How Simple Terms Mislead Us

The Pitfalls of Thinking about Outer Space as a Commons

*Henry R. Hertzfeld, Brian Weeden and Christopher D. Johnson**

Abstract

The space treaties include several different phrases defining the exploration and use of outer space. These include: "[...] for the benefit of all peoples (countries)", and "[...] shall be the "province of all mankind." The Moon Agreement extends these ideas in the phrase, "the Moon and its resources are the common heritage of all mankind." Various legal and economic terms are now used as parallels in outer space to these phrases (but do not appear in the treaties themselves). They include: "space is a global commons," "common pool resources," "anticommons," "*res nullius*" and "*res communis*." In reality, none of these terms clearly fits the full legal or economic conditions of outer space, and none of them provide an adequate framework for the future handling of space resources, space exploration, or even for resolving the unavoidable future issues when there will be competing interests or major accidents occurring in outer space. This paper will review the definitions that are often misused for space activities and suggest that more pragmatic ways of insuring that the outer space environment will be effectively managed to avoid misuse, overuse, or abuse be developed. These methods include the recognition of limited property rights and developing new binding dispute resolution techniques.

I. Introduction

The space domain is currently undergoing a period of significant change. Part of this change includes certain activities that were long considered to be in the realm of science fiction are now potentially becoming feasible. And certain space activities that were once solely the domain of governments will soon be performed by the private sector.

* Henry R. Hertzfeld, Research Professor, Space Policy Institute, George Washington University, Washington, DC; hhertzfeld@law.gwu.edu. Brian Weeden, Technical Advisor, Secure World Foundation, Washington, DC; bweeden@swfound.org. Christopher D. Johnson, Project Manager, Secure World Foundation, Washington, DC; cjohnson@swfound.org.

The space community is now grappling with how to adapt the current legal regime to deal with these new activities, and in particular the growing private sector presence in space. Within this debate, legal and economic concepts that involve the notion of outer space as a "commons" are often cited.

The space treaties[1] include several different phrases defining the exploration and use of outer space. These include: "[...] for the benefit of all peoples (countries)", and "[...] shall be the "province of all mankind." The Moon Agreement extends these ideas in the phrase, "the Moon and its resources are the common heritage of all mankind."

Nowhere in the treaties are the following phrases used:

- Res communis
- Res nullius
- Global commons
- Res extra commercium
- Common pool resources
- Anticommons
- Public good(s)
- Free goods

Some of the above are legal terms, and some are economic concepts. They all have meanings and connotations that extend the words in the space treaties to fit many different conditions. Most of these interpretations, this paper will argue, add nothing to the treaty language and actually are used in ways that go beyond the directives of the Vienna Convention on Treaties: "A treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose."[2]

It is also important to note that the noun, commons, never appears in any space treaty. Furthermore, the word, common, is used in the treaties only

1 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty]; The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119; The Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187; The Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15; The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, 18 I.L.M. 1434 [hereinafter Moon Agreement].

2 Vienna Convention on the Law of Treaties, art. 31(1), May 23, 1969, 1155 U.N.T.S. 331, 8 I.L.M. 679.

twice as an adjective, a descriptor, in the following way:

- Common interest[3]
- Common heritage.[4]

And it also appears in various, related U.N. General Assembly Resolutions dealing with outer space issues as:

- Common procedures[5]
- Common understanding[6]

None of the usages provides any direct guidance for the future handling of space resources, space exploration, or even for resolving the unavoidable future issues when there will be competing interests or major accidents occurring in outer space.

The only possible exception to this is the use of common heritage in the Moon Agreement. As outlined in many other articles, this has been a very controversial issue with many different interpretations. One must also note the lack of acceptance of the Moon Agreement among major space-faring nations, as well as the history of Art. XI of the Convention on the Law of the Seas – where amendments were needed to clarify possible commercial use of the deep seabed when technologies were developed to allow this.

Another example of the overuse of the term, global commons, can be found in U.S. military statements about space. For example,

> "To enable economic growth and commerce, America, working in conjunction with allies and partners around the world, will seek to protect freedom of access throughout the global commons".[7]

Or, the following N.A.T.O. workshop release:

> "Termed the "connective tissue" of our vibrant global economy, the four domains of the Global Commons – maritime, air, outer space, and cyber space – constitute a universal public good [...]".[8]

---

3 Preambles to the Outer Space Treaty, Liability Convention, and Registration Convention, *supra* note 1 ("Recognizing the common interest of all mankind in furthering the exploration and use of outer space for peaceful purposes").

4 Moon Agreement, *supra* note 1, at art. II.

5 Resolution 62/101 of 17 December 2007. Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects.

6 Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space, as Endorsed by the Committee on the Peaceful Uses of Outer Space at its fiftieth session and contained in G.A. Res. A/62/20, annex.

7 U.S. Dept. of Defense, Sustaining U.S. Global Leadership: Priorities for 21st Century Defense, Jan. 2012.

8 North Atlantic Treaty Organization, *Assured Access to the Global Commons Final Report*, Apr. 18, 2009, available www.act.nato.int/globalcommons (last visited Sept. 18, 2015).

These types of broad-brushed uses of very specific legal or economic terminology have led to a misunderstanding of the treaties and subsequently to proposals for legal regimes and the management of space that are virtually impossible to achieve.
Therefore, these phrases and use of terms must be put into context and better understood before useful progress can be made in the next era of activities in outer space.
The goal of this paper is to help clarify the origins and definitions of the commons terminology, and its applicability (or inapplicability) to outer space. It begins by analyzing the existing language relating to the "commons" in current international law. The paper then delves deeper into the legal and economic foundations of the commons. It concludes by proposing that more pragmatic approaches for viewing the legal framework for outer space be considered.

II. Legal Terms and Concepts of a Commons Applicable to Outer Space

A number of sources of international law address the legal state of outer space, with outer space meant to include both "void space" such as the zones between planets and orbits around them, and also that of celestial bodies themselves, including the planets and minor bodies of our solar system. As mentioned above, within the legal discourse, the phrases "province of all mankind" and "common heritage of all mankind" are used. While these terms sound similar and may have similar origins and meanings, the use of multiple phrases adds confusion to an already complicated concept.

II.1. Province of All Mankind

Article I of the 1967 Outer Space Treaty[9] states that:

> "The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic and scientific development, and shall be the province of all mankind."

The following sentence of Article I further elaborates this freedom to access space:

> "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."

9 Outer Space Treaty, *supra* note 1, at art. I.

Consequently, it is not the physical domain of outer space itself – the three dimensional expanse, beginning above airspace and extending infinitely outwards – which is the province of all mankind, but *the activity itself*, the "exploration and use" of outer space, which is addressed.

This subtlety seems all too often lost on those whom believe that space (both void space and celestial bodies) somehow belongs to humanity. Rather, the exploration and use of space (both void space and celestial bodies) is free to be explored and used by States Parties to the treaty. Because the OST has been ratified or signed by all space-faring nations and this particular provision in Article I considered to have risen to the level of customary international law, all States across the world (and by inference, all peoples), enjoy this privilege to explore and use outer space. All too often, commentators and pundits remark that outer space itself belongs to everyone. It is in fact just the opposite. Space itself belongs to no one and the right to access, explore, and use space is granted to everyone.

The full title of the treaty should also be noted. It is the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies. Shortening the title to "Outer Space Treaty," or even just the OST aids brevity, but obscures the emphasis on exploring and using outer space. Exploration and use are contained in the very title, so as to highlight the notion that States have the explicit right to both explore space, and to use space.

The Outer Space Treaty entered into force on October 10, 1967. The treaty was signed by all the major space powers, including the United States of America, the U.S.S.R., and by the major European spacefaring States, along with China, India, Japan, and many others. Today, of the 193 sovereign States in the United Nations system, 103 States have fully accepted the rights and obligations of that treaty (as a source of treaty law) and 25 more have singed it.[10] Additionally, commentators have expressed the view that significant portions, including Articles I through IV, have passed into the realm of customary international law, reflecting both State practice and *opinio juris*.[11] Consequently, the treaty is both a source of law as binding treaty rights and obligations, and as a text reflecting principles of customary international law. This then is the weight to which we should attach to any understanding that the use and exploration of outer space is the province of all mankind.

However, within the context of space activities, "province of all mankind" is not defined within the formal documents. It might be defined elsewhere, either within the body of international law, or outside of the law, but because it is not defined within any of the valid and applicable textual sources available to

10 United Nations, United Nations Handbook (2014-15).

11 Francis Lyall & Paul B. Larsen, SPACE LAW – A TREATISE 54, 180 (2009) [hereinafter Lyall & Larsen – Treatise].

provide an interpretation of it as a treaty term in the Outer Space Treaty, these secondary sources are of lessened value in interpreting its meaning. Black's Law Dictionary defines province as "an administrative district into which a country has been divided," and the Merriam-Webster Online dictionary gives a similar standard English definition, as an "Administrative district of division of an country."[12] However, it is an open question as to what rights, or obligations, are established by "province of all mankind". It might be that the phrase is hortatory in nature, akin to referring to astronauts as "envoys of all mankind[13]". However, in light of the phrase being used so prominently, in the first sentence of the first article of the treaty, some special weight must be afforded to it. In light of the freedoms established elsewhere in the Article, and across the rest of the treaty's text, "province" must reflect some forward-looking vision of humankind's use and exploration of outer space, and of that use and exploration held by all States and their peoples.

II.2. Common Heritage of Mankind

However, the province of mankind must be contrasted with a phrase contained elsewhere, and often repeated, of space as the "common heritage of mankind." This phrase is contained in the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (often shortened to "the Moon Agreement") in its Article 11.[14] Article 11.1 reads:

> "The Moon and its natural resources are the common heritage of mankind, which finds its expression in the provisions of this Agreement, in particular paragraph 5 of this article."

As stated previously, the phrase "common heritage of mankind" is often substituted for, used interchangeably with, and otherwise conflated with "province of all mankind". However, there is no legal justification for the use of this phrase as dispositive law. It should be reserved only for academic treatises and historical discussions.

The Moon Agreement is seen, rightly, as a failed exercise in treaty-making. Its negotiation and drafting was complex and was and still is controversial, taking over 5 years between when it was opened for signature in 1979, and 1984 when it entered into force. Even today, only 20 nations have ratified or signed it.[15] Juxtaposed to these 20 States are the remaining 173 States

---

12 A GUIDE TO SPACE LAW TERMS 97 (Henry Hertzfeld ed., 2012).
13 Outer Space Treaty, *supra* note 1, at art. V.
14 Moon Agreement, *supra* note 1, at art 11.
15 Committee on the Peaceful Uses of Outer Space, *Status of International Agreements relating to activities in outer space as at 1 January 2015*, A/AC.105/C.2/2015/CRP.8*, Apr. 8, 2015, *available at* www.unoosa.org/pdf/limited/c2/AC105_C2_2015_CRP08E.pdf.

(89.6%) in the international political system, which have refused to accept the Moon Agreement.

This speaks clearly to its failure, in any fashion, to constitute either a successful treaty or customary international law.[16] As such, any discussion of the phrase "common heritage" in the context of space activities is of minor and academic importance.[17]

Those who propose using the provisions of Article XI of the Moon Agreement to establish a regime of collaborative (among nations or through the United Nations) oversight of the use or exploitation of celestial bodies must keep in mind the limits of the existing treaty system in attempting to treat all of outer space as a legal commons. This is also emphasized in Article XI itself when a principle of *equity* is stated – clearly indicating the difference that recognizes national investments and capabilities that are not *equal* across space-faring nations.

III. The Historical Context for Legal Concepts of the Commons

A full description of the development of the concept of a commons is well beyond limits of this short paper. However, it is important to highlight that the origins of deeming territory as a commons to benefit all peoples of a particular region or nation likely goes back into pre-historical times and traces its use and development to reasons of necessity, mainly for hunting, fishing, and farming.

By Roman times the development of property rights (separated from public law) had become very complex, with classifications including tangible property, intangible property, whether property was *in commercio* or *extra commercio*, and if it was outside of commerce, whether it was *res divine* (in the control of the gods), *res publicae* (things open for public use and regulated by the government and not available for private ownership), *res omnium communes* (things legally not property because they were incapable of dominion and control); and *res nullius*, (things not possessed by an individual but capable of possession).[18] Beyond these categories there are others, including various servitudes, which are similar to what we currently call easements, the right of a person to use another's property. Similarly in English Common

16 See *also* LYALL & LARSEN – TREATISE, *supra* note 11, at 178-179.

17 *Ibid.*, at 196 ("It is unsurprising that no currently space-competent state (*i.e.* one able to get to the Moon by its own efforts) has committed itself to the MA [Moon Agreement], and the history of the developing countries' argumentation makes future commitment to it by space-faring states unlikely. The concept of 'common heritage' hinders rather than encourages development.").

18 Lynda L. Butler, *The Commons Concept: An Historical Concept With Modern Relevance*, 23 WM. & MARY L. REV. 835 (1982), *available at* http://scholarship.law.wm.edu/wmlr/vol23/iss4/8.

Law, the development of common areas was complicated, involved many caveats and different legal terms and conditions.

What is important to note is that all of these legal concepts of a commons need (1) a sovereign power to grant the territory to open use and to then grant whatever limited property rights are necessary for the continued existence of the commons over time, (2) an area of land or a region with well-defined borders, and (3) an economic foundation that requires or facilitates some basic human need (often food) that is more productive or efficiently performed collectively.

Outer space has note of the above. By treaty language, there is no sovereignty in space, the edges of space are not defined (either where space begins above the Earth or the outer limits of space), and the terrestrial economy may benefit from, but does not need outer space for survival.

Another important point is that all commons are fragile over time. They are created in a time and place. As technology and populations change, along with political changes, they fail to be maintained or fall victim to the pressures of developing private market use of the territory. And, when governments collapse, are taken over, or public will changes, so may the governance of any commons.

In international law, early scholars looked for what they perceived as "natural law" (unwritten but discoverable law), and found signs of it in both medieval church law, and from earlier Roman law that survived and influenced various European and British legal traditions.[19] In this fashion, the artifacts from Roman law were incorporated into concepts in international law.[20]

This question on the continuing precedential value, or usefulness, of these ancient Roman property concepts is perhaps more salient today for those

19 J.L. BRIERLY, THE LAW OF NATIONS 13 (3rd ed. 1942) ("Thus Roman law reduced the difficulty of finding the contents of natural law almost to vanishing point; and in fact the founders of international law turned unhesitatingly to Roman law for the rules of their system, wherever the relations between states seemed to them to be analogous to those of private persons. Thus, for example, the rights of a state over territory, especially when governments were almost everywhere monarchical and the territorial notions of feudalism were still powerful, bore an obvious resemblance to the rights of an individual over property, with the result that the international rules relating to territory are still in essential the Roman rules of property… We have to inquire further, however, whether this foundation is valid for us today.").

20 *Ibid.,* at 119 (3rd ed. 1942) ("Territorial sovereignty bears an obvious resemblance to ownership in private law, less marked, however to-day than it was in the days of the patrimonial state, when a kingdom and everything in it was regarded as being to the king very much what a landed estate was to its owner. As a result of this resemblance early international law borrowed the Roman rules for the acquisition of property and adapted them to the acquisition of territory, and these rules are still the formation of the law on the subject.").

from non-western countries, such as Asia or Africa, who may have alternative legal and cultural traditions and values.
Commentators have grappled with this tension and sought ways around them, including fine distinctions between legal title and *usufruct*, the right to use and exploit.[21] Certainly these ancient Roman concepts can have persuasive value, as they have been used to order the development of past societies for many centuries. However comforting ancient concepts may be, perhaps they should not be mechanically dispositive or bindingly precedential in their conceptions, nor of their outcomes.
In distinction to this is the negative prohibition on national appropriation of the *physical domain* of space itself, whether void space or celestial bodies (i.e., Outer Space Treaty Art. II). Those physical places are not subject to national appropriation.

III.1. *Res nullius*

As discussed above, the Latin phrase *res nullius* is a term borrowed from Roman law, and means a thing (*res*) without an owner. It is used in international law to mean a thing outside the jurisdiction of a subject of international law, and hence susceptible in law to being acquired by a subject of international law (such as a State).[22] The term does not appear in either the Outer Space Treaty, or in any other treaty applicable to outer space. However, it is used within the academic discourse related to international law concerning a State's territorial rights, and in the discourse in space law.
Because *res nullius* (or a *terra nullius*, when pertaining to land) is not under the jurisdiction of a State, but is subject to appropriation – and therefore the potential to be appropriated, this term does not apply to the physical domain of space. Article II of the Outer Space Treaty prohibits the conception of space as a *res nullius* or a *terra nullius*. This preventative step was taken to prevent a "colonial" land rush on celestial bodies.[23] Although controversial and subject to interpretation by nations, *res nullius* does not address the use of resources on celestial bodies. Since exploring and using space is specifically encouraged in the treaties, the extraction and use of minerals and other resources on or in celestial bodies implies that they may be taken or owned by a nation in the course of their use of space, even though the actual celestial body is not under the sovereignty of any nation.

III.2. *Res communis*

Analyzing the Outer Space Treaty's phrase "province of all mankind", especially in light of the rights and obligations enshrined in that article and across

---

21 LYALL & LARSEN – TREATISE, *supra* note 11, at 197, and footnote 94.
22 Bin Cheng, STUDIES IN INTERNATIONAL SPACE LAW Glossary – liii (1997) [hereinafter BIN CHENG].
23 *Ibid.,* at 229.

the Treaty, elucidates that the *activity* of exploring and using outer space is a right held by all, and that no State can lawfully deny another State's freedom to access space. The most closely-related legal term for this freedom to conduct activity, as a right is held by all, is that it is a *res communis*.[24]
This phrase does not appear in the Outer Space Treaty, or in any other treaty related to outer space.
The phrase *res communis*, or *res communis omnium*, relates to a thing held by all. However, in general international law, there is no *res communis omnium* – no thing which is under the joint sovereignty of all subjects of international law.
In light of the discussion above on "province of all mankind", *res communis omnium* might be the more applicable Latin term since it more pointedly suggests that the "use and exploration" of outer space, specifically the *activity* of human or robotic presence in space, is the *res communis omnium*

III.3. *Res extra commercium*

Res extra commercium is a concept which is similar but distinct from *res nullius* and *res communis*. While *res nullius* can come under the sovereignty of a singular State, and *res communis* is under the joint sovereignty of all States, *res extra commercium* is not subject to national appropriation by any State. It cannot be held by any one State, nor is it held by all States together. It is held by no one, and it cannot be held by anyone.
Like the high seas, it is territory that cannot be appropriated. Writing immediately after the entry into force of the Outer Space Treaty, Bin Cheng asserted the suitability of this term for both void space, and celestial bodies themselves:

> "Thus, under international customary law, whilst outer space constitutes res extra commercium, that is to say, areas not subject to national appropriation, celestial bodies are res nullius, that is to say, areas which may be subject to national sovereignty. However, as among contracting States [to the Outer Space Treaty], however, the status of the latter has now been changed. Under the treaty, both outer space and celestial bodies are declared res extra commercium, thus forestalling any possible recurrence of colonialism in extraterrestrial space, as some delegates did not fail to point out."[25]

As Article II of the Outer Space Treaty prohibits national appropriation, while Article I declares that the use and exploration is the province of all mankind, it seems to follow that outer space is a *res extra commercium*.

---

24 A subtlety to this exists. A *res* is a thing, and here we are concerned with a right to explore and use. Perhaps the term *quasi* (Latin: as if) might be amended to this conception.

25 BIN CHENG, *supra* note 22, at 229, See LYALL & LARSEN – TREATISE, *supra* note 11, at 184 ("The Moon and other celestial bodies are *res extra commercium*, to use the Roman law term.").

However, rather than being a place where State sovereignty is absolutely prohibited, some components of state sovereignty exist. They are enshrined in Article VIII of the Outer Space Treaty, extending state jurisdiction into space in an extraterritorial fashion. While Article II prohibits territorial jurisdiction, both personal and quasi-territorial jurisdiction persist over both space objects and personnel thereof (with quasi-territorial jurisdiction overriding personal jurisdiction, in cases of conflict).[26]

In a similar fashion, other aspects of state sovereignty persist. Keeping in mind the ample freedoms and expansive rights expressed in Article I, space itself, as a physical domain of void space and celestial bodies, may be *res extra commercium*. Looking to other domains called *res extra commercium* gives many examples. The high seas are *res extra commercium*. Notably, fish in the sea do not belong to fisherman, but once caught, they can be sold.

However, as Judge Manfred Lachs asserted in 1972:

> "It has been suggested that outer space and celestial bodies be considered res extra commercium, res communis, or res communis omnium. It is true that some of these definitions have been accepted in other areas of international law. However, their application to outer space and celestial bodies is conditioned by a reply to a basic question: 'Is outer space with the celestial bodies a 'thing' – res within the meaning of the law?' It is this that raises serious doubts. The term itself has many meanings. Municipal law qualifies res in the context of its institutions – in particular of real rights established. Though the notion has also been adopted by international law, one can hardly argue that outer space and celestial bodies, through physically the latter may be reminiscent of some parts of the globe, can be encompassed by this term. None of them being a res, they cannot in fact become res extra commercium or communis."[27]

Consequently, it appears that again, *res extra commercium* does not perfectly fit either void space or celestial bodies.

IV. Economic Terms Extended to the Idea of Outer Space as a Commons

Just as with legal terms, there are economic terms used in association with a concept of a commons that are also used incorrectly. This adds to misconceptions and may also lead to questionable public policy. This section provides a brief overview of some of these terms and why they are ill suited for direct application to space resources and activities.

IV.1. Public Goods

Economics is the study of the distribution and allocation of goods and services that satisfy human wants and that provide utility.

---

26 *Ibid.,* at 77-79.

27 Manfred Lachs, THE LAW OF OUTER SPACE – AN EXPERIENCE IN CONTEMPORARY LAW-MAKING 46 (Tanja Masson-Zwaan & Stephan Hobe eds., 2010) (1972).

Economists classify goods into categories that are measured by (1) rivalry (the degree to which one person's use of a good prevents others from using the same good) and (2) exclusivity (the difficulty of preventing users from benefiting from a good).

These categories of goods have implications for both pricing and for effective management. The differing degrees of rivalry and exclusivity lead to different incentives, which in turn have an impact on regulatory and government policy. For example, private goods are left to compete in a free market system while those goods and services that would not be forthcoming in a price system but are deemed to benefit all, are often managed by governmental intervention.

Outer space is sometimes referred to as a *public good*, i.e. that the use of space (consumption) is not rival and users cannot be easily excluded from engaging in space activities. Non-excludability arises from the Outer Space Treaty, which states that outer space is free for exploration and access by all countries.

Since countries are free to explore and access space, not individual consumers (the basis of the theory of free markets and economic competition) and nations are very easily able to exclude citizens and even other nations from space activities through technology and pricing,[28] neither condition of a true public good exists when applied to outer space.

There already exist a number of policy and legal mechanisms in the world that exclude certain users or uses.

There is no single governmental entity that can exert control over all users of space. While some may wish to see the United Nations become that entity, the reality is that the current international system of governance precludes it. The core unit of sovereign behavior is the nation state, and states only subject themselves to UN authority when it suits their interests.

The tragedy of the commons, a phrase coined by Garrett Hardin, is the result of the overuse of an area that is open to all to use.[29] The most common example is defined acreage available to all citizens to use for grazing cows. When too many take advantage of the area, clearly crowding occurs and none of the users can fully benefit from that land. Managing and governing a commons is difficult but has proven possible under some conditions, most notably when a sovereign government oversees the use and develops a system for resolving disputes peacefully.

A less recognized challenge with economic and legal management of a defined area is the concept of an *anticommons*. The seminal article on the

---

28 Note that these exclusions are practical and technological, not legal; the treaties call for nondiscrimination in the freedom of access to outer space for all nations a principle that still applies, even in the context of economic differences among nations.

29 Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 3859 (1968), *available at* www.sciencemag.org/content/162/3859/1243.

anticommons was written in 1998 by Michael Heller and discusses the "tragedy of the anticommons" where multiple owners are each endowed with the right to exclude others from a scarce resource, and no one has an effective privilege of use. When there are too many owners holding rights of exclusion, the resource is prone to underuse – a tragedy of the anticommons. Legal and economic scholars have mostly overlooked this tragedy, but it can appear whenever governments create new property rights.[30]

IV.2. Common Pool Resources

Some recent analyses have attempted to view particular space activities and usage as a form of common pool resources (CPR) instead of a distinct public good.[31] A CPR is a resource that is sufficiently large that it is difficult, but not impossible, to define recognized users and also difficult to exclude others. CPRs also exhibit a high level of competition among users. Some classic examples of CPRs are fisheries, forests, underwater basins, and irrigation systems.[32]

CPRs have long thought to be the "ideal" case of a tragedy of the commons, but recent research such as that of Nobel Prize winner Elinor Ostrom has demonstrated that is not always the case. She showed that the tragedy of the commons could be avoided. Ostrom argued that many CPRs have been successfully governed without resorting either to a centralized government or a system of private property, and cites cases where resource users have effectively self-organized and sustainably managed a CPR in spite of centralized authorities and without instituting any form of private property.[33]

Ostrom developed an eight-principle framework that outlines the conditions necessary to sustainably manage commons resources without a centralized government or private property regime. They are:

1. Clearly defined boundaries of the CPR;
2. Congruence between rules and the resource context;
3. Collective-choice arrangements that allow most resource appropriators to participate in the decision making process;
4. Effective and accountable monitoring;
5. Graduated sanctions for resource appropriators who violate community rules;
6. Low-cost and easy-to-access conflict resolution mechanisms;

---

30 Michael A. Heller, The Tragedy of the Anticommons: Property in the Transition from Marx to Markets, 111 HARV. L. REV. 621-688 (1998).

31 Brian Weeden & Tiffany Chow, Taking a common-pool resources approach to space sustainability: A framework and potential policies, 28 SPACE POLICY 3, 166-172 (2012).

32 Encyclopedia Britannica, Common-pool resource, www.britannica.com/science/common-pool-resource.

33 Elinor Ostrom, GOVERNING THE COMMONS. 1998.

7. Self-determination of the community, recognized by higher-level authorities;
8. In the case of larger common-pool resources, organization in the form of multiple layers of nested enterprises.[34]

The particular usefulness of Ostrom's approach is that it is developed for situations where neither of the two traditional solutions to the tragedy of the commons, complete privatization or a Leviathan to impose rule of law, are feasible, as is the case for Earth orbit.
However, even Ostrom's principles do not address all the challenges of the future of a space regime. They provide only broad outlines of potential frameworks and each solution needs to be individually crafted for a specific CPR and its users. That itself requires prior identification of a specific CPR, of which there are many in the context of space, just like there are many on Earth.
Moreover, we cannot characterize all of outer space and its various activities and usages as a single type of economic good which then requires a single type management structure.
Outer space and the applications with clear market demand that are derived from using outer space (*e.g.* telecommunications, direct broadcast TV, etc.) are clearly not public goods.
Space is also not a *free good*. Again, the treaties call for the freedom of access for all nations to explore outer space. But that free access has a high cost in terms of launch and operational technology and risks. In fact, in economics, there are virtually no *free goods*. Many years ago air and water were considered to be free, but today it is clear that clean, breathable air and unpolluted, abundant water do not come without a cost.

V. Summary

History has shown that the idea of a commons, let alone a global commons, is fragile: none have survived throughout time: some for reasons of political and economic upheavals and some through major technological advances.[35]
Perhaps the only component of a commons with any traction has been the concept of freedom of passage on seas. But even that has been limited by the term, "innocent passage."
The notable Dutch scholar, Grotius, eloquently advanced the concept of the freedom of the seas.[36] But even in the 1600s there were many discussions and

34 B. Weeden and T. Chow (2012) Taking a common-pool resources approach to space sustainability: A framework and potential policies, *Space Policy*, 28(3), pp. 166-172.
35 Even Hardin's tragedy of the commons is recognition of this instability and temporary nature of a commons. His examples of various commons are local or regional, not global. Clearly, if a commons cannot be stable for a small area, how can it be for a very large area?

dissents from the idea that the sea is a commons; not so much when applied to the rights of freedom of passage, but when applied to territorial fishing rights. These arguments have been expounded in legal literature before Grotius and still prevail today. There really is no authoritative agreement on how to allocate resources on the open seas, even with the modern technologies that have depleted the supply of some species.

In the world of the law of outer space, fortunately we have in the Outer Space Treaty Art. I, which guarantees the "freedom for any nation to access, explore, and indeed use outer space."[37]

Furthermore, there is a logical contradiction in this discussion about outer space being treated as a commons. If a commons needs a sovereign government to grant the open territory to the use of all people, it is that government that has to oversee, regulate, and enforce that charter. Art. II of the OST prohibits national sovereignty in outer space. Thus, it is an area without a government. Even if all nations regard outer space as a "commons," it is a very different concept from any commons that has been established in the past. There is no real legal precedent, no true means of oversight or enforcement, and therefore should not be confused with any of the many ways that concept has been applied to the territory or oceans of the Earth.

Thinking about space as a global commons may be a laudatory ideal, and one that perhaps can be regarded as a very long-term goal for society. But, it is hardly a practical solution or goal for the problems we face today, witnessed by at least a thousand years of precedent in law and practice coupled with radically different technologies, exponential world population growth from 500 million people (at most) in Roman times and the Middle Ages to over 7 billion people today,[38] and other radical political and social changes.

But all of the ways we try to phrase "benefits to all mankind," "province of all mankind," etc. have their limits. Treaty guarantees such as no sovereignty are not the same as limiting ownership, property rights, and establishing the concept of national liability for activities and human behavior in space.

Attempts to develop some sort of overall "governance" of space based on a *res communis* principle will not succeed in today's political environment. (Or, quite likely in any form where nations have the ability to interpret treaty language differently and where different forms of government exist.)

---

36 HUGO GROTIUS, MARE LIBERUM (Richard Hakluyt trans., Liberty Fund, 2004) (1609).

37 Outer Space Treaty, *supra* note 1, at art. I.

38 United States Census, *World Population-Historical Estimates of World Population*, https://www.census.gov/population/international/data/worldpop/table_history.php (accessed 9/6/2015).

VI. Recommendations

This discussion is not an argument that leads to anarchy in space. The authors fully accept and advocate taking whatever steps possible to bring uniform, fair, equitable, and responsible behavior norms to the realm of outer space. And, we fully support the current efforts to put in place guidelines for transparency, best practices, and peaceable workable methods for resolving the inevitable common problems and issues that will occur both among governments and among commercial endeavors.

Outer space is neither a commons nor a public good. It is a geographic location with many different regions. Exploring and using each region of interest to humankind will require different legal and practical approaches.

Those may include:

- Extending the already present concept of limited property rights in space beyond GEO orbit positions and space objects as they transition from science to economic goods.
- Studying the applicability of Ostrom's framework to high value, commonly used areas of space with delimited borders as CPRs.
- Using established contract law as well as national licensing procedures to develop a binding and enforceable regime of dispute resolution procedures.