3, 2, 1, LIFTOFF: THE COUNTDOWN TO ESTABLISH EXTRATERRESTRIAL PROPERTY RIGHTS HAS BEGUN

Caroline C. Raymond*

Table of Contents

I. Introduction 90
II. Property Law Principles 91
A. Res Nullius and Res Communis 94
B. Common Heritage of Mankind (CHM) 97
i. CHM in Practice 98
ii. Legal Status of CHM 102
III. Outer Space Treaties 104
A. The Outer Space Treaty (OST) 106
B. The Moon Agreement 109
IV. The Problem, Today 111
A. Undefined Property Rights and Ownership Claims 112
B. Ambiguous Language in Treaties 113
C. Inadequate Non-Interference and Safety Zone Provisions 114
D. Lack of Dispute Resolution 116
E. Global Participation and Enforcement 117
V. Conclusion 121

* J.D. Candidate 2025, Loyola University New Orleans, College of Law; B.A. 2022, Louisiana State University.

I. Introduction

The year is now. A handful of remote and narrowly accessible resources are discovered in the vast expanses of craters on Earth's Moon. These resource deposits—among them, lunar regolith, water ice, and Helium-3—present an attractive opportunity to assert property rights due to their lucrative potential: owning infrastructure used for exploitation, "cost-effective space travel" and in-space refueling, establishing an extraterrestrial real estate portfolio.[1] Although global interest has steadily increased over the years, the governing international framework provides that no state may claim ownership because outer space is deemed to be the "common heritage for all of mankind" (CHM).[2] This scenario has become progressively more complex as private companies emerge with the capability to access space on their own accord, thanks to state-of-the-art technology and capital funding. These private companies bypass international legal limitations on ownership claims because provisions in the governing agreements are vague and open to interpretation. While various governments deliberate the best course of action to strengthen the legal framework of the outer space agreements, private companies, and individuals have already begun to stake ownership claims on the Moon, Mars, and beyond. Tensions could climax as multiple ownership claims are made and the rush to develop outer space soon mimics the Wild West.[3]

Within the next few decades, Mars could soon host privately owned research hubs, energy production sites, commercial and subsistence farmlands, and subdivisions offering habitable residences. Current international agreements are ambiguous and outmatched by the urgency to expand human presence in outer space as a functional and productive new frontier. Without the timely establishment of a clear legal framework to govern extraterrestrial property rights, the

---

[1] Alex Gilbert, *Mining in Space is Coming*, MILKEN INSTITUTE REVIEW (Apr. 26, 2021), https://www.milkenreview.org/articles/mining-in-space-is-coming (explaining how celestial resources can be utilized, which underscores the rush to exploit them). In order to extract these and other valuable resources on the Moon, and eventually Mars, specialized infrastructure will need to be shipped or built in space on whatever celestial body is the focus of the exploitation, *see id.* Additionally, the components involved in resource mining—from robotic systems to equipment—must be launched into space, which is expensive. The solution to this price sensitivity is in-space refueling stations, which would also foster more cost-efficient space travel across celestial bodies, *see id.*

[2] John E. Noyes, *The Common Heritage of Mankind: Past, Present, and Future*, 40 DENV. J. INT'L L & POL'Y 447, 450–51 (2011) (describing features often affiliated with the common heritage of mankind principle); *see infra* notes 49–55. At its most basic, the CHM principle is the idea that certain entities are owned by all of humanity and any resources derived from those entities are to be shared amongst all of mankind so that everyone may use and benefit from the thing owned in common.

[3] *See* WILLIAM G. ROBBINS, *In Search of Western Lands* in LAND IN THE AMERICAN WEST 3, 5–6 (University of Washington Press 2000) ("Although the desire to acquire land may have involved all social classes, in the long run the larger capital enterprises were better equipped to buy out or push aside small holders . . . [and] [t]hose enterprises were the primary forces in directing the course of capitalist development in the West."). The "Wild West" was a period in the mid 1800s that encapsulated America's hunger to expand civilization westward—centering on the hope to claim territory—and is marked by seminal land-hungry milestones like the California Gold Rush, the Oregon Trail, and the Homestead Act of 1862.

expansion of modern space activities will face significant challenges, including legal ambiguities and conflicts over ownership, which threaten to disrupt the peaceful and orderly development of outer space. This Comment proffers an amended legal regime that addresses the immediate concerns with undefined property rights and ownership claims, ambiguous language, weak non-interference and safety zone provisions, dispute resolution methods, and global participation incentives.

The crux of this Comment centers on why existing international agreements are inadequate to effectively delineate property and ownership rights that are soon to arise in outer space as our society becomes increasingly spacefaring. Part II provides a brief summary of property rights doctrines and compares different theories of ownership. Part III discusses the discord among current international agreements that govern outer space activities, specifically, why the Outer Space Treaty and Moon Agreement cannot effectively govern property rights in outer space. Part IV highlights specific legal gaps that must be filled by a new framework, and Part V addresses them along with evaluating persisting risks that remain. Part VI concludes with a call to action.

II. Property Law Principles

Property law must serve as the legal foundation for individuals and entities seeking to establish any type of permanent structure or claim ownership of assets in outer space. An international space agreement grounded in property law should accommodate state ownership interests and provide a basis for other legal fields to build upon. Without a concrete property law framework, subsequent areas such as contract law, intellectual property law, and insurance law cannot effectively function.

At first blush, the concept of "ownership" seems fairly universal and easy to understand. However, there is not just one theory of ownership, and the term has a plethora of complex and nuanced definitions attached to it across different legal backdrops. For the purpose of this Comment—and to keep things simple—the essential elements that virtually every definition of ownership includes are the rights to control, use and enjoy, possess, and dispose of a thing.[4] As discussed more fully below, the nexus between ownership and property is closely intertwined, but distinct. Property denotes something that is owned,[5] whereas ownership refers to the legal relationship between the owner and the property.[6] Understanding the distinction between

[4] LA. CIV. CODE ANN. art. 477 (2022) ("Ownership is the right that confers on a person direct, immediate, and exclusive authority over a thing . . . [t]he owner of a thing may use, enjoy, and dispose of it."); CAL. CIV. CODE § 654 (Deering 2022) ("[O]wnership of a thing is the right of one or more persons to possess and use it to the exclusion of others.").

[5] Jeremy Waldron, "Property and Ownership," *The Stanford Encyclopedia of Philosophy* (Fall 2023 Edition), Edward N. Zalta & Uri Nodelman (eds.), https://plato.stanford.edu/cgi-bin/encyclopedia/archinfo.cgi?entry=property ("Strictly speaking, 'property' is a general term for the rules that govern people's access to and control of things like land, natural resources, the means of production, manufactured goods . . . and other intellectual products. Disagreements about their use are likely to be serious because resource-use matters to people. They are particularly serious where the objects in question are both scarce and necessary. Some have suggested that property relations only make sense under conditions of scarcity.").

[6] Jane B. Baron, *Rescuing the Bundle-of-Rights Metaphor in Property Law*, 82 U. CIN. L. REV. 57, 58 & n.3 (2014) (pointing out that ownership is a complex legal relationship that carries a particular "bundle" of legal rights with it).

ownership and property sets the stage for exploring the various property law frameworks through which ownership rights can be established.

Specifically, these frameworks are separated into three categories: communal, private, and state.[7] Communal ownership can be understood as a community's right to exclude private individuals from frustrating or otherwise interfering with "any person's exercise of communally-owned rights."[8] The communal ownership approach is a recognized model of organization in international law, as it has been worked into multiple treaties.[9] Private ownership means that an individual owner may exclude other actors from exercising those rights which are reserved for private owners, such as exclusive use and control.[10] Although the measure of use of a privately owned thing is essential, perhaps the most important element is how the owner exercises control: all "deci[sions] of what should be done with [the thing]"[11] are reserved for an owner in a private ownership scheme.

The concept of state ownership is layered and involves understanding two key concepts: sovereignty and jurisdiction.[12] Sovereignty refers to a state's "absolute and unlimited power . . . within its territorial boundaries."[13] A sovereign state must not infringe on the rights of other sovereigns, as sovereignty only extends to the bounds of that sovereign state's territory.[14] This means a sovereign state is in full control over its own territory and must respect the sovereignty of other states. Jurisdiction, on the other hand, is the practical exercise of sovereignty by a state. It pertains to "the authority of a state over persons, property[,] and events which are . . . within its territories (land, national airspace, internal and territorial waters)."[15] Although jurisdiction rests upon a state's authority, it is inherently linked to its territory because "the law … extends the

---

[7] Harold Demsetz, *Toward a Theory of Property Rights*, 57 THE AMERICAN ECONOMIC REVIEW 347, 354 (1967).

[8] *Id.*

[9] *See* Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, *adopted* Dec. 5, 1979, 1362 U.N.T.S. 22 (entered into force July 11, 1984) [hereinafter Moon Agreement]; Antarctic Treaty, Dec. 1, 1959, 12 U.S.T. 794; U.N. Convention on the Law of the Sea, art. 121, *opened for signature* Dec. 10, 1982, 1833 U.N.T.S. 397 (entered into force Nov. 16, 1994) [hereinafter UNCLOS].

[10] Demsetz, *supra* note 7, at 354.

[11] Waldron, *supra* note 5.

[12] For purposes of this Comment and for clarity, the term "state" "is an independent, sovereign government exercising control over a certain spatially defined and bounded area, whose borders are usually clearly defined and internationally recognized by other states." *See* Melissa Y. Rock, *State, Nation and Nation-State: Clarifying Misused Terminology*, GEOG 128*:* Geography of International Affairs (Oct. 19, 2024, 4:12PM), https://www.e-education.psu.edu/geog128/node/534.

[13] Suruchi Aggarwal, *Globalisation: Conceptions and Perspectives*, "State Sovereignty and Jurisdiction," Indrira Gandhi Open Univ., New Delhi, Unit 2.2, 28 (2021), https://www.egyankosh.ac.in/bitstream/123456789/76728/1/Unit-2.pdf.

[14] Joseph H. Beale, *The Jurisdiction of a Sovereign State*, 36 HARVARD L. REV. 241, 241 (1923) (explaining that a sovereign State's power is absolute, so it follows that infringing on the rights of other sovereign States is legally unacceptable).

[15] Aggarwal, *supra* note 13, at 29.

jurisdiction of a sovereign throughout [its] own territories."[16] This simply means that the state's legal authority is limited to its own borders. International law incorporates these concepts by setting out "'do not'-obligations" that states must adhere to in order to respect the sovereignty of all states. [17] Therefore, no state is allowed to assert jurisdiction over territory within another state, even if the act at issue occurs outside the jurisdiction-asserting state's territory.[18]

The governing international agreements create complications for a spacefaring sovereign state attempting to exercise its sovereignty and jurisdiction over space territories and resources.[19] These agreements, particularly the Outer Space Treaty (OST), prohibit national appropriation and instruct that outer space should remain "free for exploration and use by all states."[20] When—not if—a state's claim of territory nonetheless prevails, the question "Does the state have sovereignty over the claimed territory?" requires a well-defined answer that international law cannot provide in its current state.[21]

In a space law context, understanding the difference between a private ownership claim and a state's appropriation claim is essential because state claims are barred while private claims exist in a more fluid legal landscape. [22] With that understanding in hindsight, the legal strain placed on private and state actors attempting to establish ownership rights in outer space is apparent since outer space currently operates under a communal doctrine.[23] Despite the current communal approach in outer space, acts of possession are likely to nonetheless occur due to mounting private and state interests.[24] To further narrow the scope of the property-ownership relationship as relevant to the space law dilemma, this Comment will connect private, state, and communal ownership to three Roman civil law property doctrines: *res nullius*, *res communis*, and the CHM.

---

[16] Beale, *supra* note 14, at 245.

[17] CEDRIC M. RYNGAERT, *The Concept of Jurisdiction in International Law*, *in* JURISDICTION IN INT'L LAW 53, (Oxford Monographs in International Law) (2nd ed. Oxford University Press 2015).

[18] *See id.* at 53.

[19] *See* 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* Jan. 27, 1967, 610 U.N.T.S. 205 (entered into force Oct. 10, 1967) [hereinafter Outer Space Treaty] ("Outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.").

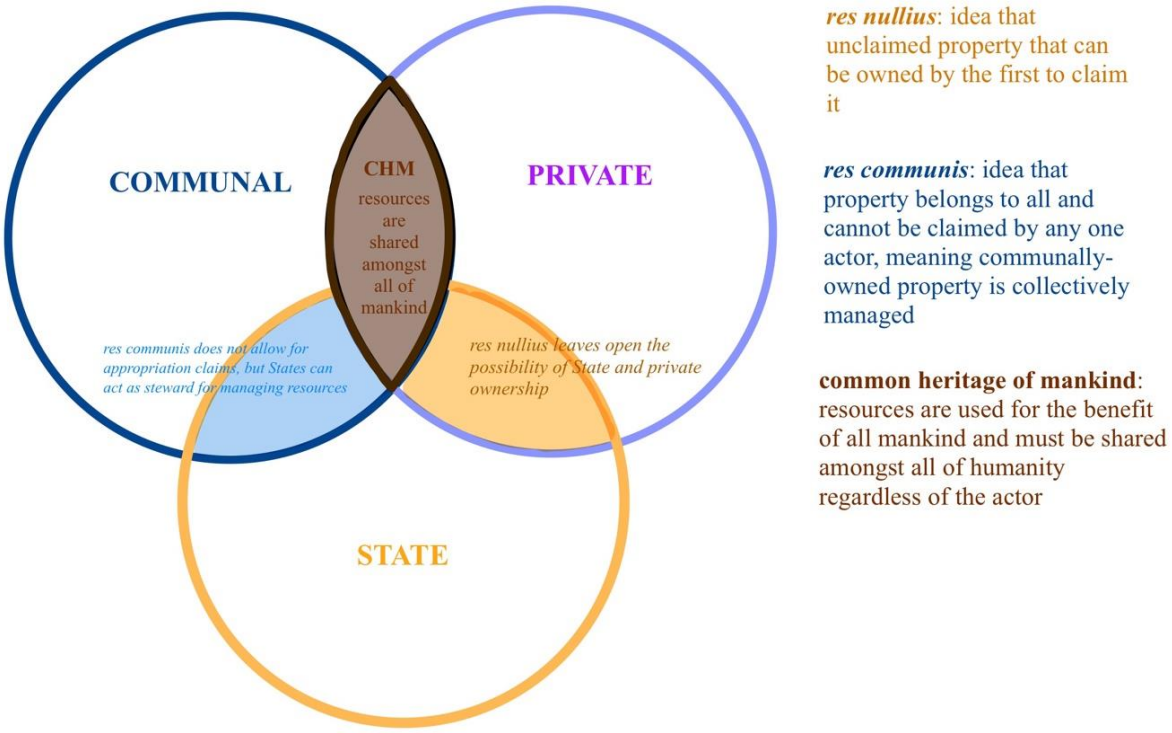
[20] *Id.*

[21] *See* Anna Stilz *Why do states have territorial rights?*, 1 INT'L THEORY 185 (2009); *see also* A. John Simmons, *On the Territorial Rights of States*, 11 Philosophical Issues, 300 (2001).

[22] *Appropriate*, MERRIAM-WEBSTER (11th ed. 2003), https://www.e-education.psu.edu/geog128/node/534. Appropriation means "taking exclusive possession of" something, usually without authority or the right to do so.

[23] *See* discussion *infra* note 41 (noting that communal property doctrines prohibit any private or State claims to ownership).

[24] *See* Stilz, *supra* note 21, at 188 ("On an original acquisition theory, by performing certain acts with respect to resources – such as laboring on them, or being the first to occupy them – an individual or group in the state of nature can generate a strong 'natural' entitlement to the resources in question. The right generated is a special right, since it pertains only to persons who either performed the acts of acquisition in question, or who have been the recipient of permissible transfers from persons who acquired the resource initially.").



[25]

A. Res Nullius and Res Communis

The current gap in the law lies between the outright prohibition of appropriation claims and the growing push to establish property rights in outer space—two positions that cannot exist under the same legal framework. There is an opportunity to close that divide by entertaining a more practical property law doctrine in international space law. The term *res nullius* translates to "property of no one."[26] Therefore, the doctrine of *res nullius* is unquestionably linked to the concepts of property and ownership.[27] The method of acquiring property that is deemed *res nullius* is through occupation, meaning actual possession and use.[28] Once the *res nullius* property is occupied, the idea is that the property "becomes susceptible to appropriation or exploitation."[29] Because resources found in outer space are typically concentrated in small regions on celestial bodies,[30] the urge to physically occupy and exercise exclusive jurisdiction over those areas is

[25] I made this Venn diagram to help readers conceptualize the relationships between types of ownership and related property law doctrines discussed in this Comment.
[26] Christopher C. Joyner, *Legal Implications of the Concept of the Common Heritage of Mankind*, 35 INT'L & COMP. L.Q. 190, 194 (1986).
[27] *Id.*
[28] *See id.* at n.24–25; *see also* Blake Gilson, *Defending Your Client's Property Rights in Space: A Practical Guide for the Lunar Litigator*, 80 FORDHAM L. REV. 1367, 1392 n.232 (2011).
[29] Joyner, *see supra* note 26, at 194.
[30] *See* Gilbert, *supra* note 1. For example, Gilbert notes that "recent probes have confirmed substantial amounts of water ice lurking . . . in shadowed craters at the lunar poles . . . [and]

strong.[31] Therefore, to assert ownership over a body that is classified as *res nullius*, "sovereignty must be clearly demonstrated and performed through discovery . . . and effective occupation through subsequent permanent settlement or exercise of jurisdiction."[32] This means that the *res nullius* designation of territory ceases after acquisition has occurred because that territory has "transformed legally into territory subject to the exclusive ownership or jurisdiction of a recognized sovereign."[33] Describing the friction between the law on appropriation and the desire of the population, international legalist Sir Hersch Lauterpacht states that "theory and practice agree nowadays upon the rule that occupation is effected through taking possession of, and establishing an administration over, territory in the name of, and for, the acquiring [state]."[34] The idea of appropriation by occupation does not legally apply to outer space today, though, because the cosmos operates under the doctrine of *res communis*.[35]

According to Roman law, an area that is shared by all and unable to be claimed by any one actor is classified as *res communis*.[36] Think about airspace and solar energy, both are shared by all and used to benefit everyone.[37] Webster's dictionary defines the word "common" as "belonging to or shared by two or more individuals . . . or by all members of a group."[38] Hugo Grotius, often referred to as the "father of international law,"[39] distinguishes private property and common, or community, property, providing that:

> [n]ow, as there are some things which every man enjoys in common with all other men, and as there are other things which are distinctly his and belong to no one else,

---

significant deposits of [H]elium-3 . . . across the equatorial regions of the Moon." *See also* Mary Lee & Jan Osburg, *Governance in Space: Mining the Moon and Beyond*, RAND CORP. (Nov. 18, 2022), https://www.rand.org/pubs/commentary/2022/11/governance-in-space-mining-the-moon-and-beyond.html (discussing the location of resource deposits and utility of resources as rocket propellant).

[31] Carol R. Buxton, *Property in Outer Space: The Common Heritage of Mankind Principle vs. the First in Time, First in Right, Rule of Property*, 69 J. AIR L. & COM. 689, 706 (2004) ("[A]ncient man first fought over [E]arth's resources—and then the land itself when occupation became feasible."); *see also* Vikram Mansharamani, *The Space Business is Taking Off*, NAVIGATING UNCERTAINTY (Feb. 19, 2024), https://mansharamani.substack.com/p/the-space-business-is-taking-off (quoting astrophysicist Neil deGrasse Tyson, "[t]he first trillionaire there will ever be is the person who exploits the natural resources on asteroids").

[32] *See* Joyner, *supra* note 26, at 194.

[33] Joyner, *supra* note 26, at 194.

[34] L. H. Lauterpacht, OPPENHEIM'S INTERNATIONAL LAW: VOL. 1 PEACE § 251 (9th ed. 1955).

[35] F.S. Ruddy, *Res Nullius and Occupation in Roman and International Law*, 36 U. MO. KAN. CITY L. REV. 274, 285 (1968)*; see* discussion *infra* notes 36–41.

[36] Enver Arikoglu, *The Concept of the Common Heritage of Mankind and the Legal Status of Outer Space in International Law*, in PROCEEDINGS FOR THE FIRST SYMPOSIUM ON SPACE ECONOMY, SPACE LAW AND SPACE SCIENCES 109, 110 (2022).

[37] *See* David Tan, *Towards a New Regime for the Protection of Outer Space as the "Province of All Mankind"*, 25 YALE J. INT'L L. 145, 161 (2000).

[38] *Common*, MERRIAM-WEBSTER (11th ed. 2003), https://www.merriam-webster.com/dictionary/common.

[39] Danielle Kroon, *The End of Freedom of the Seas: Grotius, Law of the Sea, and Island Building*, 52 INT'L LAW. 299, 301 (2019).

> just so has nature willed that some of the things which she has created for the use of mankind remain common to all, and that others through industry and labor of each man become his own.[40]

As Grotius stated, the fundamental character of those things, designated as common property, are not capable of ownership because they belong to all of mankind, and even one claim of ownership would be incompatible with the character of the thing.[41]

Despite mutual exclusivity of the *res nullius* and *res communis* principles, the growing number of lunar projects[42] necessitates the development of a legal framework for entities and states planning to establish a presence on the Moon.[43] For example, the majority of these projects require building infrastructure, which could create de facto claims on lunar territory, complicating the current legal landscape.[44] Specifically, the Defense Advanced Research Projects Agency (DARPA)[45] has named fourteen companies—including Jeff Bezos' Blue Origin and Elon Musk's SpaceX—that will coalesce to develop strategies to allow for a permanent American presence on the Moon, including the construction of "self-sustaining lunar infrastructure."[46] Building infrastructure on a celestial body in order to support lunar activity undoubtedly raises questions of

---

[40] *Id.* at 305; HUGO GROTIUS, THE FREEDOM OF THE SEAS OR THE RIGHT WHICH BELONGS TO THE DUTCH TO TAKE PART IN THE EAST INDIAN TRADE (James Brown Scott ed., Ralph Van Deman Magoffin trans., Oxford University Press, 1916) (1633) (translation of MARE LIBERUM, SIVE DE JURE QUOD BATAVIS COMPETIT AD INDICANA COMMERCIA DISSERTATIO).

[41] Kroon, *supra* note 39, at 306.

[42] *See* Zeynep K. Oran, *2024: A pivotal year for Lunar exploration with NASA's Artemis Program and global space missions*, *World, Science-Technology*, ANADOLU AJANSI (Jan. 8, 2024), https://www.aa.com.tr/en/science-technology/2024-a-pivotal-year-for-lunar-exploration-with-nasas-artemis-program-and-global-space-missions/3103174 (last updated Sept. 1, 2024). Lunar missions invariably raise questions of property rights. For example, do certain missions "own" the surrounding territory it is conducting "lunar research on? Or, what if two projects are underway simultaneously? And, how far do the property rights extend?

[43] *See* discussion *infra* notes 138–44; *see also* Amanya S. Gangawat, *Re-exploring Terra Nullius and Property Rights in Space: Could a Lunar Settlement Claim the Lunar Estate?*, 6 ADVANCED SPACE L. J. 13, 16–17 (2020).

[44] *See* Len Rosen, *U.S. Defence Agency Issues Calls to Develop a Lunar Economy and Infrastructure*, 21ST CENTURY TECH (Dec. 10, 2023), https://www.21stcentech.com/u-s-defence-agency-issues-calls-develop-lunar-economy-infrastructure/.

[45] DEFENSE ADVANCED RESEARCH PROJECTS AGENCY, https://www.darpa.mil/about-us/about-darpa. DARPA is an agency of the United States Department of Defense. DARPA was founded early in the wake of the space race, when the United States recognized that the Soviet Union had made use of military technology to advance the launch of the first orbiting satellite *Sputnik*. DARPA focuses on researching and developing technologies to be used in the advance of national security.

[46] Rosen, *supra* note 44; *see* Michael Nayak, *10-Year Lunar Architecture Capability Study (LunA-10),* DEFENSE ADVANCED RESEARCH PROJECTS AGENCY, https://www.darpa.mil/program/ten-year-lunar-architecture-luna-10-capability-study (including these companies: Blue Origin, CisLunar Industries, Crescent Space Services LLC, Fibertek, Inc., Firefly Aerospace, GITAI, Helios, Honeybee Robotics, ICON, Nokia of America, Northrop Grumman, Redwire Corporation, Sierra Space and SpaceX).

property rights and occupation[47]—questions that the present-day outer space treaties cannot supply a direct answer to.[48]

It is easy to misconstrue *res communis* as synonymous with the CHM principle, however, this Comment clarifies that although slight, the two principles are distinguishable. To preface, the CHM principle exists within the same vein as *res communis*, but the CHM principle places special emphasis on those localities containing exploitable resources and requires that the resources be shared with all of humanity.[49]

B. Common Heritage of Mankind (CHM)

Outer space strictly operates as *res communis* while the Moon operates under the CHM principle.[50] This principle advances the "common interest of mankind as a whole," and it follows that the principle applies to past, present, and future generations of mankind.[51] The major distinction between the CHM principle and *res communis* lies at the point of exploitation.[52] Therefore, the concept of the CHM principle promotes the idea that some areas and, most importantly, their resources, belong to all of humanity. Similarly to things that are *res communis*, those localities deemed to be the CHM are not susceptible to private ownership or state appropriation.[53] The CHM as a legal principle has been positioned as "applying particularly to areas beyond the limits of national jurisdiction and to [the] natural resources found there."[54]

---

[47] *See* WILLIAM BLACKSTONE, *Commentaries on the Laws of England in Four Books* vol. 1 (Books I & II) (Philadelphia: J.B. Lippincott Co. 1893), at *9, http://files.libertyfund.org/files/2140/Blackstone_1387-01_EBk_v6.0.pdf ("[A]s we before observed that occupancy gave the right to the temporary use of the soil, so it is agreed upon all hands, that occupancy gave also the original right to the permanent property in the substance of the [E]arth itself; which excludes everyone else but the owner from the use of it.").

[48] *See* Outer Space Treaty, *supra* note 19. The Moon Agreement and OST do not have any provisions that lend credence to long-term presence or occupation on the moon.

[49] *See* Prue Taylor, *The Common Heritage of Mankind: A Bold Doctrine Kept within Strict Boundaries*, THE WEALTH OF THE COMMONS: A WORLD BEYOND MARKET & STATE 353 (David Bollier & Silke Helfrich eds., 2012); Arikoglu, *supra* note 36, at 110 ("It is only open for exploitation under an international arrangement or regime for the benefit of mankind as a whole, not for unilaterally exploitation by individual states. For this reason, CHM refers to a more advanced stage than the concept of *res communis* in terms of common property. Whereas under the *res communis* regime, individual state and persons can freely carry out their activities on the natural resources and will endeavor to maximize its benefit. The fundamental feature which distinguishes CHM from the *res communis* is the obligation to share the benefits derived from the exploitation of the natural resources.") (emphasis added).

[50] *Compare* Ruddy, *supra* note 35, at 285 *with* Noyes, *supra* note 2, at 461.

[51] YOSHIFUMI TANAKA, THE INTERNATIONAL LAW OF THE SEA, 19 (Cambridge University Press, 1st ed. 2012) ("It may be argued that the term 'mankind' is a transspatial and transtemporal concept. It is transspatial because 'mankind' includes all people on the planet. It is transtemporal because 'mankind' includes both present and future generations. It would seem to follow that the common interest of mankind means the interest of all people in present and future generations.").

[52] *See* Taylor, *supra* note 49, at 355.

[53] *See* Taylor, *supra* note 49, at 356.

[54] Noyes, *supra* note 2, at 449.

Additionally, to digest that the CHM principle is a subspecies of *res communis*, it is helpful to consider that the CHM principle is the "product of a growing worldwide awareness" of the reality of natural resource depletion.[55] The basic idea of the CHM principle is that certain resources are to be used and managed for the benefit of all mankind, but it comes with a caveat. The CHM principle limits use and exploitation by requiring that any discovery of resources or exploitation of such be disclosed and shared with the international community as a whole.[56] This community-based caveat is perhaps the basis of many national governments' reluctance to become member-states of binding treaties that mandate the CHM principle.[57] The reason for this widespread reluctance is that although private and state entities "spend their time and money developing the technology that enables them to harvest resources," in addition to the "expeditions that collect the resources," the CHM principle demands them to split those benefits with the rest of the world.[58] To better understand this reluctance, it is useful to consider the different implications of CHM-based agreements.

i. CHM in Practice

The CHM principle first formally appeared in the United Nations (U.N.) Convention on the Law of the Sea (UNCLOS) of 1982.[59] UNCLOS establishes the legal framework for use and exploration of the seas and exploitation of resources derived from them.[60] Importantly, UNCLOS lays out a legal framework for the future development of "specific areas of the law of the sea."[61] The legal zoning of the sea is divided into several maritime jurisdictional zones, including zones

---

[55] Carl Q. Christol, *Evolution of the Common Heritage of Mankind Principle*, 1 W. ST. U. INT'L L.J. 63, 68 (1981) (emphasizing that the nature of the CHM principle is to preserve the natural resources of the areas it governs).

[56] *See* Stefan-Michael Wedenig & Jack Wright Nelson, *The Moon Agreement: Hanging by a Thread?*, MCGILL INST. OF AIR & SPACE LAW (Jan. 26, 2023), https://www.mcgill.ca/iasl/article/moon-agreement-hanging-thread.

[57] *See* Hope M. Babcock, *The Public Trust Doctrine, Outer Space, and The Global Commons: Time to Call Home ET*, 69 SYRACUSE L. REV. 192, 212 n.172 (2019) (highlighting that reluctance is likely strategic because a treaty cannot bind countries that are not signatories); *see also* Ted R. Bromund, et al., *7 Reasons U.S. Should Not Ratify UN Convention on the Law of the Sea*, THE HERITAGE FOUNDATION (Jun. 4, 2018), https://www.heritage.org/global-politics/commentary/7-reasons-us-should-not-ratify-un-convention-the-law-the-sea (summarizing that the costs of joining UNCLOS outweigh the benefits and providing context as to why the U.S. Senate opposed ratification); UNITED NATIONS TREATY COLLECTION, Chapter XXIV, OUTER SPACE, https://treaties.un.org/doc/Publication/MTDSG/Volume%20II/Chapter%20XXIV/XXIV-2.en.pdf (status as of Apr. 20, 2024 at 11:15pm); UNITED NATIONS TREATY COLLECTION, Chapter XXI, LAW OF THE SEA, https://treaties.un.org/doc/Publication/MTDSG/Volume%20II/Chapter%20XXI/XXI-6.en.pdf (status as of Apr. 20, 2024 at 11:15pm); SECRETARIAT OF THE ANTARCTIC TREATY, *Parties*, https://www.ats.aq/devAS/Parties?lang=e.

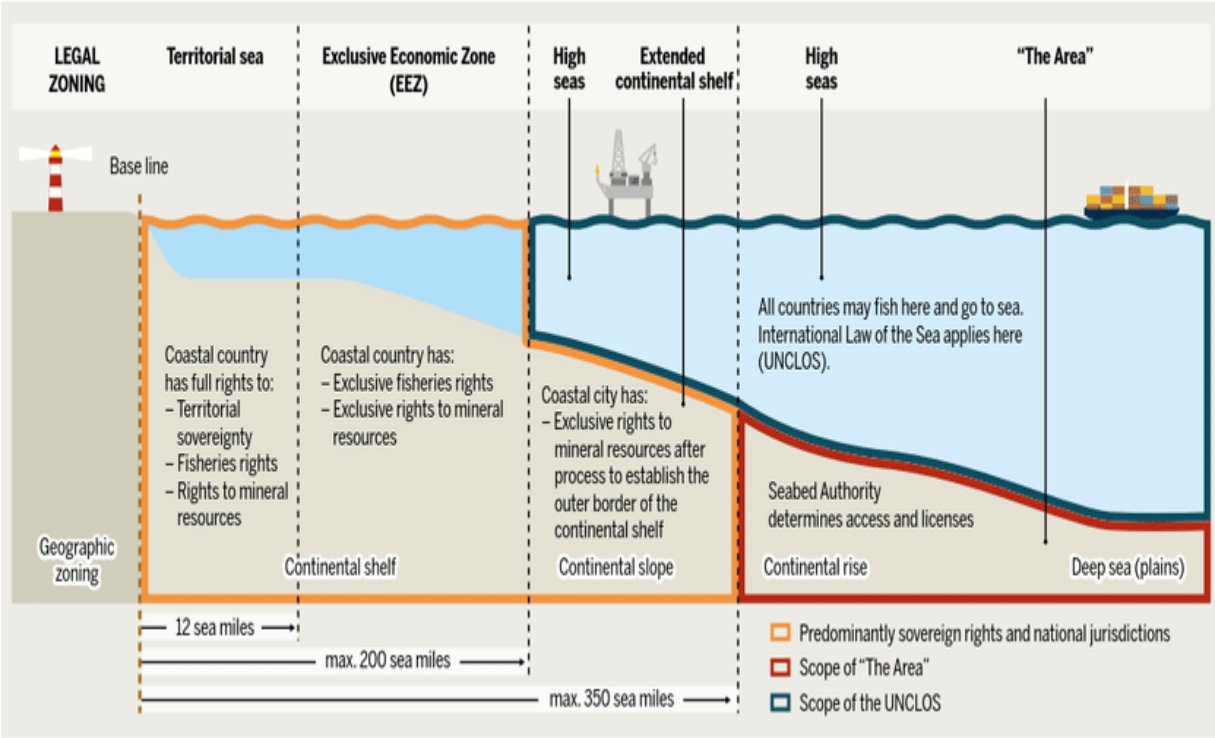
[58] Babcock, *supra* note 57, at 216 (quoting Buxton, *supra* note 31, at 693).

[59] UNCLOS, *supra* note 9, at art. 136 ("The Area and its resources are the common heritage of mankind."). The "Area" encompasses the seabed beyond the national continental shelf.

[60] *Our Work: Legal Affairs, United Nations Convention on the Law of the Sea*, INT'L MAR. ORG., https://www.imo.org/en/ourwork/legal/pages/unitednationsconventiononthelawofthesea.aspx (last visited Oct. 13, 2024).

[61] *Id.*

reserved for state jurisdiction and zones extending beyond state jurisdiction.[62] The figure below illustrates the different maritime zones, and specifies what zones states may exercise jurisdiction over based on territorial sovereignty[63] and sovereign rights.[64]



65

These maritime zones are recognized under international law.[66] The territorial sea is a zone over which a state exercises territorial sovereignty, and this extends 12 nautical miles from the baseline.[67] The Exclusive Economic Zone (EEZ) extends 200 nautical miles from the baseline and

[62] Tanaka, *supra* note 51, at 4–5.
[63] Tanaka, *supra* note 51, at 6 ("Territorial sovereignty is characterized by completeness and exclusiveness. This means that "only the State in question may exercise jurisdiction over its territory," *see id.* The limit on a State's territorial sovereignty is rooted in the spacial nature of the territory. Meaning, a State may only exercise territorial sovereignty within the bounds of the space within its territory. *See* discussion accompanying notes 12–18.
[64] Tanaka, *supra* note 51, at 7("Sovereign rights concern acertain space and can be exercised solely within the space in question."). Importantly, sovereign rights are limited by their nature, just like territorial sovereignty.
[65] Bas Bolman et al., *Oceans Report - Addressing SDG14 issues with factual data and state of the art knowledge*, DELTARES (Feb. 2018), https://www.researchgate.net/figure/maritime-zones-according-to-UNCLOS-Baehr-2017_fig1_331928317.
[66] Tanaka, *supra* note 51, at 4.
[67] *See* image accompanying Bolman, *supra* note 65. The baseline is where the maritime zones are calculated from, usually along the low-water line of the coastal State.

is where a state exercises sovereignty and jurisdiction over the seabed and subsoil of the water; meaning, the state may explore, exploit, and manage natural resources within the EEZ because it is within its sovereign jurisdiction.[68] The "high seas" is a zone beyond state jurisdiction, and is governed by UNCLOS; here, states may not subject any part of this zone to its sovereignty and each state has a right to "enjoy the freedom to use the high seas."[69] Within the high seas zone, Professor Yoshifumi Tanaka explains that the flag state "has the exclusive jurisdiction over vessels flying its flag."[70] Therefore, when a state grants a vessel the right to sail under its flag, the state maintains the right to exercise "enforcement jurisdiction" over vessels flying its flag on the high seas.[71] Importantly, this means that if there is damage to or cause of injury on a flag-flying vessel on the high seas, the flag state is "entitled to make claims against other states."[72] Tanaka clarifies that states exercising exclusive jurisdiction (1) have the authority to prevent interference by other states with a vessel flying its flag and (2) carry the responsibility of ensuring that flag-flying vessels comply with national and international laws and regulations.[73]

The zone called "The Area" extends beyond the scope of both UNCLOS and any state jurisdiction; instead, it is governed by the CHM principle.[74] The Area contains valuable resources in enriched forms and minerals that are only found in the deep seabed of oceans[75]—much like the rare natural resources found on celestial bodies in outer space. Outer space is currently treated the same as The Area: operating under the CHM principle as to its natural resources and, because of its nature, is well beyond the scope of any state sovereignty or jurisdiction.

Given that outer space, like The Area, falls under the CHM principle, legal dynamics in maritime law find a clear parallel in space law. As Professor E.D. Brown observed, there are two radically different tactics at play in international maritime law: the freedom of the high seas and the CHM principle; noting that, "the ascendancy of one over the other during any particular historical period has tended to reflect the interests of the predominant powers of the day."[76] As

[68] Bolman, *supra* note 65; *U.S. Maritime Limits & Boundaries*, NAT'L OCEANIC AND ATMOSPHERIC ADMIN., U.S. DEPT OF COM., OFFICE OF COAST SURV., (updated April 16, 2012) https://nauticalcharts.noaa.gov/data/us-maritime-limits-and-boundaries.html.
[69] *See* image accompanying Bolman, *supra* note 65; Tanaka, *supra* note 51, at 149–51.
[70] Tanaka, *supra* note 51, at 152.
[71] Tanaka, *supra* note 51, at 152. ("The flag State exercises enforcement jurisdiction over all peoples within its [vessels] flying its flag regardless of their nationalities.").
[72] Tanaka, *supra* note 51, at 152.
[73] Tanaka, *supra* note 51, at 153.
[74] Tanaka, *supra* note 51, at 170–71.
[75] Michael Lodge, *The International Seabed Authority and Deep Seabed Mining*, UN CHRONICLE, Nos. 1 & 2 Vol. LIV (May 2017), https://www.un.org/en/chronicle/article/international-seabed-authority-and-deep-seabed-mining#:~:text=It%20contains%20most%20of%20the,been%20known%20since%20the%201860s.
[76] E.D. Brown, *Freedom of the High Seas Versus the Common Heritage of Mankind: Fundamental Principles in Conflict*, 20 SAN DIEGO L. REV. 521, 521 (1983).

Brown correctly anticipated, these tactics are once again in direct confrontation, not only in the realm of the sea,[77] but also in outer space.

Many of the major space players, such as the United States, China, and Russia, have demonstrated scientific, commercial, property, and ownership interests that are incompatible with a communal-based ownership regime. For example, China and Russia have both been granted what is called an "exploration contract" by the International Seabed Authority (ISA).[78] The ISA is an internationally created organization that was created in 1994 as the governing authority over activities in The Area.[79] The ISA has the power to grant licenses to state and private actors for the exploration and exploitation of The Area.[80] According to the ISA, there are currently thirty one active fifteen-year term exploration licensed contracts for specific resources located in The Area.[81] China and Russia's, among other states and private actors, exploration contracts presently authorize exploration activities in The Area—not actual mining operations.[82] But, as Brown cautioned, the "interests of the predominant powers of the day" will persist.[83] And those interests, particularly China's, are deep sea mining.[84] The push for deep sea mining mirrors the rush to

---

[77] Buxton, *supra* note 31, at 692–94. Depending on which State is doing the interpreting, the "freedom of the high seas" and the "common heritage of mankind" are interpreted differently. Buxton summarizes the differing interpretations as follows. The same interpretation gap has evolved and applies again in this context. Developed spacefaring nations are interpreting the CHM principle to mean that access to exploit celestial resources is available to all states, so long as they do not assert ownership over the area the resources were recovered from. On the other hand, nations that are lagging in development are interpreting the CHM principle to mean that despite their lack of contribution to the exploitation of the resources, the principle calls for the equitable sharing among all states so they may still enjoy the benefits of access to the area and its resources. *See also Overview and Final Summary by the Chair of the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space*, U.N. Doc. A/AC.105/C.2/2022/CRP.18 (Mar. 28, 2022), https://www.unoosa.org/res/oosadoc/data/documents/2022/aac_105c_22022crp/aac_105c_22022crp_18_0_html/AAC105_C2_2022_CRP18E.pdf ("[i]t was added that a more detailed set of laws and regulations were needed as a guidance for daily application and to resolve any difference in interpretation.").

[78] INT'L SEABED AUTH., *Status of Contracts for Exploration in the Area*, ch. 5 fig. 12, (2024) https://www.isa.org.jm/wp-content/uploads/2024/06/ISA_Secretary_General_Annual_Report_2024_Chapter5.pdf.

[79] Tanaka, *supra* note 51, at 32; *see also* INT'L SEABED AUTH., *About ISA*, https://www.bbc.com/news/articles/cxwwjlrk1mlo.

[80] INT'L SEABED AUTH., *Exploration Contracts*, https://www.isa.org.jm/exploration-contracts/.

[81] *Id.*

[82] INT'L SEABED AUTH., *Frequently Asked Questions*, "What is the current status of deep seabed mining?," https://www.isa.org.jm/frequently-asked-questions-faqs/.

[83] Brown, *supra* note 76, at 521.

[84] Isaac Kardon & Sarah Camacho, *Why China, Not the United States, Is Making the Rules for Deep-Sea Mining*, CARNEGIE ENDOWMENT FOR INT'L PEACE, (2023) https://carnegieendowment.org/research/2023/12/why-china-not-the-united-states-is-making-the-rules-for-deep-sea-mining?lang=en.

establish extraterrestrial property rights that would eventually foster resource exploitation, as those same major players are now eyeing the Moon and other celestial bodies.[85]

ii. Legal Status of CHM

The phrase "common heritage of mankind" incorporates words that read easily, but the connotation of the phrase varies across the international community.[86] Examining the consequences of each word, and the phrase altogether through a legal lens is critical:

> [t]erms and phrases which carry only very vague or general connotations may, with the passage of time, ripen into legal concepts and principles. Undoubtedly, the concept of 'common heritage of mankind' will need clarification with particular emphasis on its juridical ramifications. Otherwise, how can we expect the international community to honor the requirements pertaining to mankind which have been incorporated in significant international agreements or live up to the spirit of U.N. resolutions if there is no clear understanding of at least the basic legal implications?[87]

As legal scholars point out, a decades-old problem with the definition of CHM persists today: there is no "commonly agreed-to" definition of CHM.[88]

Before explaining the current operative international framework in outer space as it relates to property and ownership rights,[89] it is helpful to illustrate some practical drawbacks of communal ownership claims in place of private or state ones. Suppose that the current communal CHM approach still persists in the year 2050. A subsistence farmer who now lives on Mars by way of Private Company A is in the process of cultivating a plot of land. On an adjacent plot of land, an agronomist from Private Company B is testing out various pesticides on the planet's soil. The farmer's crops do not grow due to the proximity of the agronomist's pesticide testing. Under the CHM principle, the farmer cannot exclude the agronomist from exercising his right to use the communal land; nor can the farmer exclude any other actor from exercising their right to use or benefit from any crops his labor would have produced. As economist Harold Demsetz characterizes these issues, "[w]hat would be a simple negotiation between two [individuals] under a private property arrangement turns out to be a rather complex negotiation between the farmer and everyone else."[90]

---

[85] *See id.*; *see* Rebecca Morelle, *Who owns the Moon? A new space race means it could be up for grabs*, BRITISH BROAD. CORP., https://www.bbc.com/news/articles/cxwwjlrk1mlo.

[86] *See generally* Stephen Gorove, *The Concept of "Common Heritage of Mankind": A Political, Moral, or Legal Innovation*, 9 SAN DIEGO L. REV. 390 (1972).

[87] *Id.* at 402.

[88] Scott J. Shackelford, *The Tragedy of the Common Heritage of Mankind*, 28 STAN. ENV'T. L. J. 109, 110 (2009).

[89] *See infra* Part III.

[90] *See generally* Demsetz, *supra* note 7, at 357 ("an increase in the number of owners is an increase in the communality of property."). This anecdote was based, in part, on a scenario demonstrating the burdens communal property rights place on members of the community by requiring agreement of the entire community on any conflicting usages of land owned in common. *See also* Gorove, *supra* note 86, at 394 ("[i]f the property of mankind belongs to all human beings, for a disposition of such property, consent ought to be received in some form…from everyone").

Now, imagine that instead of private individuals we introduce state ownership, in which the surface land on Mars is subject to state appropriation. Under a state-based approach, the plots of land would likely come into the territory of the states that first take possession and exercise occupation and use of the land.[91] Therefore, presume state C has sovereign jurisdiction over the land where the farmer lives, and state D has sovereign jurisdiction over the land where the agronomist operates. The conflict over the territorial line remains, but now it is mediated through state-to-state negotiations according to national and international regulations on territorial enforcement. While neither scenario is unflawed, this Comment proposes that private and state approaches to ownership and property rights claims are more practical than a communal approach in an outer space context.

A complex question for the international space community arose in December of 1993 at a Sotheby's auction in New York City.[92] On a $68,500 winning bid, private astronaut Richard A. Garriott purchased two pieces of space machinery—one of which is still in use today.[93] As the owner of *Lunokhod 2*, a lunar rover that was launched into space by the Soviet Union on January 11, 1973, Garriott boasts that he is the "world's only private owner of an object on a foreign celestial body."[94] Furnished with a bill of sale, title, and other supporting documents conveying ownership, Garriott questioned the realities of his purchase, asking, "[w]hat does ownership of property that is not situated here on the Earth [look like]? What does that mean? What are someone's legal rights? How do you assert those legal rights?"[95] Furthermore, Garriott also claims that he owns the forty-kilometer trackway *Lunokhod 2* has rolled over on the surface of the moon.[96] Garriot's ownership claim stems from the theory of acquisition by occupation, which emphasizes physical possession and use.[97] The private astronaut and entrepreneur hypothesized, "[i]f you rove onto my property, we can now have an economic exchange which solidifies … the existence of direct commerce between our properties on the moon," and thus would invoke mutual recognition

[91] *See* internal discussion, *supra* Part II.A.

[92] Kenneth Chang, *After 17 Years, a Glimpse of a Lunar Purchase*, THE NEW YORK TIMES (Mar. 31, 2010), https://www.nytimes.com/2010/03/31/science/space/31moon.html.

[93] *See* Guy Raz, *Lunar Rover is Spotted for First Time in 37 Years*, NPR (Mar. 20, 2010, 10:38AM), https://www.npr.org/transcripts/124956591?storyId=124956591; Chad Anderson, *Who Owns the Moon?*, Space Capital Podcast, Ep. 07 (May 29, 2018), at [31:13–32:20], https://spaceangels.libsyn.com/ep-07-who-owns-the-moon. Garriott states that *Lunokhod 2* has three sets of valuable mirrors that allow for various global observatories to gain accurate Earth-Moon distance measurements to detect movement and shift of the moon. He calls these "*my* mirrors" (emphasis added).

[94] Anderson, *supra* note 93, at [23:37–23:50].

[95] Anderson, *supra* note 93, at [25:00–25:21].

[96] Anderson, *supra* note 93, at [32:30–34:31]; Leonard David, *Who owns the moon? One man's lunar claim*, SPACE.COM (Nov. 10, 2021), https://www.space.com/moon-property-rights-lunokhod-2-richard-garriott.

[97] *See* internal discussion, *supra* Part II.A.

of private celestial property rights.[98] What do the governing international space treaties[99] have to say about property rights like those posited by Garriott?[100] The response is inadequate at best.

III. Outer Space Treaties

In an effort to promote peace and security among nations after the devastating global involvement in World War II, the U.N. was officially established in late 1945.[101] In 1958, the U.N. established the Office for Outer Space Affairs,[102] just three months after President Dwight D. Eisenhower signed a law creating the National Aeronautics and Space Administration (NASA).[103] A year later, the U.N. established the Committee on the Peaceful Uses of Outer Space (COPUOS) as a permanent body aimed at coordinating international efforts to manage the peaceful exploration and use of outer space.[104] Since 1962, COPUOS has addressed complex issues incipient to ever-advancing space activity with the help of its two subcommittees, the Scientific and Technical Subcommittee and the Legal Subcommittee.[105] Within the two subcommittees, there are multiple working groups—comprised of state and private space actors and experts in the field of space advancement—that meet annually to submit comprehensive policy proposals aimed at enhancing and furthering contributions to space activity.[106]

A working group within the Legal Subcommittee[107] is currently evaluating specific topics—like guidance on the governing legal framework and an overview of national regulatory frameworks—

---

[98] Raz, *supra* note 93, at [36:48–37:50] ("if you rove onto my property, I can charge you access rights to come make use of my territory…we recognize each other's property rights on the moon.").

[99] Outer Space Treaty, *supra* note 19.

[100] Gangawat, *supra* note 43, at 16–17 (listing multiple claims of ownership on the moon and other celestial bodies).

[101] *United Nations Charter* (1945), NATIONAL ARCHIVES, https://www.archives.gov/milestone-documents/united-nations-charter#:~:text=The%20United%20Nations%20was%20established,circumstances%20following%20World%20War%20I. The two main bodies of the U.N. are the General Assembly, consisting of nearly 200 member states, and the Security Council, whose permanent members are those victors of World War II—China, France, the United Kingdom, Russia, and the United States—and whose two-year-term members are countries elected by the General Assembly, *see id.*

[102] *History,* UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS, Secretariat of COPUOUS, https://www.unoosa.org/oosa/en/aboutus/history/index.html (last visited Oct. 25, 2024).

[103] Jon Uri, *65 Years Ago: Sputnik Ushers in the Space Age*, NASA (Oct. 4, 2022), https://www.nasa.gov/history/65-years-ago-sputnik-ushers-in-the-space-age/.

[104] *COPUOUS History,* UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS, Our Work, Secretariat of COPUOUS, https://www.unoosa.org/oosa/en/ourwork/copuos/history.html (last visited Oct. 25, 2024).

[105] *Id.*

[106] *See generally Working Groups of the Committee and its Subcommittees*, UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS, COPUOS 2024, https://www.unoosa.org/oosa/en/ourwork/copuos/working-groups.html (last visited Oct. 25, 2024).

[107] *See generally Working Group on the Status and Application of the Five United Nations Treaties on Outer Space,* UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS, Our Work, Secretariat of

to improve the five U.N. outer space treaties.[108] The creation of the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space demonstrates that the international legal community is aware that the Outer Space Treaties must evolve with present-day activities in the cosmos. It is not the intention of this Comment to suggest that the international community is unconscious or willfully oblivious to the need for the development and rigorous implementation of new laws to govern outer space. This Comment simply recognizes that solutions to inadequacies in the current law will not sprout overnight and will involve careful consideration and collaboration.

With that being said, there are two international treaties that chiefly pertain to extraterrestrial property rights: first, the Treaty on Principles Governing the Activities of states in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty or OST)[109] and, second, the Agreement Governing the Activities of states on the Moon and Other Celestial Bodies (Moon Agreement).[110] The OST functions as an outer space constitution that the rest of international space law stems from.[111] The role of the Moon Agreement is to supplement the OST, but was actually rejected by the major spacefaring states due to its CHM provision.[112] There are three other main space treaties, but they are not as relevant to this Comment.[113] The OST was entered into force in 1967,[114] and was largely based on Cold War fears of launching nuclear weapons into space as a military advantage.[115] To address a continuing human presence in outer space, the Moon Agreement was entered into force in 1984.[116]

COPUOS, Committee and its Subcommittees, Working Groups, https://www.unoosa.org/oosa/en/ourwork/copuos/lsc/wg-tre/working-group-on-tre.html (last visited Oct. 25, 2024) ("[t]his Working Group was established under the Legal Subcommittee in 2001 to review the status of the treaties, their implementation, and obstacles to their universal acceptance.").

[108] Outer Space Treaty, *supra* note 19; Moon Agreement, *supra* note 9; Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, *opened for signature* Apr. 22, 1968, 672 U.N.T.S. 119 (entered into force Dec. 3, 1968); Convention on International Liability for Damage Caused by Space Objects, *opened for signature* Mar. 29, 1972, 861 U.N.T.S. 187 (entered into force Sept. 1, 1972); Convention on Registration of Objects Launched into Outer Space, *opened for signature* Jan. 14, 1975, 1023 U.N.T.S. 15 (entered into force Sept. 15, 1976) [hereinafter collectively referred to as Outer Space Treaties].

[109] Outer Space Treaty, *supra* note 19.

[110] Moon Agreement, *supra* note 9.

[111] Outer Space Treaty, *supra* note 19.

[112] Moon Agreement, *supra* note 9; *see* Wedenig, *supra* note 56.

[113] Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, *opened for signature* Apr. 22, 1968, 672 U.N.T.S. 119 (entered into force Dec. 3, 1968); Convention on International Liability for Damage Caused by Space Objects, *opened for signature* Mar. 29, 1972, 861 U.N.T.S. 187 (entered into force Sept. 1, 1972); Convention on Registration of Objects Launched into Outer Space, *opened for signature* Jan. 14, 1975, 1023 U.N.T.S. 15 (entered into force Sept. 15, 1976).

[114] *See* Outer Space Treaty, *supra* note 19.

[115] Adam G. Quinn, *The New Age of Space Law: The Outer Space Treaty and the Weaponization of Space*, 17 MINN. J. INT'L L. 475, 477 (2008).

[116] Moon Agreement, *supra* note 9; *see Procedural History*, AUDIOVISUAL LIBRARY OF INTERNATIONAL LAW, https://legal.un.org/avl/ha/agasmocb/agasmocb.html.

A. The Outer Space Treaty (OST)

The Outer Space Treaty serves as the foundation of outer space law, providing the first steppingstone of a framework governing the peaceful use of outer space by all nations.[117] Using the OST as a precursor, the U.N. adopted four other space treaties to address specific concepts included in the OST.[118] Some key provisions of the OST, elucidated further below, aim to regulate outer space activities and maintain peace and security during space exploration.[119]

The OST is made up of twelve articles, but the first two mainly implicate property rights as they discuss use, access, occupation, and appropriation:

> *Article I*
>
> The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.
>
> Outer space, including the Moon and other celestial bodies, shall be free for exploration and use by all states without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies.
>
> There shall be freedom of scientific investigation in outer space, including the Moon and other celestial bodies, and states shall facilitate and encourage international cooperation in such investigation.
>
> *Article II*
>
> Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.[120]

Article I permits outer space, "including the moon and other celestial bodies," to be used and explored by all of mankind.[121] Article I goes on further to mandate "free access to all areas of celestial bodies," meaning that any actor in outer space has the right to access every part of celestial bodies.[122] On one hand, the "free access" provision encourages international cooperation and aims to reduce conflict with the carte blanche application of universal access to all.[123] On the other hand,

---

[117] *See* Outer Space Treaty, *supra* note 19.

[118] *See* Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, *adopted* Dec. 19, 1967, 672 U.N.T.S. 119 (entered into force Dec. 3, 1968); Convention on International Liability for Damage Caused by Space Objects, 861 U.N.T.S. 187 (entered into force Sept. 1, 1972); Convention on Registration of Objects Launched into Outer Space, 1023 U.N.T.S. 15 (entered into force Sept. 15, 1976); Moon Agreement, *supra* note 9.

[119] *See* Outer Space Treaty, *supra* note 19, at art. A.

[120] Outer Space Treaty, *supra* note 19, at arts. I–II.

[121] Outer Space Treaty, *supra* note 19, at art. I.

[122] Outer Space Treaty, *supra* note 19, at art. I.

[123] Gary Deel, *Why Should We Explore Space? What Are the Benefits for Us?*, AMERICAN PUBLIC UNIVERSITY (Mar. 15, 2024) https://www.apu.apus.edu/area-of-study/math-and-

the "free access" clause is problematic because it tends to destroy any private or state incentive to contribute the finances, research, and development[124] necessary to create a long-term presence in outer space or extract resources below the moon's surface by allowing universal access to all parts of any celestial body.

Article II is often referred to as the "non-appropriation" provision.[125] It provides that a sovereign state may not appropriate the moon or other celestial bodies in outer space.[126] Despite specifically prohibiting state appropriation, some legal scholars argue that Article II does not expressly prohibit private claims of ownership.[127] As commercial space law expert Jim Dunstan put it, "for those of us who are enlightened, and have studied [the OST], know that [Article II] is not the end of the answer."[128] What Dunstan means is that the discourse surrounding Article II centers on the narrow interpretation that the non-appropriation clause applies only to state claims, and under that interpretation, the prohibition on appropriation does not apply to private claims.[129] However, Dunstan dispels this so called "Article II loophole" by drawing attention to Article VI of the OST.[130] Article VI provides that states must authorize and give continuing supervision to the activities of its national private spacefaring actors; thus, Dunstan proposes that state governments bear the responsibility of ensuring its private actors comply with the OST, thereby closing the Article II loophole.[131]

However, not all interpretations of the OST share Dunstan's conclusion.[132] This Comment does not agree with Dunstan that Article VI fully bridges the gap that Article II leaves open because continued state authorization and supervision does not necessarily prohibit private actors using and controlling extraterrestrial land and resources, even if there are no explicit claims of ownership. To combat the lack of explicit regulatory language, COPUOS's Legal Subcommittee

---

science/resources/why-should-we-explore-space/#:~:text=Because%20space%20exploration%20is%20collaborative,as%20they%20pursue%20common%20goals (noting that pursuing common missions in outer space builds trust among States).

[124] Dennison A. Butler, *Who Owns the Moon, Mars, and Other Celestial Bodies: Lunar Jurisprudence in Corpus Juris Spatialis*, 82 J. AIR L. & COM. 505, 509 (2017).

[125] Abigail D. Pershing, *Interpreting the Outer Space Treaty's Non-Appropriation Principle: Customary International Law from 1967 to Today*, 44 YALE J. INT'L L. 149, 152 (2019).

[126] Moon Agreement, *supra* note 9.

[127] David Ungar, *Out of This World: Discovery, Terra Nullius, and Beyond*, SCIENCE AND TECH. L. REV. (Feb. 23, 2021), https://journals.library.columbia.edu/index.php/stlr/blog/view/320#_edn8 ("[t]he Outer Space Treaty is only directed to 'national appropriation' and does not explicitly address private actors.").

[128] Corbin Barthold, *Space Law (Part 2) Property Rights in Space*, TECH POLICY PODCAST Ep. 28, (Feb. 23, 2016), at [2:58–3:04], https://techfreedom.org/28-space-law-part-2-property-rights-in-space/.

[129] *Id.*

[130] *Id.* at [3:07, 3:23–3:38].

[131] *Id.* at [3:23–3:38]; *see* Outer Space Treaty, *supra* note 19, at art. VI.

[132] *See* Pershing, *supra* note 125, at 165–66 (proposing that customary law drives State and private acceptance of the non-appropriation principle and noting the cracks in Article II's non-appropriation provision to allow for private ownership).

stated that national legislation should be passed to provide a check on private launchers.[133] This check is a necessary legal supplement to the OST because private space companies are the leading actors when it comes to launches, missions, and research development. However, technology and a permanent lunar presence may outpace national regulatory legislation, further underscoring that timely amendments to the OST permitting variations of property and ownership rights are of the essence.

Article IX of the OST is referred to as the "non-interference" provision.[134] The general idea of a non-interference zone is that it represents an area around an object or activity, such as a lunar base or resource extraction operation, within which all other actors are restricted from entering or conducting their own activity.[135] If a state is aware that its activity or activity of a private actor might create a harmful interference to the space activities of a different state, then the two states must consult with each other.[136] Dunstan discusses Article IX as a "thorny question" that needs to be resolved, as states or private companies could claim non-interference zones under this OST provision where activities are occurring.[137] Although interfering with the area would be characterized as claiming a non-interference zone, it would merely serve as a veneer to an ownership claim—states or private actors would have use and control over the zone while being able to exclude others from accessing it due to the non-interference provision. Dunstan offers an example: what if an actor decides to put a station on Shackleton Crater,[138] due to its valuable lunar ice deposits that could make use of solar energy, and claims a non-interference zone all the way around it?[139] The first actor that sets up the station there, on the moon's narrowly accessible South

---

[133] Comm. on the Peaceful Uses of Outer Space, Bringing the benefits of space to all countries: a guidance document on the legal framework for space activities, UN Doc A/AC.105/C.2/117 (2022) ("A prominent reason to enact national space legislation is the need to provide a practical regulatory system for private sector involvement. Moreover, common reasons are the need to fulfil obligations under treaties to which a State has become a party and the need to achieve consistency and predictability in the conduct of space activities under the jurisdiction of that State. Moreover, some States include national space activities of a governmental or public character within that framework.").

[134] Outer Space Treaty, *supra* note 19, at art. IX.

[135] *See* Cody Knipfer, *Revisiting "non-interference zones" in outer space*, THE SPACE REVIEW (Jan. 29, 2018), https://www.thespacereview.com/article/3418/1 (raising the question of whether an entire activity such as mining operations be protected from interference); *see* Jessy Schingler, *Imagining safety zones: Implications and open questions*, THE SPACE REVIEW (Jun. 8, 2020), https://www.thespacereview.com/article/3962/1 (discussing the implications of non-interference zones claimed over activities and structures, such as roving and lunar bases).

[136]Laura Montgomery, *The "Non-Interference" Provision of Article IX of the Outer Space Treaty and Property Rights*, GROUND BASED SPACE MATTERS: SPACE LAW AND POLICY (Mar. 31, 2017), https://groundbasedspacematters.com/index.php/2017/03/31/the-non-interference-provision-of-article-ix-of-the-outer-space-treaty-and-property-rights/.

[137] Barthold, *supra* note 128, at [16:00–16:09].

[138] Caroline Capone, *Shackleton Crater's Illuminated Rim & Shadowed Interior*, NASA (Apr. 20, 2022), https://science.nasa.gov/resource/shackleton-craters-illuminated-rim-shadowed-interior/ (explaining that Shackleton Crater is located on the South-pole of the Moon and hosts coveted ice deposits).

[139] Barthold, *supra* note 128, at [15:42–15:53].

Pole, would effectively have ownership of that area because it would be the only one with exclusive access to it.[140]

B. The Moon Agreement

The Moon Agreement is made up of twenty-one articles, with Article 11 packing in multiple controversial provisions addressing property rights:

> *Article 11*
>
> (1) The moon and its natural resources are the common heritage of mankind, which finds its expression in the provisions of this Agreement, in particular in paragraph 5 of this article.
>
> * * *
>
> (3) Neither the surface nor the subsurface of the moon, nor any part thereof or natural resources in place, shall become property of any state, international intergovernmental or non- governmental organization, national organization or non-governmental entity or of any natural person. The placement of personnel, space vehicles, equipment, facilities, stations and installations on or below the surface of the moon, including structures connected with its surface or subsurface, shall not create a right of ownership over the surface or the subsurface of the moon or any areas thereof. The foregoing provisions are without prejudice to the international regime referred to in paragraph 5 of this article.
>
> * * *
>
> (5) 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.
>
> (6) In order to facilitate the establishment of the international regime referred to in paragraph 5 of this article, states Parties shall inform the Secretary-General of the United Nations as well as the public and the international scientific community, to the greatest extent feasible and practicable, of any natural resources they may discover on the moon.[141]

The first provision in the Moon Agreement contains the CHM principle, classifying both the Moon "and its natural resources [as] the common heritage of mankind."[142] The third provision places a blanket prohibition on property rights over any surface or subsurface where resources may be found on the Moon.[143] Read in conjunction with the fifth and sixth provisions, the CHM provision in the Moon Agreement requires that discoveries of, benefits from, and actual resources extracted from the Moon must be shared for free with all of the world.[144] Practically, this means that although the extracting state may have developed advanced technology, engineered specialized equipment, and funded the mission, states that contributed nothing would benefit from

[140] Barthold, *supra* note 128, at [15:54–16:00].
[141] Moon Agreement, *supra* note 9. Only relevant provisions to this Comment were included here.
[142] Moon Agreement, *supra* note 9, at art. 11(1).
[143] Moon Agreement, *supra* note 9, at art. 11(3).
[144] Moon Agreement, *supra* note 9, at art. 11(5)-(6).

the extracting state's efforts under the CHM principle in the Moon Agreement. For example, attorney Abigail Pershing explains that, as drafted, the Outer Space Treaty and Moon Agreement would allow other countries to "legally profit from a U.S.-operated mining facility" due to the OST's prohibition on state appropriation and the Moon Agreement's CHM principle.[145] In that scenario, the U.S. would have no ownership claim to the land upon which its facility is seated (under the Moon Agreement's third provision) nor exclusive rights to the resources it collected from its operations—it would have to share the benefits of its own labor with other states.[146]

Out of the five outer space treaties, the Moon Agreement is the only one the United States has not ratified.[147] Other self-launching countries with resource exploitation interests such as China and Russia also refuse to ratify the Moon Agreement.[148] Legal scholars and economists suggest that the leading spacefaring states' hesitancy to ratify the Moon Agreement is due to the impracticality of the use, management, and sharing of natural resources.[149] This suggestion makes sense because the leading space powers are the states responsible for funding, researching, and executing projects and missions focused on extracting natural resources found in space. However, the CHM principle disincentivizes states with greater exploration capabilities by requiring them to relinquish their discovered benefits to the whole international community without reward.

Despite the aim of the Outer Space Treaties, they are not currently structured as an enforceable body of international law. Rather, they have been seen as a collection of flexible legal considerations that state and private actors have strategically interpreted to fit their multiplanetary agendas. For example, the United States established the Artemis Accords in 2020, which are a series of non-binding agreements co-led by the U.S. state Department and NASA.[150] Although the Artemis Accords uphold the core principles of peace and transparency in the OST, they veer sharply away from the Moon Agreement by "facilitat[ing] [an outline for] commercial space mining."[151] Critics of the Artemis Accords opine that the U.S. has interpreted the OST and Moon Agreement in a way that effectively evades the OST's prohibition on state sovereignty by permitting private companies to mine resources under U.S. jurisdiction so long as there is no official claim to ownership of the lunar surface or subsurface itself.[152] Similarly, on the private actor side, lack of government oversight and international cooperation could breed increased risk

---

[145] Pershing, *supra* note 125, at 167.
[146] *See* Pershing, *supra* note 125, at 167.
[147] *See* Outer Space Treaties, *supra* note 9.
[148] Irmgard Marboe, *What, if any, relevance does the Moon Agreement have to activities in space today?*, THE NEW SPACE AGE: BEYOND GLOBAL ORDER 1, 4 (2021).
[149] *See* Wedenig, *supra* note 56.
[150] *Principles for a Safe, Peaceful, and Prosperous Future*, NASA, THE ARTEMIS Accords, https://www.nasa.gov/artemis-accords/.
[151] Kiran Vazhapully, *Space Law at the Crossroads: Contextualizing the Artemis Accords and the Space Resources Executive Order*, OPINIOJURIS (July 20, 2022), https://opiniojuris.org/2020/07/22/space-law-at-the-crossroads-contextualizing-the-artemis-accords-and-the-space-resources-executive-order/.
[152] *See* Zhanna M. Smith, *The Moon Caught in a Bad Romance*, CENTER FOR STRATEGIC & INTERNATIONAL STUDIES (May 18, 2021), https://www.csis.org/analysis/moon-caught-bad-romance; *see* Rossana Deplano, *The Artemis Accords: Evolution or Revolution in International Space Law?*, 70 INT'L & COMP. L. Q. 799, 805 (Jun. 15, 2021).

of uncoordinated space activities and potential conflict over resource exploitation.[153] Professor Alanna Krolikowski frames immediate concerns of over-exploitation with, "[e]veryone is targeting the same sites and resources: [S]tates, private companies, everyone . But they are limited sites and resources. We don't have a second moon to move on to."[154] For example, U.S.-based company Interlune plans to mine Helium-3 from the south pole of the Moon with the intent to commercialize and deliver these large quantities.[155] Conflictingly, though, is China's plan to not only mine Helium-3 and other resources located in the same location, but also to establish a permanent lunar base at the south pole of the Moon within the next decade.[156]

Would the OST's prohibition on national appropriation then become moot once China builds its lunar base on the Moon's surface? Further, does drilling into the subsurface of the Moon to establish infrastructure signify an appropriation claim through use and occupation? Would the CHM principle's stipulation on outer space resources apply in these instances because neither nation is a party to the Moon Agreement? The lack of clarity in the OST and the impractical nature of the CHM principle are problematic because neither provides enforceable mechanisms for the property rights and ownership claims to come into outer space. Without a clear legal framework, states and private actors alike are likely to act in their own interest, which, in turn, will lead to uncoordinated and potentially competing activities. The potential overlap in activity raises the risk of conflict, as states and private actors could assert claims over the same property or resources without an established legal process for dispute resolution. Additionally, the CHM principle fails to provide practical incentives and enforcement that are vital to ensure compliance or cooperation among space-faring actors, especially when rare and valuable extraterrestrial resources are at stake.

IV. The Problem, Today

Houston, we have a problem: the legal framework across the five outer space treaties is unclear and largely left to interpretation, thereby creating an international handicap on the effective establishment of property rights in space. The lack of definitive rules regarding ownership and

---

[153] Matthew Gross, *The Artemis Accords: International Cooperation in the Era of Space Exploration*, HARVARD INTERNATIONAL REVIEW (Jan. 27, 2023), https://hir.harvard.edu/the-artemis-accords/ ("The Artemis Accords shed private corporations of responsibility and create a scenario in which rogue private entities could violate the terms of the agreement without facing severe consequences.").

[154] *Growing Interest in Moon Resources Could Cause Tension, Scientists Find*, CENTER FOR ASTROPHYSICS: HARVARD & SMITHSONIAN (Nov. 23, 2020), https://www.cfa.harvard.edu/news/growing-interest-moon-resources-could-cause-tension-scientists-find#:~:text=According%20to%20Milligan%2C%20it's%20a,moon%20to%20move%20on%20to.

[155] Christian Davenport, *This company intends to be the first to mine the moon*, THE WASHINGTON POST (Mar. 13, 2024), https://www.washingtonpost.com/technology/2024/03/13/moon-mining-plans-interlune/.

[156] Scott Firsing, *China Sets Sights on the Moon Again as New Space Race Intensifies*, INT'L POLICY DIGEST (May 26, 2024), https://intpolicydigest.org/china-sets-sights-on-the-moon-again-as-new-space-race-intensifies/; Andrew Jones, *China plans to build moon base at the lunar south pole by 2035*, SPACE.COM (Sept. 10, 2024), https://www.space.com/china-moon-base-south-pole-2035.

property rights—namely, resource exploitation—stifles the development of a coherent legal framework and pushes state and private actors toward self-governance in this legal void. Now, state and private actors are taking matters into their own hands, creating agreements like the Artemis Accords and launching independent resource extraction missions. While these efforts attempt to close that void, they actually create a patchwork of self-serving regulations that lack international coordination. Consequently, there is a high potential for a chaotic and conflict-ridden future for outer space activities if a clear legal framework to address these issues is not established soon.

A. Undefined Property Rights and Ownership Claims

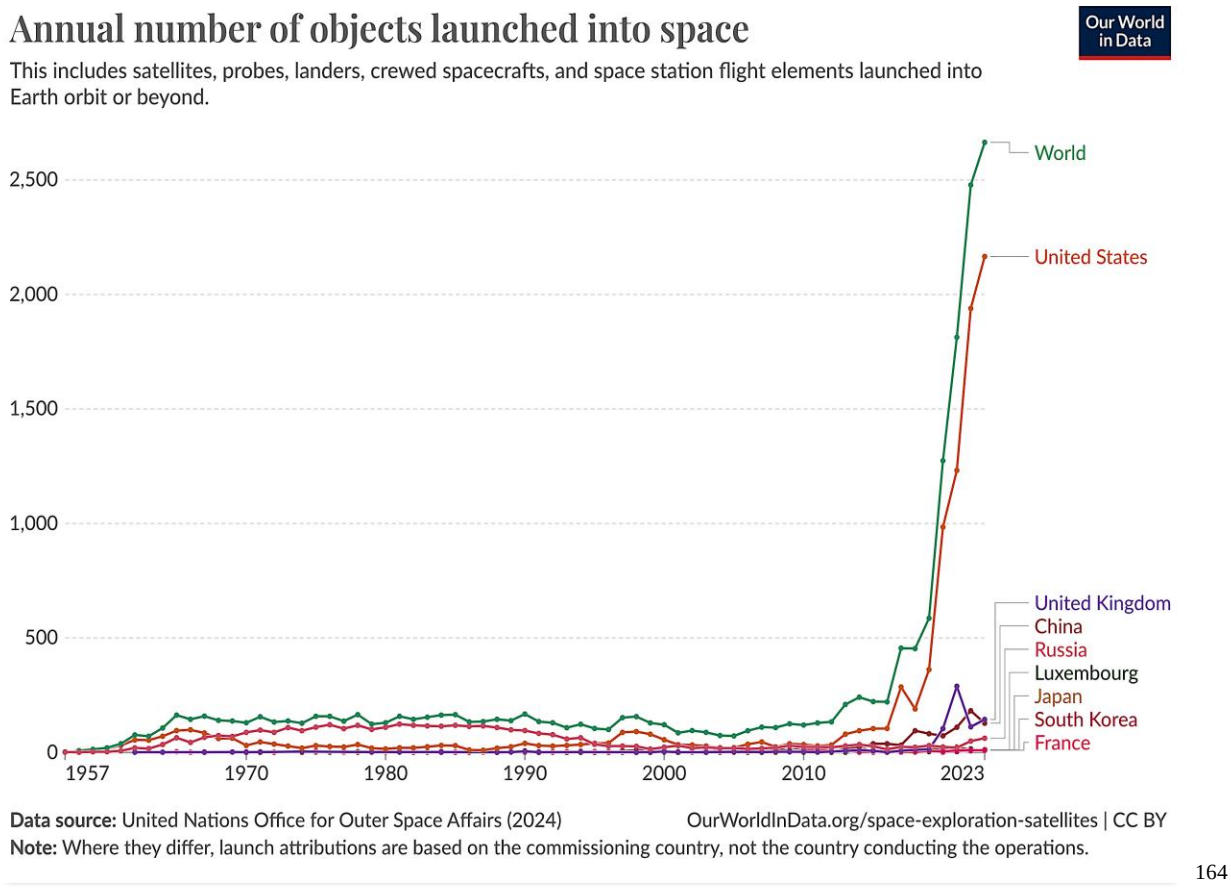
Professor Eliot Tracz of the New England School of Law highlights the advantageous relationship between property rights that are defined and the regulatory effect that follows by detailing the power a possessor has to exclude others from interfering with the property.[157] He writes once "property rights are defined, it becomes possible to regulate the activities associated with the right."[158] Professor Tracz also notes that defining property rights provides protection to the potentially exploitable resources by limiting the rate at which they may be extracted.[159] However, the current outer space treaties do not contain provisions that clearly define property rights, instead the OST offers a carte blanche prohibition on national appropriation of a celestial body without addressing how private actors may claim or utilize extraterrestrial resources.

Without clearly defined property rights, essential components that would support the development of an outer space market—such as title and the rights to use, possess, exclude, and transfer—lack legitimacy.[160] This graph tracks the ever-increasing number of objects launched into outer space from each spacefaring state and compares it to the total global number of launched objects.[161] With more congestion in outer space comes an increased need for clear-cut property and ownership laws that operate on an international level, rather than each state and private actor following legislation specific to the launching state.[162] For example, the United States was the first

---

[157] Eliot T. Tracz, *Markets, Regulation, and Inevitability: The Case for Property Rights in Outer Space*, 30 U. MIAM INT'L & COMP. L. REV. 42, 62 (2023) ("[I]f a temporary right existed to possess a celestial body, or a portion of a celestial body, for the purposes of extracting resources, then the existence of that right would have a regulatory effect by allowing the possessor to restrict who may enter that celestial body and remove those resources.").
[158] *Id.* at 62.
[159] *Id.*
[160] *Id.* at 64.
[161] "Annual number of objects launched into space – UNOOSA", data processing by OUR WORLD IN DATA [dataset], UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS, "Online Index of Objects Launched into Outer Space" [original data] (retrieved Mar. 20, 2024), https://ourworldindata.org/grapher/yearly-number-of-objects-launched-into-outer-space?time=earliest..2023&country=OWID_WRL~USA~CHN~GBR~FRA~JPN~LUX~RUS~KOR#sources-and-processing. I electively chose the shown countries because they are the top 8 most active launchers on a global scale. This data was compiled from annual UNOOSA reports.
[162] Morgan M. DePagter, *"'Who Dares, Wins:' How Property Rights in Space Could be Dictated by the Countries Willing to Make the First Move*", CHICAGO J. INT'L LAW, CJIL Online 1.2.

to implement a body of space resources law, "recognizing the property rights of private [actors] to materials gathered in space" in the Artemis Accords.[163]



[164]

A sense of urgency follows the need for amending the OST as companies like SpaceX and Blue Origin plan to mine the Moon and asteroids for valuable resources in the near future.[165] Without clear property rights, there cannot be legitimate regulatory authority over resource allocation or building infrastructure. Simply barring states from appropriating any part of celestial bodies, while ignoring private actors, creates a regulatory gap where unchecked resource exploitation occurs, leading to disputes and unsustainable practices.

B. Ambiguous Language in Treaties

The devil is in the details. Revision and amendment of the OST is vital and should incorporate carefully articulated definitions and legal rules rather than using boilerplate language.

[163] *See* Gilbert, *supra* note 1.
[164] Chart of Annual number of objects launched into space – UNOOSA, in *supra* note 161.
[165] Claire O'Shea, *NASA Selects Blue Origin as Second Artemis Lunar Lander Provider*, NASA (May 19, 2023), https://www.nasa.gov/news-release/nasa-selects-blue-origin-as-second-artemis-lunar-lander-provider/.

For example, the following terms, among others, do not have definitions within the meaning of the treaties in which they are included: access, activity, exploration, peaceful purposes, outer space, and use. Without clear definitions, these terms remain open to interpretation, which can lead to conflicting claims between spacefarers and hinder the development of a coherent legal framework to which outer space activity must adhere.

What qualifies as "exploration"? To what lengths may "exploration" reach? Does "exploration" include mining resources for the purpose of discovery and scientific development? Does the United States correctly interpret "peaceful purposes" to mean non-aggressive?[166] Or does the term "peaceful purposes" simply echo the prevention of a military presence in outer space? Do national security measures such as satellite deployment and destruction in outer space qualify as "peaceful purposes"?[167] The OST in its form today does not offer explanations. The interpretive discretion the OST allows state and private actors could prove to be unsafe as a permanent human presence in outer space is coming as soon as September of 2025.[168] The text of UNCLOS provides definitions, including the context and scope of the definition, that provide specific meanings as to what falls under that definition.[169] The inclusion of specific definitions would improve comprehension and enforcement of the outer space treaties. Without revision, OST definitions are outdated, resulting in a delayed response to advancing technological capabilities. For example, in the next two decades, methods for resource extraction and the accessibility of lunar launch sites will look much different than they do today. The language in the OST cannot remain ambiguous if it is to effectively address the evolving landscape of outer space activities and resource utilization.

C. Inadequate Non-Interference and Safety Zone Provisions

The United States formed the Artemis Accords to regulate the civil exploration and exploitation of natural resources found in outer space.[170] The Artemis Accords are based on the five outer space treaties, and have attracted signatories who have not ratified the Moon Agreement, chiefly due to its incorporation of provisions for the extracting of natural resources found beneath the Moon's surface.[171] If widely adopted, the Artemis Accords would require the drafting of

---

[166] *See* Jeremy Grunert, *The "Peaceful Use" of Outer Space?*, WAR ON THE ROCKS (Jun. 22, 2021), https://warontherocks.com/2021/06/outer-space-the-peaceful-use-of-a-warfighting-domain/.

[167] *See id.* (cautioning that Russia and China's use of anti-satellite weapons in outer space implicate the "peaceful purposes" provision in Article III of the OST).

[168] Abbey Donaldson, *NASA Shares Progress Toward Early Artemis Moon Missions with Crew*, NASA (Jan. 9, 2024), https://www.nasa.gov/news-release/nasa-shares-progress-toward-early-artemis-moon-missions-with-crew/#:~:text=NASA%20will%20now%20target%20September,remains%20on%20track%20for%202028.

[169] UNCLOS, *supra* note 9, at arts. 29, 76, 101, 103, 122.

[170] *Artemis Accords Overview*, U.S. DEPARTMENT OF STATE, https://www.state.gov/artemis-accords/; The Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids for Peaceful Purposes, NASA, [hereinafter The Artemis Accords].

[171] Merryl Lawry-White, *Mining Space Resources: Where are we Now?*, SPACE ARBITRATION, https://space-arbitration.com/mining-space-resources-where-are-we-now/; see notes accompanying *infra* note 143–45.

"bilateral agreements in which 'partner [states]' agree to follow [United States]-drafted rules."[172] A set of pivotal provisions in the Artemis Accords that "partner states" must incorporate in bilateral agreements involve safety zones. Safety zones are essentially state-claimed areas that seek to protect extraterrestrial sites from collisions and harmful interference by other operations taking place in close proximity.[173] Importantly, partner states to the Artemis Accords accept an obligation to report the "nature of their space activities" in any safety zone it claims.[174]

Another provision regarding safety zones details that safety zones are expected to "change, evolve, or end based on the status of the specific activity."[175] Through the simple reference to the nature of the activity that would occur within a safety zone, the Artemis Accords are already lightyears ahead of the OST and Moon Agreement by recognizing that current activities in outer space are specific to the purpose of the project. The provision further provides that partner states commit to "adjust their usage of safety zones over time based on mutual experiences and consultations with each other and the international community," which would act as a limit on a state with a prolonged claim of a safety zone.[176]

In early 2023, the United States detailed a series of thirteen legal instruments used to regulate any entity organized under the laws of the state carrying out space activities in a submission to COPUOS's Legal Subcommittee.[177] This collection of American regulatory frameworks, which included the Commercial Space Act,[178] is revolutionary because international space law of this specificity has not yet been put in practice. However, other states have expressed the view that the passage of national legislation protecting property rights in outer space could constitute a violation of the OST.[179] This discrepancy is precisely why the OST needs to be amended in a timely fashion.

---

[172] Cait Storr, *Could corporations control territory in space? Under new US rules, it might be possible*, THE CONVERSATION (June 2, 2020), https://theconversation.com/could-corporations-control-territory-in-space-under-new-us-rules-it-might-be-possible-138939.

[173] *See* Knipfer, *supra* note 135.

[174] Caitlin Kim, *One Small step for Space Law*, THE REGULATORY REVIEW (Mar. 24, 2022) https://www.theregreview.org/2022/03/24/kim-one-small-step-space-law/.

[175] The Artemis Accords, *supra* note 170, at 6.

[176] The Artemis Accords, *supra* note 170, at 6.

[177] Comm. on the Peaceful Uses of Outer Space, Schematic Overview of National Regulatory Frameworks for Space Activities, UN Doc A/AC.105/C.2/2023/CRP.28, (Mar. 20, 2023). The United States listed thirteen different legal mechanisms it uses to govern activity in outer space. Some of these include the Commercial Space Act, the Commercial Space Launch Competitiveness Act, and Government Orbital Debris Mitigating Standard Practices.

[178] *Id.*; Commercial Space Act of 1998, Pub. L. No. 105–303, 112 Stat. 2877 (1998).

[179] Comm. on the Peaceful Uses of Outer Space, Draft Report: Status and application of the five United Nations treaties on outer space, UN Doc A/AC.105/C.2/L.298/Add.1 (2016). ("Some delegations expressed concern that the national legislation of some countries unilaterally enacted to protect private property rights in resources extracted from the Moon or other celestial bodies may amount to either a claim of sovereignty or a national appropriation of those bodies and thus could constitute a violation of the Outer Space Treaty." "The view was expressed that the unilaterally enacted national legislation of a particular State that protected private property rights

D. Lack of Dispute Resolution

states have expressed a desire to fill the legal gap between the OST and Moon Agreement as semi-permanent lunar bases are within the realm of imminent possibility.[180] It is critical to note that the states authorizing projects to create lunar settlements—the United States, Russia, China, and India—are not member-states of the Moon Agreement because they will not be bound by its provisions when carrying out these missions.[181] The primary motivation to establish lunar bases is to explore, collect, and utilize valuable resources on the Moon. An American non-profit organization called the Open Lunar Foundation, which is dedicated to finding solutions to peaceful lunar exploration and development, submitted policy and governance recommendations with respect to Moon resources to the Working Group on Legal Aspects of Space Resource Activities[182] in December of 2022.[183] One section of the submission highlighted that all resources on the Moon "differ in levels of scarcity."[184] Along with the separable nature of lunar resources, when the "value of [those] resource[s] [are] increasing, it is more likely to be privatized so that the entity responsible for developing it can 'fully capture the resulting benefits,'"[185] such as using mined

---

in resources extracted from the Moon or other celestial body represented a reversal of the negotiation position of that State at the time of the negotiation of the Moon Agreement in the Committee and its adoption by the General Assembly.").

[180]Comm. on the Peaceful Uses of Outer Space, Overview and final summary by the Chair of the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space on the responses from member States and permanent observers of the Committee to the Set of questions provided by the Chair of the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space, taking into account the UNISPACE+50 process, provided by the Chair and contained in the Report of the Legal Subcommittee on its fifty-sixth session, document A/AC.105/1122 (Annex I, Appendix I), and the Report of the Legal Subcommittee on its sixtieth session, document A/AC.105/1243 (Annex I, Appendix I), A/AC.105/C.2/2022/CRP.18, at 10 (2022). ("Some States expressed the view that the Outer Space Treaty contained a legal gap with regard to space resources activities. The view was expressed that the provisions of the Outer Space Treaty were rather general as regards the use and exploration of the Moon and other celestial bodies and that there was a need to develop those principles in more detail. It was emphasized that this was particularly important in light of the growing interest among space-faring nations to engage in new projects and missions aimed at exploring and using the Moon and other celestial bodies including their resources.").

[181] Christian Davenport, *Will China beat the United States back to the moon? It's possible.*, THE WASHINGTON POST (Nov. 13, 2023), https://www.washingtonpost.com/technology/2023/11/13/china-nasa-moon-landing-first/; Jeff Foust, *DARPA to study integrated lunar infrastructure*, SPACENEWS (Aug. 15, 2023), https://spacenews.com/darpa-to-study-integrated-lunar-infrastructure/; Moon Agreement, *supra* note 9.

[182] Comm. on the Peaceful Uses of Outer Space, Open Lunar Foundation – Input to the Working Group on Legal Aspects of Space Resource Activities, UN Doc A/AC.105/C.2/2023/CRP.25, (2023). The Working Group is a subgroup of the Legal Subcommittee of UNCOPUOS.

[183] *Id.*

[184] *Id.* at 9; *see Growing Interest in Moon Resources Could Cause Tension, Scientists Find*, *supra* note 150.

[185] Babcock, *supra* note 57, at n.254.

lunar resources to then fuel deep space exploration.[186] Therefore, the potential for conflict over the where states may establish a lunar base is high. To address this, an amended OST or new provision is needed as exploration, exploitation, and utilization of Moon resources will define the scope of an international treaty's application.

E. Global Participation and Enforcement

The current outer space treaties offer little incentive for global participation because they provide no real benefit or reward to state or private actors in terms of economic gain[187] and the opportunity to assert extraterrestrial property rights. In response to COPUOS's Legal Subcommittee survey, several states expressed that the CHM principle does not "offer a practical or attractive path forward" as its legal implications are cumbersome and unworkable.[188] The CHM principle, which mandates collective ownership of celestial resources, discourages state and private actors from investing the capital, technology, and risk associated with exploration and development. To foster development and ensure the future of the outer space market, a shift toward a reworked legal regime is needed. One approach to this participation issue is to establish coveted partnerships between private actors and state space agencies that would grant appropriate licensing and provide close oversight.[189] Such partnerships would also ensure international transparency while "harnessing the combined strength of both [state and private] sectors"—striking a balance between necessary regulation and economic viability.[190]

V. Analysis

To effectively define extraterrestrial property rights, a zonal management approach similar to UNCLOS could offer a balanced framework. A parallel approach to UNCLOS zones in outer space would clarify specific zones, thus enabling exclusive property rights to actors who extract resources in conjunction with and under the supervision of the launching state. This system would allow for state and private interests alike. Dunstan analogizes this to fishing in the high seas, where once a fish is caught, it belongs to the fisherman.[191] This principle should apply to space resources as well. It is vital that this zonal management system should avoid the CHM principle for extracted resources because it restricts ownership and property rights while disincentivizing state and private actors from advancing the development of outer space. Professor Tanaka warns that rigid zones may create tension between the law and the natural conditions unique to outer space, suggesting that flexibility is key.[192] A new provision in the OST, as well as bi- and multilateral agreements

---

[186] Lawry-White, *supra* note 171.
[187] Joshua Robin, *Space Is Getting Crowded: The Laws Governing the New Commercial Space Race*, 21 LOY. MAR. L. J. 93, 96 (2022).
[188] Lawry-White, *supra* note 171, at 13.
[189] *See* Shelli Brunswick, *The Transformative Power of Public-Private Partnerships In Space Exploration*, FORBES (Jun. 24, 2024), https://www.forbes.com/councils/forbestechcouncil/2024/06/24/the-transformative-power-of-public-private-partnerships-in-space-exploration/.
[190] *Id.*
[191] Corbin Barthold, *Space Law (Part 2) Property Rights in Space*, TECH POLICY PODCAST Ep. 28, (Feb. 23, 2016), https://techfreedom.org/28-space-law-part-2-property-rights-in-space/.
[192] Tanaka, *supra* note 51, at 4.

like the Artemis Accords, should incorporate a defined zonal management model to ensure sustainable property rights in outer space.

As more sophisticated extraterrestrial agendas emerge with the advancement of technological capability, various terms in the outer space treaties have been left to broad interpretation by state and private actors alike. Therefore, a new provision dedicated to providing detailed definitions contained within the OST should follow Articles I and II of the treaty. For example, the definition of "exploration" should encompass not only the extent of scientific investigation of celestial bodies but also the scope and limit of extraction methods to keep pace with technological advancements to avoid hindering the orderly development of outer space. The new provision could read:

> *Definition and Scope of Exploration*
>
> "Exploration" refers to the systematic and intentional activity undertaken by state and private actors in outer space, including the Moon and other celestial bodies, with the primary objective of discovering, investigating, and studying extraterrestrial phenomena, environments, and resources. Exploration under this Treaty does not include: (1) permanent territorial or appropriation claims over the surface or subsurface of celestial bodies, (2) establishment of military bases on celestial bodies, (3) commercial exploitation of celestial resources without proper oversight by the Celestial Board of Resource Exploration and adherence to international law.
>
> *International Oversight*
>
> Exploration activities shall be subject to the supervision and governance of the Celestial Board of Resource Exploration. The Board shall ensure that all exploration complies with the principles of this Treaty.
>
> *Resource Sharing and Ownership*
>
> Once a mission successfully explores and discovers exploitable resources on a celestial body, those resources shall be considered the joint property of the launching state and the entity that conducted the exploration and discovery. This ownership grants the right to use, enjoy, and dispose of the resources in accordance with other international laws. No actor shall claim or demonstrate de facto ownership over the surface or subsurface of any celestial body upon which they have established infrastructure. No single actor may monopolize resource extraction activities. Disputes shall be resolved before the International Outer Space Court.
>
> *Restrictions of Exploration*
>
> Exploration must adhere to the following conditions: (1) states and other entities shall not interfere with the exploration or peaceful activity of other states and entities. Any potential conflicts shall be submitted before the International Outer Space Court. (2) states and other entities engaged in exploration shall inform the Celestial Board of Resource Exploration of the nature, specific location, and scope of their exploration missions.

These terms should be subjected to regular legal hygiene and maintenance, meaning that as technology and society evolve, so too should the scope and explanations of definitions contained in the OST.

The U.N. should draft a new provision or amend Article II of the OST to create room for extraterrestrial property rights, with particular attention to non-interference safety zones because lunar exploration and use missions have gained enormous interest in recent years.[193] Additionally, states would likely follow suit in their complementary domestic regulations. For example, a new Article II could read:

> Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of permanent occupation or use, or by any other means. *However, temporary and exclusive non-interference safety zones, established for the purpose of ensuring safe and efficient operations in space, may be recognized under internationally agreed terms, provided that: (1) such zones are non-sovereign in nature and do not imply de facto ownership of the celestial body, (2) they are limited in scope and duration to the activities being conducted subject to approval by COPOUS, and (3) they are subject to international oversight and regulation by COPOUS and dispute resolution through the International Outer Space Court.*[194]

Specifically, the addition of limited duration and mandating jurisdiction within the International Outer Space Court would provide structure to state and private actors executing missions requiring temporary property rights in the form of non-interference safety zones. This revision of the OST listens to the concerns and desires of spacefaring actors while preserving the orderly development of scientific, and soon commercial, activities on celestial bodies. Importantly, this amendment gives more authority to COPOUS, the existing body within the U.N. of which all major spacefaring states are currently members.[195]

Although the legal status of property rights in outer space remains uncertain, the next logical step should be to formally recognize these rights through customary international law. Professor Tanaka explains that the laws governing the sea in UNCLOS stem from the same sources of international law found under the Statute of the International Court of Justice (ICJ) in Article 38(1).[196] The ICJ is "the principal judicial organ" of the U.N., and its function involves settling legal disputes between member-states and releasing advisory opinions on legal questions

---

[193] *Overview and Final Summary by the Chair of the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space*, *supra* note 180, at 10. ("Some States expressed the view that the Outer Space Treaty contained a legal gap with regard to space resources activities. The view was expressed that the provisions of the Outer Space Treaty were rather general as regards the use and exploration of the Moon and other celestial bodies and that there was a need to develop those principles in more detail. It was emphasized that this was particularly important in light of the growing interest among space-faring nations to engage in new projects and missions aimed at exploring and using the Moon and other celestial bodies including their resources.").

[194] Outer Space Treaty, *supra* note 19, at art. II (emphasis added to indicate a possible amendment).

[195] *Committee on the Peaceful Uses of Outer Space: Membership Evolution*, UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS, Secretariat of COPOUS, https://www.unoosa.org/oosa/en/ourwork/copuos/members/evolution.html.

[196] Tanaka, *supra* note 51, at 8; Statute of the International Court of Justice, art. 38, ¶ 1.

submitted by specified agencies.[197] The Statute contains the governing rules that the ICJ must follow.[198] Article 38(1) of the Statute is accepted by the international legal community as the base of formal sources of international law.[199] As such, establishing an internationally recognized legal rule concerning property rights in outer space could materialize in one of three ways. Article 38(1) lists three legal avenues by which a rule comes to fruition: "(a) international conventions, whether general or particular, establishing rules expressly recognized by the contesting states; (b) international custom, as evidence of a general practice accepted as law; (c) the general principles of law recognized by civilized nations."[200] Treaties that are signed by two or more states and act as an international agreement are classified as international conventions.[201] Customary law, or international custom, will apply when there is no law in place to follow.[202] The general principles of law are those legal norms that prevail in the majority of states, such as sovereignty, good faith, and equity.[203]

Therefore, a body capable of coordinating extraterrestrial dispute resolution should be established before it is too late. A court modeled after the IJC would have the ability to provide legal mechanisms to settle disputes occurring in outer space. The new court should be made up of justices who have extensive backgrounds in outer space, technology, commercial and corporate, energy and environmental, and regulatory laws. Further, appointed justices should be nominated by COPOUS and confirmed by member-states of the U.N. based on qualifications, legal expertise and experience, global diversity, and impartiality to avoid a political influence on the International Outer Space Court (IOSC).[204]

Without defined property rights or the promise of financial reward, there is little motivation for the international space community to willingly ratify the outer space treaties. To endorse "pioneer-states" that have demonstrated a distinct presence in outer space, state space agencies should contract long-standing partnerships so that this work can continue with a strong legal backbone. One mechanism of private enforcement is to have states levy fines against private actors that disobey national regulations, which would be in accordance with the newly amended OST. For example, the United States recently fined Swarm Technologies, a company acquired by

---

[197] *The Court*, INTERNATIONAL COURT OF JUSTICE, https://www.icj-cij.org/court.

[198] Statute of the International Court of Justice, art. 1 ("The International Court of Justice established by the Charter of the United Nations as the principal judicial organ of the United Nations shall be constituted and shall function in accordance with the provisions of the present Statute.").

[199] Tanaka, *supra* note 51, at 9; *see* Mortimer N.S. Sellers, *Why States Are Bound by Customary International Law*, 4 INT'L LEGAL THEORY 22 (1998).

[200] Statute of the International Court of Justice, ch. 2, art. 38(1).

[201] *International Conventions*, LIBRARY OF CONGRESS, Public International Law: A Beginner's Guide, https://guides.loc.gov/public-international-law/international-conventions#:~:text=International%20conventions%20are%20treaties%20signed,party's%20adherence%20to%20the%20treaty.

[202] *International Custom*, LIBRARY OF CONGRESS, Public International Law: A Beginner's Guide, https://guides.loc.gov/public-international-law/international-customs.

[203] *General Principles*, LIBRARY OF CONGRESS, Public International Law: A Beginner's Guide, https://guides.loc.gov/public-international-law/general-principles.

[204] The International Outer Space Court could serve as the name of the new court, modeled after the name "International Court of Justice" that handles international disputes on Earth.

SpaceX, for breaching the OST and subjected it to a hefty fine, strict compliance, and regulatory oversight.[205]

Though the five outer space treaties only bind party states, non-parties who follow custom could become bound by *opinion juris*—the view that something is law and therefore, that something is indeed binding.[206] Customs may be understood as "tacit treaties," which in this context, means custom would bind states because those states have accepted the development and survival of the custom.[207] Professor Tanaka provides that customary law "comes into play in a situation where … no specific rule[s]" exist in the governing treaties.[208] One drawback to relying on international custom is getting private parties to follow it, so national legislation would have to serve as the check on private companies. Again, if state-private partnerships were implemented, following international custom would be a built-in solution. Therefore, while new and amended provisions to the OST are being drafted, customary law could offer "needed standards … to coordinate international actors" in the same way a treaty would.[209]

VI. Conclusion

Amending the OST is essential to allow for property and ownership rights, particularly for extracted celestial resources, while phasing out the CHM principle as it conflicts with present-day extraterrestrial exploration goals. Both new and amended OST provisions should incorporate clear language and definitions, providing both scope and limited explanations to preserve legal clarity. An amendment to Article II should be written to describe the scope and limited duration of non-interference safety zones subject to oversight by the Celestial Board of Resource Exploration. Additionally, dispute resolution should be adjudicated before the IOSC. Finally, the most immediate solutions to global participation and enforcement of outer space law are state-private partnerships, the issuance of fines for noncompliant private actors, and following customary law.

The need for revision and amendment is imperative. The law becomes moot when faced with the will of the population. And the population has spoken: Spacefaring actors, both state and private, are eager to establish extraterrestrial property rights in the near future. Failure to address property rights in current international space law will yield global ramifications of astronomical proportions.

---

[205] Moza Alhamed, et. al, *Loopholes and Lacune in International Space Law*, OXJOURNAL (Oct. 21, 2022), https://www.oxjournal.org/loopholes-lacunae-space-law/ (detailing that a United States regulatory agency, the Federal Communications Commission fined Swarm Technologies $1 million dollars for its violation of the OST).

[206] *See* Sellers, *supra* note 199, at 24.

[207] *See* Sellers, *supra* note 199, at 24; Emily Kadens & Ernest A. Young, *How Customary is Customary International Law?*, 54 WM. & MARY L. REV. 885, 890 (2013).

[208] Tanaka, *supra* note 51, at 10.

[209] Sellers, *supra* note 199, at 24.