submitted on 16 December 2016 (the '2016 Midas Final Report'). The final report is available at: <https://www.eu-midas.net/sites/default/files/deliverables/D9.6_FINAL_lowres.pdf>.

143 It states that 'plumes present perhaps the most significant potential source of environmental impact from deep-sea mining.' (Section 3.2.1 of the 2016 MIDAS Final Report).

6 Conclusions

This Chapter examined the governing principle of the whole DSM legal regime – the common heritage of mankind. It investigated the legal meaning and legal effect of the principle in general, and one element of the principle in particular – marine environmental protection.

It identifies eight elements of the principle in the context of DSM. The concept of CHM in the context of DSM is further compared with the common interest/heritage of mankind in outer space and common interest of mankind in Antarctica. The comparison shows that they differ but they also share common elements. Moreover, it indicates the close connection between the concept of CHM and a broad trend of international law – community interests. Such a connection is significant because it opens a large intellectual space for the reflection of the principle of CHM.

It further investigates the third-party legal effect of the principle of CHM and the international DSM regime established upon that principle. It concludes attentively that the international DSM regime could argue for a third-party effect through a public law approach (the exercise of public authority for the community interest). It also points out that some elements of the principle of CHM, such as environmental protection, are the codification of customary international law, while others are new rules. And an argument that the principle of CHM as prescribed in the UNCLOS in its entirety has gained a customary international law status is significantly strengthened owing to the almost universal participation in the UNCLOS. However, the arguments of the universal binding effects of both the principle of CHM and the international DSM regime encounter an obstacle – the persistent objection of the United States as a third party.

When it moves to the environmental aspect of the principle, this Chapter argues that, at a conceptual level, marine environmental protection in DSM embraces community interests, common concerns of humankind and obligation *erga omnes*. At the operational level, it emphasizes that marine sciences play a significant role, and the gaps in existing marine scientific knowledge pose a large obstacle to the making and implementation of international environmental law.

In brief, this Chapter sets out the basic positions of the entire research. The discussion of international environmental obligations and liabilities of all participants in DSM in the following Chapters is based on the following principal propositions:

1 Marine environmental protection is an integral element of the principle of CHM, it is interconnected with the other elements of the principle;
2 The essence of the principle of CHM is its being a manifestation of community interests;
3 Definite answers to the questions of whether the principle of CHM and the international DSM regime have third-party effect cannot be given at this time;

4 The requirements of marine environmental protection in DSM are obligations *erga omnes*;
5 Marine environmental protection relies heavily on marine scientific knowledge; the current status and future development of marine sciences determine the features and evolution of the DSM environmental legal regime; and
6 Community interests and marine scientific knowledge are two common threads running through this entire research.