BRILL
NIJHOFF

EUROPEAN REVIEW OF INTERNATIONAL STUDIES
10 (2023) 375–400

eris
brill.com/eris

Regulating Space Resource Activities in a Fair and Equitable Manner: Understanding the Principle of Common Heritage of Humankind in Space Law

João Marques de Azevedo | ORCID: 0009-0009-7724-3928
PhD Candidate, FCT Scholarship Holder, Coordinator at SPARC - NOVA School of Law, Lisbon, Portugal
joao.azevedo@novalaw.unl.pt

Received 9 August 2023 | Accepted 15 January 2023 |
Published online 9 April 2024

Abstract

Article 11 (1) of the 1979 Moon Agreement enshrined the principle of the common heritage of humankind in space law. As of 2023, the Moon Agreement has been ratified by fewer than 20 countries, with many considering this principle the reason for it. This is mostly due to a lack of understanding (and many misconceptions) of its precise meaning and legal effects. However, due to the recent focus on space resource activities, it is fundamental that we understand it and how it can be helpful to regulate space resource activities in an equitable and fair manner. In this article, I analyse and explain the common heritage principle and its elements. First, I look at its interpretation in scholarly work in order to identify its features in international law. Following this, I address the Outer Space Treaty as the basis of the Moon Agreement. I end with an assessment of the latter treaty, to understand the dimensions of common heritage in space law. After these steps, I submit that the common heritage principle should not be discarded and remains the best approach to the issue of space resource activities.

Keywords

common heritage of humankind – Moon Agreement – Outer Space Treaty – space resource activities – space law

 | DOI:10.1163/21967415-10030006
 | ISSN: 2196-6923 (print) 2196-7415 (online)

1 Introduction

Article 11 (1) of the 1979 Moon Agreement (MA)[1] defines celestial bodies and their resources as the common heritage of humankind. However, despite entering into force in 1984, it has only managed to achieve 18 ratifications.[2] The usual reason used to justify this lack of success is the common heritage (CH) principle itself. The principle is described as controversial and confusing, whilst at the same time it is surrounded by many misconceptions[3] that have led to more uncertainty in the field of space resource activities. With the issue now being discussed in the United Nations Committee on Peaceful Uses of Outer Space (UN COPUOS), it becomes more important than ever to clarify the meaning and extent of the principle in space law, and to better understand its legal implications and relevance in regulating space resource activities in an equitable and fair manner.

It is generally recognised defining CH is not an easy task. For instance, Anthony Aust considers CH to be controversial and not used outside the context of the law of the sea or space law, whilst even in these areas it is loosely defined.[4]

There is no doubt that it is a term that can be applied to areas beyond national sovereignty and territorial jurisdiction (global commons). In general, the idea of global commons entails a vision of common wealth shared by all, thus addressing resources as well. However, this is not permanent; it is an initial state of things, since, at some point, goods are removed from the common area (*commons' resource pool*), therefore allowing ownership at a later stage.[5]

To better understand the CH principle, it is important to understand how it is different from *res nullius* and *res communis*. From there, I look at its interpretation in scholarly work to identify its features in international law. Following this, I address the 1967 Outer Space Treaty (OST)[6] as basis of the

1 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, opened for signature on 18 December 1979 and entered into force on 11 July 1984, 1363 U.N.T.S. 3.

2 Status of International Agreements relating to activities in outer space as at 1 January 2022, UN Doc. A/AC.105/C.2/2021/CRP.10, p. 10.

3 Von der Dunk, 'International Space Law', pp. 99–101.

4 Aust, *Handbook of International Law*, p. 41.

5 Pahuja, 'Conserving the World's Resources?', p. 400.

6 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, opened for signature on 27 January 1967 and entered into force on 10 October 1967, 610 U.N.T.S. 205.

Moon Agreement. I end with an assessment of the latter treaty, to understand the dimensions of common heritage in space law. This final step also includes an analysis of proposals to improve the agreement, or other proposals outside it, and future perspectives.

2 Understanding the Common Heritage Principle

2.1 *What CH is Not: Res Nullius and Res Communis*

Res or *terra nullius* is used in international law to describe those territories or resources over which there is no sovereign state.[7] Nonetheless, territories considered *terra nullius* can fall under state sovereignty via *occupatio*, therefore requiring an intent to exercise sovereignty and effective control.[8] As such, by allowing the possibility of future acquisition it creates a fundamental difference with CH, which prescribes the prohibition of appropriation and exercise of sovereignty.[9]

On the other hand, *res communis* describes those areas over which there is not and there cannot be State sovereignty, meaning they may not be appropriated by States, unless, for some reason, there would be a situation of general acquiescence. In theory, these areas are held in common by the international community as whole.[10]

Despite the prohibition of appropriation, such areas may be used under certain freedoms such as the freedoms of access, use, and exploration. The *res communis* principle also prescribes the obligation of states conducting their activities in a way that avoids the harmful contamination of these areas or that affects the corresponding interests of other states.[11]

In terms of use and exploitation of an area and its resources under *res communis*, this can be performed by all (as long as it does not prevent the use of others), unilaterally. However, in a CH regime, unilateral exploitation is not permitted; instead, regulation and collective management and administration are required.[12]

7 Crawford, *Brownlie's Principles of Public International Law*, p. 220.
8 Aust, *Handbook of International Law*, p. 38.
9 Noyes, 'The Common Heritage of Mankind: Past, Present, and Future', p. 420.
10 Crawford, *Brownlie's Principles of Public International Law*, pp. 251–52.
11 Crawford, 252.
12 Egede, *Africa and the Deep Seabed Regime: Politics and International Law of the Common Heritage of Mankind*, p. 47.

One additional aspect seems to be on the table: equality. As Van Hoof suggests, *res communis* only leads to formal equality. It allows access of all States to those areas and unilateral exploitation, but practically speaking, the "fruits can only be reaped by States having at their disposal the ways and means"[13] necessary to access them. In short, CH goes a step further by introducing another notion: equity. It is the requirement of equitable sharing of benefits that constitutes the fundamental difference between *res communis* and CH.

2.2 *The Birth of Common Heritage of Humankind*

The birth of CH is generally attributed to the speech of the Maltese Ambassador, Arvid Pardo, before the First Committee of the UNGA on 1 November 1967.[14] Ambassador Pardo argued for the use of the seabed, ocean floor, and their subsoil beyond national jurisdiction and exploitation of resources for peaceful purposes and "in the interests of mankind". He addressed the need for an international regime for the exploration of these resources, the prohibition of national appropriation, the need for an international agency to administer this exploration in the name of humankind and the need to draft a treaty to codify a set of principles to be applicable to the Area.[15]

The UNGA would indeed adopt these ideas in Resolution 2749 (XXV),[16] where the first paragraph declares the Area and its resources to be the common heritage of humankind. Before that, a *moratorium* had also been called in Resolution 2574 (XXIV)[17] to allow for the discussion of the matters under Pardo's proposal.

Notwithstanding whom made it the focus of discussions, Noyes explains that the values associated with CH have ancient historical roots. It derives from those terms of Roman law identified above, which were applied to common areas or common resources. Additionally, its components have parallels in

13 Van Hoof, 'Legal Status of the Concept of the Common Heritage of Mankind', p. 55.

14 There is some discussion if it was Arvid Pardo or Aldo Cocca, the Argentinian ambassador that first made reference to the principle, the latter in connection to space law. For more on this: Noyes, 'The Common Heritage of Mankind: Past, Present, and Future', p. 457; Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space*, p. 244. Cocca, 'Revaluation of the Concept of Common Heritage of Mankind: Keys to the Social Benefits of Space Technology', p. 781. Still, Mr. Pardo's speech is the source for the ensuing analysis and may be found in General Assembly, 22nd session: 1st Committee, 1516th meeting, Wednesday, 1 November 1967, New York, UN Doc. A/C.1/PV.1516.

15 Article 1, United Nations Convention on the Law of the Sea, opened for signature on 10 December 1982 and entered into force on 16 November 1994, 1833 U.N.T.S. 3.

16 UN Doc. A/RES/2749(XXV), 17 December 1970.

17 UN Doc. A/RES/2574(XXIV), 15 December 1969.

religious traditions: peaceful conduct, sharing with the misfortunate, caring and responsibility for future generations.[18]

He underlines a particular aspect of the historical context around the CH discussions: the New International Economic Order (NIEO) movement.[19] The 60s, 70s and 80s, a period when the treaties incorporating CH were negotiated, were marked by political disagreements between the developed and developing countries.

The new wave of decolonisation had led to recently independent states looking to overcome their colonial past and what they saw as the West's monopoly over the world economy. Developing states united as the Group of 77, which was influential in the negotiation of the 1982 United Nations Convention on Law of the Sea (UNCLOS). Their goal was to prevent the unilateral exploration and use of the resources of the commons under *res communis*, which would favour only the industrialised states. CH was the methodology used to pursue that goal.[20]

2.3 *What CH Is: Interpreting and Assessing the Principle in International Law*

There is some discussion regarding the status of common heritage of humankind. Is it a legal principle? And if so, what is its content? What does it entail?

Notwithstanding other perspectives,[21] I consider it to be a principle of international law. For Wolfrum, CH is even a part of customary international law and is a "distinct basic principle providing general, but not specific, legal obligations".[22]

This is also Van Hoof's view, legal principles not only as a norm but as guidelines for interpreting, applying, and creating rules.[23] This explains why both authors view CH as also generating obligations for states as lawgivers and not only as its subjects. In this sense, states must cooperate, or at least do

18 Noyes, 'The Common Heritage of Mankind: Past, Present, and Future', p. 458.

19 For developments on the NIEO: Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space*, pp. 219–29; Noyes, pp. 459–60; Shackelford, 'The Tragedy of the Common Heritage of Mankind', pp. 116–17.

20 Lee, p. 219.

21 For an analysis of other perspectives, Marques de Azevedo, 'The Principle of Common Heritage of Humankind in the Law of the Outer Space', pp. 37–38.

22 Wolfrum, 'Common Heritage of Mankind', p. 7.

23 Van Hoof, 'Legal Status of the Concept of the Common Heritage of Mankind', p. 78.

not create barriers, to the negotiation and establishment of a CH regime. As such, CH follows the international law of cooperation, challenging traditional international law.[24]

This is indeed the correct way of perceiving CH: it is a basic principle, it produces legal obligations not only for the use and exploration of the global commons but also in the creation, application and interpretation of norms related to these areas and their resources.

Admittedly, there is some uncertainty about the legal implications of CH or disagreement around its features. Yet, even if not included in treaties, legal principles can influence discussions around the creation of rules, either as *soft law* or as emergent customary law.[25] But considering its inclusion in international treaties, it is evident that common heritage of humankind can be qualified as a principle of international law.

The debate regarding its status as *jus cogens* or customary international law is, however, different. Kemal Baslar wrote that the principle is "akin to *jus cogens*"[26] in law of the sea and, surprisingly, part of customary law in relation to outer space.

Wolfrum agrees that the principle is indeed part of customary international law while in the UNCLOS it has received a "special status": it is placed above treaty law, but it does not amount to *jus cogens*. Indeed, this latter aspect was also addressed by Van Hoof, CH in the UNCLOS does not ammount *jus cogens*.

The article discussed by both authors is 311 (6), where states have agreed no amendments can be made to the basic CH principle of Article 136 UNCLOS and they will not be part of agreements derogating it.

While the wording of the article could lead to a conclusion that the CH principle is to be considered a peremptory norm of international law, Van Hoof underlines the drafting history of the article, showing it does not allow such conclusion.[27] Article 311 (6) is the result of a compromise. The CH principle is not *jus cogens* and does not produce such consequences under international law, but has a special status for the States Parties to the UNCLOS.

There are also some divergences regarding the essential elements of CH, although most scholars identify the same aspects.

For instance, Baslar considers that the *non-appropriation principle* and *international management of the areas and resources in question* are the only

24 Van Hoof, p. 50. In this regard he is of course following Friedmann's distinctions from *The Changing Structure of International Law*.

25 Noyes, 'The Common Heritage of Mankind: Past, Present, and Future', pp. 460–61.

26 Baslar, 'Common Heritage of Mankind', p. 3.

27 Van Hoof, 'Legal Status of the Concept of the Common Heritage of Mankind', pp. 59–64.

core elements. Nonetheless, he admits more elements can be considered to be part of the principle, with the possibility of adaptation: some elements can be withdrawn and others such as cooperation, burden sharing, public trust or sustainable development can be added.[28] On the other hand, Van Hoof goes further and adds two more core elements: requirement that the area in question is *used only for peaceful purposes* and *equitable benefit sharing*.[29]

Another element is introduced by Joyner: *freedom of scientific investigation*. He also identifies a more progressive (or rather, more demanding) variant of CH to which he calls "NIEO variety". In this variety, instead of the "legally absent" ownership of the CH region, the international community would have full legal ownership rights over the common area and resources. When it comes to the resources particularly, developing countries would have preferential treatment in revenue distribution. Finally, instead of international/common management of these areas and resources by states as representatives of humankind, a "specific institutional mechanism" would be humankind's trustee and exercise jurisdiction over the common area.[30]

Joyner admits that environmental concerns and the protection of the interests of future generations can be elements of a CH regime. His perspectives on benefit sharing, however, seem to be focused only in the economic and revenue aspects instead of other possible benefits.[31]

Noyes includes both an NIEO and an environmental perspective when he considers the elements of common heritage of humankind and he identifies, besides the non-appropriation principle, the use for peaceful purposes and "governance via a common management regime" (not necessarily via an international authority).[32]

In terms of equitable sharing, he adds that "particular attention to the interests and needs of developing states" must be given.[33] In this latter aspect he does not follow the 'preferential rights' language of Joyner, and, as such, describes better the adaptations the principle entails, for instance, in space law.

– Finally, in a similar fashion to Wolfrum's comprised approach, one can conclude that the CH principle is a tool for management of the resources of the

28 Baslar, 'Common Heritage of Mankind', pp. 2–3.
29 Van Hoof, 'Legal Status of the Concept of the Common Heritage of Mankind', p. 56.
30 Joyner, 'Legal Implications of the Concept of Common Heritage of Mankind', p. 193.
31 Joyner, pp. 194–95.
32 Noyes, 'The Common Heritage of Mankind: Past, Present, and Future', p. 450.
33 Noyes, p. 450.

commons,[34] and includes different elements, the following being generally identified:[35]

- *Non-appropriation.* There can be no sovereign claims and exercise of sovereignty as well as no public or private appropriation over areas and their resources under CH. This element is *jus cogens*, produces *erga omnes* obligations,[36] and is one of the fundamental elements necessary to enforce a CH regime.
- *International management system*. Under which states would act as trustees of humankind, meaning the latter does not become a subject of international law per se, although as Joyner as points out, this reference to humankind could mean that those movements and peoples not represented by states should also be included. For him, humankind's interests are greater "than the sum of all States' national interests".[37] How this representation is to be done, however, is still up for discussion in the sense this could be done through the creation of specific IGO's (such as the International Seabed Authority) or even through a UN Committee.
- *Regulated utilisation with the creation of a legal regime.* This is another key element, given that any exploitation must be regulated under CH to prevent exclusive use and exploration of areas and resources.
- *Equitable benefit sharing requirement*. Exactly what form and what type of benefit sharing, however, is debatable. Wolfrum mentions there are differences between treaties addressing CH. For instance, there is a difference between the benefit sharing in the UNCLOS and in the 1994 Implementation Agreement.[38] Indeed, there is a wide array of interpretations and suggestions. Although desirable, benefit sharing does not necessarily need to be done in a financial way, as there is also the immaterial benefit interpretation proposed by Wolfrum (the deepening of humankind's knowledge), for instance.[39]
- *Environmental protection/sustainable development*. Common heritage of humankind does not only entail respect for the interests of the current generation but also of future ones. Here, the environmental protection component is included as well. In short, the idea of sustainable development is also at the heart of the CH principle to give meaning to or realise the idea of 'heritage'.[40]

34 Baslar, 'Common Heritage of Mankind', p. 2.
35 Wolfrum, 'Common Heritage of Mankind', pp. 5–7.
36 Jakhu and Freeland, 'Article II', pp. 248–55.
37 Joyner, 'Legal Implications of the Concept of Common Heritage of Mankind', p. 195.
38 Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982, opened for signature on 28 July 1994, provisionally entered into force on 16 November 1994 and definitively on 28 July 1996, 1836 U.N.T.S. 3.
39 Wolfrum, 'Common Heritage of Mankind', p. 6.
40 Wolfrum, p. 7.

Both the number of elements and exactly how these elements are implemented can change. For instance, this can change between branches of international law, to be tailored to the requirements of the commons in questions.[41] It can change even within the same branch, between different legal instruments, to better adapt to the dominant economic and political approaches.

In fact, this is precisely what happened from the 1982 UNCLOS to the 1994 Implementation Agreement.[42] International law of the sea has, so far, the only case of practical application of the principle, yet, if one looks at the Implementation Agreement, it is easy to notice that only a very weakened version of the principle survived.

The UNCLOS featured articles creating mandatory technology transfers, production limitations and a compensation fund, but they were badly received.[43] These early components of CH in law of the sea had to be changed to design a principle more compatible with private activities and commercial exploitation in a world of free market and economic liberalism.[44]

However, not all was lost, as the CH principle applied to the Area and its resources survived, even if in its basic form. The non-appropriation principle has been upheld, like the obligation of using the Area and its resources exclusively for peaceful purposes and protection of the marine environment. When it comes to the equitable sharing of benefits, albeit altered by the Implementation Agreement, the general idea remains.[45]

This idea of adaptation is perhaps the biggest lesson one must take to the interpretation of the CH principle in outer space, and it is of great use if we are to overcome the challenges its application faces in such a realm.

3 Common Heritage of Humankind in Space Law

We shall take a closer look at those provisions most relevant to the topic of common heritage of humankind: Articles I, II and IX of the Outer Space Treaty and Article 11 of the Moon Agreement.

Even with Article 11 MA being the one enshrining the common heritage principle in relation to space law, its goal was to develop provisions of the

41 Jakhu *et al.*, 'Article 11 (Common Heritage of Mankind/International Regime)', p. 391.

42 For my detailed analysis of the issue, Marques de Azevedo, 'The Principle of Common Heritage of Humankind in the Law of the Outer Space', pp. 39–45.

43 Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space*, p. 247.

44 Lee, p. 252.

45 Noyes, 'The Common Heritage of Mankind: Past, Present, and Future', p. 465.

Outer Space Treaty, which can lead us to try finding 'clues' of the existence of CH in the OST; in fact, there have been claims that the OST was the first space law treaty incorporating the principle.[46] This is mostly due to the confusion with the 'province of all (hu)mankind' term.

After having a look at these possible clues, I will move to the Moon Agreement to explore how the principle was addressed and then conclude with the considerations of this aspect.

3.1 *Common Heritage of Humankind in the Outer Space Treaty?*

Article I enshrines the freedom of use and exploration of outer space (which includes exploitation of space resources)[47] and considers them to be province of all humankind. This latter term, however, is not equal to common heritage of humankind. Von der Dunk explains that this is because the approach made is different between the two; province of all humankind reflects the *res communis* approach where States are free to act as they wish unless there are legal obligations they must respect.[48]

Taking into account the common benefits clause, whilst a general legal obligation exists, the existence of a duty to share benefits and profit cannot be deduced from this article,[49] although depending on future dominant political perspectives, such interpretation could change at some point (therefore following a common heritage approach).[50] However, states do have the duty to refrain from activities that deeply jeopardise the interests of other states or that are harmful to them.[51]

In short, "province of all humankind" is along the same line of Van Hoof's vision of *res communis* mentioned above: the fruits of outer space are there to be reaped, all can do so, but only if they develop the capabilities for it; the positive aspect is that their right to do so is at least protected. Nevertheless, most authors still defend non-spacefaring nations and have seen the benefits of the use and exploration of space (mostly through downstream space applications).[52]

Article II introduces a cornerstone element common to a CH approach: the prohibition of appropriation. In the context of outer space, this principle prohibits national (public and private) acts of appropriation. This interpretation

46 Wolfrum, 'Common Heritage of Mankind', p. 3.
47 Hobe, 'Article I', p. 195; Von der Dunk, 'International Space Law', p. 57.
48 Von der Dunk, pp. 57–58.
49 Soucek, *Space Law Essentials*, p. 25.
50 Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space*, p. 159.
51 Lee, p. 159–65.
52 Lyall and Larsen, *Space Law: A Treatise*, p. 64–65.

is consistent with Art. VI, where "national" also includes private activities.[53] The term "any other means" also covers private endeavours resulting in ways in which to exercise state sovereignty.[54]

The issue is if the term appropriation is limited to claims and exercise of sovereignty or if it affects exclusive property rights over the outer space environment.

The history of drafting and negotiations seems to follow the second perspective. For instance, the Belgian and French statements revealed both countries' perception that appropriation was to include both the establishment of sovereignty and "the creation of titles to property in private law".[55]

The former are not the only examples. Jakhu & Freeland underline that most delegates favoured the broad interpretation that private proprietary claims were not admissible in outer space; even the United States were of the opinion that space was to remain free from exclusive property rights.[56]

This has been upheld by examples such as the 2003 Nemitz case in the US, or the Moon plots case in China where the national courts established that private property rights over celestial bodies were not admissible under Art. II.[57]

Additionally, it seems difficult to understand how a state, which is not allowed to exercise sovereignty or territorial jurisdiction over outer space, would be able to entitle or grant its citizens exclusive property rights over the space environment.[58]

This does not mean that sovereignty or property rights do not exist in outer space. Article VIII allows the state of registry to retain jurisdiction and control over a space object and over the personnel of the spacecraft, meaning it has quasi-territorial jurisdiction in outer space.[59] Likewise, companies retain

53 Jakhu and Freeland, 'Article II', p. 240.

54 Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space*, pp. 169; 177–79.

55 From Belgium's representative statement, UN. Doc A/AC.105/C.2/SR.71 and Add.1, 4 August, pp. 6–7. The French statement is found in UN. Doc. A/C.1/PV.1492, 17 December 1966, pp. 31–40, where it is mentioned there is the "prohibition of proclaiming rights of sovereignty and ownership (…)".

56 Jakhu and Freeland, 'Article II', pp. 238–39.

57 For a simple description of the cases, Jakhu and Freeland, pp. 250–51.

58 Soucek, 'International Law', p. 316. As so, "[i]ndividuals cannot establish any property rights by claiming something is 'theirs'. To sell and transfer property, such individuals have to have acquired the property themselves; but since states cannot have property, they cannot transfer such property on to individuals. In other words: 'Since there is no national appropriation … no valid legal title can exist'."

59 For more on the issue of jurisdiction: Cheng, *Studies in International Space Law*, p. 73.

ownership of their space objects. Even the ITU regime for allocation of the radio spectrum and orbital allows the operator "exclusive use for the satellite's entire lifespan"[60] on a first come-first served basis. At the same time, the ITU regime ensures an 'equitable' share of the geostationary orbit.[61]

However, as Lee underlines, without these assets in place, they could not claim exclusive occupation of the orbital positions or land plots, and the allocation of exclusive use is not a permanent situation.[62] The conclusion one must take from all of this is: some forms of property rights and sovereignty can exist *in* outer space, just not *over* outer space, and celestial bodies.

Some scholars, like Kerrest, draw an additional aspect from this article: the prohibition of exploiting mineral resources in outer space, since that is a form of appropriation.[63] I must respectfully disagree with this perspective.

Understandably, it could be asked how the commercial exploitation of space resources is to take place without some form of exclusive property rights taking place in outer space. There can be exploitation without exclusive property rights over both the 'land' and the resources *in situ*, for instance.

The only necessity is some assurance that such exploitation occurs without external interference, which can be done through what Jakhu & Freeland call "extraterrestrial exploitative rights".[64] Still, the exploitation of a celestial body to the point of its destruction is not allowed since that would indeed amount to a form of appropriation.[65]

It is in this aspect that Article 11 (3) of the Moon Agreement clarifies the extent of Article II OST. As Jakhu & Freeland underline, the prohibition of appropriation in Article II OST is then "directed towards preventing a claim to 'ownership rights' over (a part of) outer space", with ownership rights over extracted resources being possible.[66] This is why the principle of non-appropriation refers to outer space and celestial bodies, but no explicit mention of mineral resources was included.

Nonetheless, the existence of the non-appropriation principle in the Outer Space Treaty, although necessary for a common heritage regime, does necessarily entail that such regime is found in the OST.

60 Walter, 'The Privatisation and Commercialisation of Outer Space', pp. 406–7.
61 For a shot description of the ITU regime, Jakhu and Freeland, 'Article II', pp. 262–64.
62 Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space*, p. 179.
63 Kerrest, 'Space Law and the Law of the Sea', p. 252.
64 Jakhu and Freeland, 'Article II', p. 260.
65 Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space*, p. 200.
66 Jakhu and Freeland, 'Article II', p. 259.

Article IX of the OST creates more limitations to the use and exploration of outer space. In this respect, states must conduct their activities with "due regard to the corresponding interests of all other States Parties to the Treaty."

The article does not only cover harmful interference between states and private entities but also the harmful contamination and adverse changes to outer space and Earth environment.

Yet, Article IX is somewhat more limited than its counterparts in the Moon Agreement, namely Article 4 and Article 7, which consider the possibility of creating scientific reserves on celestial bodies as well. As such, while it addresses the issues of environmental protection, Article IX seems to fall short of explicitly introducing the idea of sustainable development in the manner the Moon Agreement does.

These three articles especially, and the Outer Space Treaty in general, although providing foundations useful for the establishment of the common heritage principle, do not amount to it.

This is both due to the fact that it was not envisioned during the negotiations, and to the absence of explicit reference to an international management system, to a legal regime for resource exploitation or a positive requirement of equitable benefit sharing.[67] On another note, this means that the Outer Space Treaty reinforces the *res communis* nature of outer space, since without the aforementioned elements it still allows the unilateral and exclusive use and exploitation of resources.

As it stands, the most that can be said is that the common heritage regime drawn in the Moon Agreement was one of the logical conclusions possible to reach with the elements provided by the Outer Space Treaty.

3.2 *The Moon Agreement*

3.2.1 Preliminary Notes

Article 11 introduces the principle of common heritage of humankind in space law. As paragraph 1 underlines, it "finds its expression in the provisions of this Agreement (…)". The CH principle includes different elements that in the Moon Agreement are also found outside of Article 11. By developing provisions of the Outer Space Treaty, those common elements found there are mirrored throughout the MA as well.

For instance, the provision of exclusively peaceful purposes is also found in Article 3 MA. Similarly, the environmental protection provisions are found in Article 7. Besides Article 11, allusions to the idea of sustainable development can be found in Article 4 (1) where the due regard principle is extended to

67 Lyall and Larsen, *Space Law: A Treatise*, pp. 64–65.

include the interests of "future generations" and to the promotion of higher living standards and furtherment of economic and social progress.

Article 6 also presents additional provisions on the use of mineral resources according to the freedom of scientific investigation. As such, it allows space actors to collect and remove samples which "remain at their disposal". They can use minerals resources to support their missions but must, however, use only the appropriate quantities necessary for such endeavours.

Still, none of the former seem to be an issue for States. Only Article 11 is problematic; as I usually say: it is the biggest public image problem an international treaty has ever had.

Thomas Gangale's contribution on the matter shows that there are many misconceptions around Article 11, which have prevailed and are not confined to the realm of American academia and Congressional Space Subcommittees' discussions.[68]

Let us start by briefly addressing the negotiation of Article 11 and clarify some aspects.

3.2.2 The Negotiation History

The history of Article 11 is tied down with the Argentine proposal for a draft agreement of 1970. In this proposal,[69] the natural resources of celestial bodies were to be common heritage of humankind. All the substances originating in celestial bodies were considered natural resources. There was also to be a difference between the system applicable to resources used *in situ* and those brought to Earth. The benefits of such resources were to be made available to all peoples and the distribution of the benefits should promote human development and balance the interests of developing countries and those endeavouring in exploitation activities.

Despite this, the US have, at some point, insisted that they were the real proponents of the common heritage of humankind. Truthfully, from the outset, Argentina was indeed supported by the US as well as France[70] and, as we know, in the final version of the text, the principle was extended to celestial bodies as well.

The Soviet Union was effectively against the principle. In the draft agreement of 1971 it did not even mention common heritage of humankind, although Article 11 (3) MA is much similar to Article 8 of the Soviet proposal.[71] The USSR

68 Gangale, 'Myths of the Moon Agreement'. pp. 7–8.

69 Can be found in: UN. Doc. A/AC.105/85, 3 July 1970, Annex II, pp. 1–2.

70 Gangale, 'Myths of the Moon Agreement', p. 8.

71 Christol, 'The Common Heritage of Mankind Provision in the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies', pp. 456–57.

was also against the idea of the MA applying to other celestial bodies besides the Moon, but in that regard their view did not prevail.[72]

The issues for the Soviet Union were, for one thing, the perception that CH related to the ownership and property rights one would find in municipal law (such as the traditional elements of *usus, fructus* and *abusus*), concepts that the Soviets did not want to introduce in international law. On the other hand, comparisons with the negotiation of the UNCLOS and the idea of having an international organisation managing, or even owning, space resources did not bode well.[73]

The issue was solved after an Austrian Working Paper, followed by a final Brazilian proposal, which accommodated the fears of the USSR. As such, per Article 11 (1), the expression of common heritage of humankind is to be found in the provisions of the Agreement with special attention paid to 11 (5).

It must not be forgotten that the Moon Agreement was approved by consensus within the COPUOS.[74] This means that all members at the time, including both the United States and the USSR, had no more objections to the treaty and decided it could be adopted. However, this certainly seems to have meant nothing as neither of them have ratified it.

3.2.3 Article 11

Per Article 11 (1), celestial bodies and their resources are the common heritage of humankind, the expression of which is found in the Agreement to prevent direct comparisons with some unwanted aspects that might have found their way into the UNCLOS. This aspect seems to have been ignored and has not prevented misconceptions where the MA would require compulsory technology transfers or production limitations.[75] Such an aspect is not required by the Moon Agreement.

Article 11 (2) specifies the first element of CH in outer space: non-appropriation. This is a repetition of Article II OST, which, as stated above, precludes sovereignty and ownership rights over the outer space environment. This prohibition covers states and private entities, but it does not mean that exploitation activities are not permitted.

72 Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space*, p. 258.

73 Christol, 'The Common Heritage of Mankind Provision in the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies', p. 459; Gangale, 'Myths of the Moon Agreement', p. 10.

74 Christol, 'The Moon Treaty: Fact and Fiction'.

75 Gangale, 'Myths of the Moon Agreement', pp. 11–12.

This interpretation would not make Article 11 (3) redundant.[76] What this article does in fact is to clarify the extent of the non-appropriation principle by specifying that the surface, subsurface and *in situ* resources of celestial bodies cannot become the property of any entity, including IGOs, meaning no rights of ownership are attributed to the UN. At the same time, the commercial exploitation of resources is permitted, and it lists all the equipment and facilities states are allowed to place on celestial bodies. These activities and space objects do not generate ownership rights over the surface and subsurface of celestial bodies. Finally, it explains that there is an exception of ownership over extracted resources, which is in line with the common heritage of humankind.

Paragraph 4 does nothing more than to underline the freedom of use and exploration that was already contained in Art. I OST. However, as Bin Cheng points out, the article does not confer more rights pertaining to natural resources. It deals instead with forms of exploration and use such as "landing, take off, emplacement of personnel, the establishment of manned and unmanned stations and so forth".[77]

Article 11 (5) is highlighted by some as creating a moratorium on resource exploitation.[78] This is far from the truth. In fact, let us see what is mentioned:

> States Parties to this Agreement hereby undertake to establish an international regime, including appropriate procedures, to govern the exploitation of the natural resources of the Moon as such exploitation is about to become feasible. This provision shall be implemented in accordance with article 18 of this Agreement.

From this, it seems easily understandable that what was agreed upon is that an international regime is needed to manage the exploitation of space resources, but no regime was actually created.

It is possible to perceive that a moratorium on such exploitation has not been established. This is due to the terms "is about to become feasible", which obviously requires that some exploitation takes place before the establishment

76 For contrary opinions Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space*, pp. 169; 177–79; Lyall and Larsen, *Space Law: A Treatise*, pp. 60–62; Diederiks-Verschoor and Kopal, *An Introduction to Space Law*, p. 26. They consider that it does not make sense that both Art. II OST or Art. 11 (2) MA and Art. 11 (3) to refer the prohibition of property rights.

77 Cheng, *Studies in International Space Law*, p. 377.

78 Gangale, 'Myths of the Moon Agreement', pp. 15–18.

of such regime. Otherwise, one would not perceive that this exploitation was about to become feasible and therefore the need for such a regime could not be assessed.[79] It would counter the purpose of Article 11 to create a moratorium.

The Moon Agreement reflects a sort of package deal: developed countries would agree with the common heritage principle and the need for a legal regime, if developing countries agreed not to place a moratorium on space resources exploitation.[80]

It seems clear that saying that the MA creates a significant hindrance to mining activities in celestial bodies[81] is fiction and not science. As Gangale recalls, if any *de facto* moratorium exists, it is the result of the misperceptions generated by those who are against the Moon Agreement.[82]

Article 11 (6) was designed precisely to facilitate the creation of an international regime. States Parties are required to inform the UNSG of any natural resources they find on celestial bodies, which will also permit to understand when the exploitation of space resources can be initiated.

Although no legal regime is established in the Moon Agreement, paragraph 7 describes the main purposes of this future regime: orderly and safe development of the natural resources; their rational management; expansion of opportunities in their use (find ways to better use them and adapt to their use); and equitable sharing of the benefits derived from them, whereby the interests of developing countries, and of those countries contributing to the exploration of celestial bodies, would be given special consideration.

If the first three aspects are not disputed, the last one has certainly seen its share of discussions. Frans von der Dunk mentions that the reason for this was comparisons with the UNCLOS where such element led to "mandatory benefit-sharing and mandatory transfer of technology".[83]

Gangale shows that there have been those sharing this view (even speaking of an international taxation system) of the Moon Agreement.[84] This and saying the Moon Agreement calls for an equal share of the benefits of these resources[85] are the kind of misconceptions that give it such a bad reputation.

79 Gangale, p. 15.
80 Christol, 'The Common Heritage of Mankind Provision in the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies', p. 469.
81 Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space*, p. 181.
82 Gangale, 'Myths of the Moon Agreement', p. 18.
83 Von der Dunk, 'International Space Law', p. 102.
84 Gangale, 'Myths of the Moon Agreement', p. 21.
85 As Jakhu *et al.*, 'Article 11 (Common Heritage of Mankind/International Regime)', p.393.

Equitable is, of course, not the same as equal. Article 11 (7) just underlines the balance of interests between those spacefaring nations with direct investment in resource exploitation and developing countries. As Jakhu et. al. suggest, if there is a slight favouring of developing countries, it is in the sense that they could still benefit from exploitation activities without contributing to them, although, as it has been said, such benefits could end up not being pecuniary.[86]

Bin Cheng also leans in this direction since, as in Art. I OST, non-spacefaring nations are already benefiting from the benefits of space applications. This seems to suggest the mere technical developments resulting from the use of exploited resources could end up fulfilling this requirement. For him, this would mean that the future international regime would not lead to "dramatic changes"[87] in terms of benefit sharing. While this is so, some direct financial benefits would certainly be preferable. Invariably, this is something that can be discussed when negotiating the legal regime.

From my perspective, the purpose of Article 11 (7) reflects lessons learned from the past. The Age of Discovery and colonialism was a time of exploration by only those with the methods to do so, which resulted in consequences still observable today, such as asymmetries between developed and developing countries, and gave some nations a significant head start in developing technology that led to their current space capabilities. The goal of human space activities should be to balance this scale, instead of increasing these differences further.

As such, in efforts to de-root colonialism from international law,[88] and achieve the promise of the true universality of the project, bringing back what were once the *others* under its umbrella,[89] this is a crucial aspect. This element must not be ignored and measures to lead to its practical implementation must be encouraged.

Finally, paragraph 8 highlights that all activities relating resources in celestial bodies must respect Article 6 (2) and Article 11 (7). This means that even prior to the establishment of a legal regime to regulate exploitation activities, its main purposes must still be adhered to.

Even if the previous analysis has clarified some issues, the questions of how the management framework and legal regime would work and how the

86 Jakhu *et al.*, p. 398.

87 Cheng, *Studies in International Space Law*, p. 380.

88 For more, I suggest: Koskenniemi, 'Empire and International Law: The Real Spanish Contribution'; Anghie, *Imperialism, Sovereignty and the Making of International Law*.

89 Eslava and Pahuja, 'Between Resistance and Reform: TWAIL and the Universality of International Law', p. 121.

equitable sharing of benefits requirement is to take effect still cannot be answered.

What we know, according to the treaty itself, is that the future regime is to be negotiated and implemented via a review conference (Art. 18). However, at the time of writing, no regime has been established, which poses a final question regarding the common heritage principle: how effective is it?

Even without an international regime, the other common heritage elements such as the purposes specified in Art. 11 (7) must still be respected. The only issue is that such obligations only exist for those ratifying states. In this matter, even when conducting exploitation activities with non-States Parties, they must respect the provisions of the Moon Agreement.

As such, the effectiveness of the common heritage principle in the law of outer space remains seriously compromised because the principle is confined to the Moon Agreement,[90] which currently only has 18 States Parties.

Nonetheless, there are have been some proposals to solve the issue of the Moon Agreement and space resource activities, which I will address below.

3.3 *Possible Solutions, Proposals, and Future Perspectives*

Back in 2002, Christol formulated two interesting proposals that would give a concrete form to the equitable sharing of benefits requirement:

1 – For exploitation activities conducted by private entities: after a seven-year period of consecutive net profit, such entities would pay a percentage of their profit (25%) to the UN. No obligation exists on those years without net profit.

2 – For exploitation activities conducted by states or IGOs: after a five-year period of consecutive net profit, they would pay a percentage of such profit (30%) to the UN. No obligation exists on those years without net profit.[91]

These payments would build a fund to be used in promoting human development, specially within developing countries.

These proposals seem to be one of the best-case scenarios and in line with the common heritage principle, but I would add that the percentage of profits does not need to be that high to lead to an equitable share of benefits (it could be 5 to 15%). Still, while financial contributions could be a desirable measure to achieve this result, it needs not to be so.

90 Zhukov and Kolosov, *International Space Law*, p. 169.

91 Williams, 'Final Report on the Review of Space Law Treaties in View of Commercial Space Activities – Concrete Proposals', pp. 13–14.

In the same 2002 ILA Report, von der Dunk stated that the problem with the Moon Agreement was the common heritage of humankind principle. In fact, he has proposed some solutions to make the MA more acceptable for ratification by States. The first would be to replace the term 'common heritage of humankind' with 'province of all humankind'.[92]

Additionally, Article 11 (3) would not make a reference to resources in place, meaning that only the surface, subsurface, or any part thereof cannot become property of anyone. Article 11 (5) would include the minimum requirements of the international regime such an international registry for licenced activities in celestial bodies (with a registration fee to be paid to the international authority responsible for this task). The same paragraph would specify that, even without such a regime, exploitation activities are permitted as long as they do not seriously harm other state's interests and respect the purposes of paragraph 7 (something which is actually already found in the Moon Agreement).

Finally, under his proposal, the equitable sharing element would be deleted.[93] To do so would be a mistake. As Maureen Williams has written, the CH principle is "an important element for negotiation between industrialised and developing countries inasmuch as it is developed and used within each specific context and subject".[94]

Indeed, representatives of developing countries already have to navigate a "language of international law" that was created to ensure the "disempowerment and disfranchisement" of their nations.[95] To remove such a fundamental element would undermine any possibility of universality in international law.

Moreover, this would add more uncertainty to the Moon Agreement instead of removing it, since the CH principle can be interpretated more concretely than the term 'province of all humankind'. The same can be said for the equitable sharing element. Whatever form it might take, this requirement is essential to the reasoning of Article 11. Its removal would then come to defeat the main purpose of the CH regime.

In more recent years the discussion around the exploitation of space resources has drawn increased attention. With the common heritage principle closely linked to the failure of the Moon Agreement, other proposals or approaches have been submitted to provide a framework that would solve the issue.

92 Williams, p. 8.
93 Williams, pp. 8–10.
94 Williams, p. 11.
95 Anghie, *Imperialism, Sovereignty and the Making of International Law*, p. 31.

For instance, the 2020 Artemis Accords are a set of non-legally binding principles designed to guide the "cooperation in the civil exploration and use of the Moon, Mars, comets, and asteroids".[96] They are inspired by the Outer Space Treaty and promoted by the United States, but they make no mention to the common heritage principle or even the Moon Agreement.

This comes to no surprise as Executive Order of 6 April 2020[97] clearly states that the US does not consider the Moon Agreement to be "effective or necessary" in the exploitation of celestial bodies. They do not even consider outer space to be a 'global commons'.

This initiative parts ways with the common heritage principle and promotes unilateral exploitation without any requirement of benefit sharing and international regulation or management.

The Accords are a clear attempt by the US government to create and influence state practice in a way that corresponds to the American interpretation of current space law provisions (this was certainly one of Russia and China's criticisms of this approach).[98] The fact that they have been negotiated outside a forum like the UN COPUOS and have not been later submitted to it during the on-going discussions supports such perspective.

Contrarily, the 2019 Hague Building Blocks were submitted by Luxembourg and the Netherlands in 2020 as one of the possible models for activities dealing with space resources.[99]

These Building Blocks reflect an adaptive governance approach meaning that rules for the activities are to be adopted incrementally "at the appropriate time on the basis of contemporary technology and practices" (Introduction). Their purpose is to lead to an international framework that enables the development of space resources activities.

This proposal seems to be following the lines drawn in the Moon Agreement and the premise of the common heritage principle, although without explicit references to it. This is perhaps a politically wise decision: eliminating the term without necessarily eliminating its elements and purposes. Yet, it would be

96 The Artemis Accords, adopted on 13 October 2020, available at: https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf.

97 Executive Order 13914 of 6 April 2020, *Encouraging International Support for the Recovery and Use of Space Resources*, 85 FR 20381, available at: https://www.federalregister.gov/documents/2020/04/10/2020-07800/encouraging-international-support-for-the-recovery-and-use-of-space-resources (accessed on 2 September 2021).

98 For more on this: Newman, 'Artemis Accords: Why Many Countries Are Refusing to Sign Moon Exploration Agreement'.

99 Building blocks for the development of an international framework on space resource activities, UN Doc. A/AC.105/C.2/L.315.

preferable to ratify the Moon Agreement and then negotiate a legal framework, using the Building Blocks as possible guidelines.

4 Conclusion

Above I have tried to clarify the form which the common heritage principle takes in the law of outer space in order to promote a better understanding of what it is.

First, although some of the elements necessary to its existence can be found in the Outer Space Treaty, it cannot be said that it was incorporated in this document, mostly because there are no specific references to an international management system or a legal regime for resource exploitation in outer space. Additionally, although a mention to the desire of common benefits exists, no specific positive duty of equitable benefit sharing is envisioned (though if the CH gains enough traction, Article I OST could start to be construed in this way).

It is in the Moon Agreement that the common heritage principle was properly enshrined, specifically in its Article 11. In space law, celestial bodies and their natural resources are the common heritage of humankind, and not outer space in general. Celestial bodies fall under the non-appropriation prohibition, meaning they are not subject to sovereign or ownership rights either by States, IGOs or private entities.

Article 11 (3) further clarifies this prohibition, adding that resources in place are not subject to appropriation, but extracted resources may be owned (although much is left to be said about the desirability of allowing ownership rights or some form of property rights over extracted space resources). Exploitation activities are permitted under the common heritage regime (but they do not generate any ownership rights over the surface or subsurface of celestial bodies), and, according to Art. 6 (2), samples can be removed (they remain at the disposal of the entities that removed them) and resources can be used to support scientific research as well.

Additionally, the common heritage principle in outer space calls for some sort of international framework established via a legal regime to govern exploitation activities. The exact forms that this framework and regime will take are still up for debate and developing this issue is not my goal.

Still, it can be said that, while the creation of a specific international organisation would be desirable because it would facilitate decision making and cooperation on the matter, the MA does not necessarily demand this should be the preferred method.

Until this regime is established, exploitation activities are still permitted, and no moratorium exists. Nevertheless, these activities must still respect the purposes of the future regime. Moreover, they must be conducted exclusively for peaceful purposes (Art.3), with due regard for the interests of other states and of future generations [Art. 4 (1)], and, under the equitable benefit sharing element, the interests of developing countries and of those contributing to the exploration of celestial bodies will be given special consideration. How this equitable sharing of benefits is to be achieved is not clearly defined.

What is clear is that the Moon Agreement does not create barriers to resource exploitation activities. The fact that exclusive property rights over celestial bodies and *in situ* resources is not permitted cannot (and should not) be construed as a deterrence measure for investing in them. It is not hard to conceive a regime where 'exploitative rights' are conceded. These would grant the right to exploit resources of celestial bodies free of interference without leading to ownership over the resources in place or the plots assigned to them.

Under this appreciation, it is unrealistic to say that the CH principle establishes a hold on private initiatives. Resorting to Christol's words once again, the principle does not oppose free-enterprise, in fact "[b]oth the free-enterprise and socialist states will be able to live very comfortably with the CHM principle".[100] As it currently stands, one could not agree more with this perspective.

Overall, as Jakhu et. al. mention, if the Moon Agreement and its interpretative solutions are disregarded, the only existing legal framework would be the Outer Space Treaty, whose provisions would then be much more restrictive (especially if one does not concur that there are exceptions to the non-appropriation prohibition). As such, the MA offers a much more favourable position especially regarding exploitation activities.[101]

States should consider ratifying this treaty to safeguard properly their interests and of those they represent in pursuing resource exploitation activities in celestial bodies. They are, then, free to negotiate an international regime for the management of these activities according to the common heritage principle. This is essential if we are to effectively pursue the idea of space for all humankind.

100 Christol, 'The Common Heritage of Mankind Provision in the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies', p. 454.

101 This is also subscribed by Jakhu *et al.*, 'Article 11 (Common Heritage of Mankind/ International Regime)', pp. 398–99.

Acknowledgement

This work is an adaptation of the author's Master's dissertation (Marques de Azevedo, 'The Principle of Common Heritage of Humankind in the Law of the Outer Space', http://hdl.handle.net/10362/140419), whose results have been presented at the 2022 ESSCA Space Law & Policy Workshop.

The author would like to acknowledge the funding received by the Portuguese Foundation for Science and Technology without which this work would not be possible.

Bibliography

Anghie, Antony. *Imperialism, Sovereignty and the Making of International Law* (Cambridge: Cambridge University Press, 2010).

Aust, Anthony. *Handbook of International Law* (Cambridge: Cambridge University Press, 2005).

Baslar, Kemal. 'Common Heritage of Mankind'. In *Encyclopedia of the Barents Region*, Vol. 1 A–M:5, 2016.

Cheng, Bin. *Studies in International Space Law* (Oxford: Clarendon Press, 1997). https://doi.org/10.1093/acprof:oso/9780198257301.001.0001.

Christol, Carl Q. 'The Moon Treaty: Fact and Fiction'. The Christian Science Monitor, 1980. https://www.csmonitor.com/1980/0402/040234.html.

Christol, Carl Q. 'The Common Heritage of Mankind Provision in the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies'. *The International Lawyer* 14, no. 3 (1980): 429–83.

Cocca, Aldo Armando. 'Revaluation of the Concept of Common Heritage of Mankind: Keys to the Social Benefits of Space Technology'. *Acta Astronautica* 19, no. 9 (1989): 779–83.

Crawford, James. *Brownlie's Principles of Public International Law*, 8th ed. (Oxford: Oxford University Press, 2012). https://doi.org/10.1093/he/9780199699698.001.0001.

Diederiks-Verschoor, I. H. Ph., and V. Kopal. *An Introduction to Space Law*, 3rd ed. (Kluwer Law International, 2008).

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

Eslava, Luis, and Sundhya Pahuja. 'Between Resistance and Reform: TWAIL and the Universality of International Law'. *Trade, Law and Development* 3, no. 1 (2011): 103–30.

Gangale, Thomas. 'Myths of the Moon Agreement'. In *AIAA* SPACE 2008 Conference & Exposition, 1–24, 2008.

Hobe, Stephan. 'Article I'. In *Cologne Commentary on Space Law: Volume I*, edited by Stephan Hobe, Bernhard Schmidt-Tedd, Kai-Uwe Schrogl, Martin Reynders, and Rada Popova (Berliner Wissenschafts-Verlag, 2017).

Jakhu, Ram, and Steven Freeland. 'Article II.' In *Cologne Commentary on Space Law: Volume I*, edited by Stephan Hobe, Bernhard Schmidt-Tedd, Kai-Uwe Schrogl, Martin Reynders, and Rada Popova (Berliner Wissenschafts-Verlag, 2017).

Jakhu, Ram, Steven Freeland, Stephan Hobe, and Fabio Tronchetti. 'Article 11 (Common Heritage of Mankind/International Regime)'. In *Cologne Commentary on Space Law: Volume II*, edited by Stephan Hobe, Bernhard Schmidt-Tedd, and Kai-Uwe Schrogl, 388–99 (Carl Heymanns Verlag, 2013).

Joyner, Christopher C. 'Legal Implications of the Concept of Common Heritage of Mankind'. *The International and Comparative Law Quarterly* 35, no. 1 (1986): 190–99.

Kerrest, Armel. '3.3.1 Space Law and the Law of the Sea'. In *Outer Space in Society, Politics and Law*, edited by Christian Brünner and Alexander Soucek (Vienna: Springer-Verlag/Wien, 2011).

Lee, Ricky J. *Law and Regulation of Commercial Mining of Minerals in Outer Space* (Springer, 2012).

Lyall, Francis, and Paul B. Larsen. *Space Law: A Treatise*. *Space Policy* (Ashgate Publishing Limited, 2009). https://doi.org/10.1016/j.spacepol.2009.11.010.

Marques de Azevedo, João. 'The Principle of Common Heritage of Humankind in the Law of the Outer Space'. (NOVA School of Law, 2021). http://hdl.handle.net/10362/140419.

Newman, Christopher. 'Artemis Accords: Why Many Countries Are Refusing to Sign Moon Exploration Agreement.' The Conversation, 2020. https://theconversation.com/artemis-accords-why-many-countries-are-refusing-to-sign-moon-exploration-agreement-148134.

Noyes, John E. 'The Common Heritage of Mankind: Past, Present, and Future.' *Denver Journal of International Law and Policy* 40 (2012): 447–71.

Pahuja, Sundhya. 'Conserving the World's Resources?'. In *The Cambridge Companion to International Law*, edited by James Crawford and Martti Koskenniemi, 3rd ed. (Cambridge University Press, 2013).

Shackelford, Scott J. 'The Tragedy of the Common Heritage of Mankind.' *Stanford Environmental Law Journal* 27 (2008): 101–57. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1407332.

Soucek, Alexander. 'International Law'. In *Outer Space in Society, Politics and Law*, edited by Christian Brünner and Alexander Soucek (Vienna: Springer-Verlag/Wien, 2011).

Soucek, Alexander. *Space Law Essentials – Volume I: Textbook*. 1st ed. (Vienna: NWV, 2016).

Van Hoof, G. J. H.. 'Legal Status of the Concept of the Common Heritage of Mankind.' *Grotiana* 7 (1986): 49–79.

Von der Dunk, Frans von der. 'International Space Law'. In *Handbook of Space Law*, edited by Frans von der Dunk and Fabio Tronchetti (Edward Elgar Publishing Limited, 2015).

Walter, Edith. '4.1 The Privatisation and Commercialisation of Outer Space'. In *Outer Space in Society, Politics and Law*, edited by Christian Brünner and Alexander Soucek (Vienna: Springer-Verlag/Wien, 2011).

Williams, Maureen. "Final Report on the Review of Space Law Treaties in View of Commercial Space Activities – Concrete Proposals," 2002.

Wolfrum, Rüdiger. "Common Heritage of Mankind." In *Max Planck Encyclopedia of Public International Law*, 10 (Oxford University Press, 2015).

Zhukov, Gennady, and Yuri Kolosov. *International Space Law*. 2nd ed. (Moscow: Statut Publishing House, 2014).