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TOWARDS A PROVISIONAL SYSTEM FOR PRIVATE PROPERTY RIGHTS ON THE MOON
THAT BOTH ENCOURAGES COMMERCE AND PROTECTS THE ENVIRONMENT

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ABSTRACT

With both advances in technology and increasing demand for limited raw materials on earth, the issue of private property rights and protecting the ecosystem of the moon has again assumed prominence. While it is widely believed that many parts of the Moon Agreement are unworkable, until recently there has been no impetus for a new system, simply because it seemed unnecessary. This paper will argue that a new system is necessary, and that the way to ease into it to set up a provisional system, under the aegis of the Outer Space Treaty, that will allow the first few enterprises to work on the moon real legal certainty for their activities. This provisional system will allow the pioneers legal certainty for their activities while preserving the rights of the citizens of the world as the system develops, so that even as the resources of the moon are used to help mankind, the environment of the moon is protected. This way, the space law community can see what problems will arise in this experimental atmosphere, enabling them to perfect, when the activities on the moon become so widespread that a permanent system is needed, a legal framework that both encourages commercial activity and protects space from pointless environmental damage.

FULL TEXT1. INTRODUCTION

The issue of private property rights in space in general and on the moon in particular has assumed new prominence with both advances in space technology and an increasing demand for raw materials on earth. The economic rise of China and India in the last decade has both increased the need for raw materials and added new and

increasingly active powers to space. Simultaneous with the rise of China and India is an increased worry about the environment, on both earth and in space.¹ While a number of commentators have pointed out the need for new international agreements on orbital debris, the issue of environmental damage on orbital bodies, such as the moon, has gone largely untreated. The obvious reason for this is that there are no organizations currently operating on the moon, so it seems a

pointless intellectual exercise. However, it is clear that despite the legal confusion over the Moon Treaty², private companies and national governments are seriously looking into the possibility of unmanned robotic vehicles exploring and exploiting the moon.³ The Moon Treaty has been heavily criticized over the years by many learned commentators, including Professor Bin Cheng, who described it as “hastily and hence poorly put together.”⁴ It is not in the scope of this paper to rehash the various arguments over the Moon Treaty. This paper will base its arguments and conclusions on the current legal regime for the main space faring nations, the 1967 Outer Space Treaty.⁵

As any system for protecting the environment of celestial bodies is inextricably intertwined with the system for exploiting the natural resources of that body, the paper will also briefly discuss a likely system, and how that system can be used to protect the environment. It has been repeatedly noted that there are no provisions in either the Outer Space Treaty or any other *corpus iuris spatialis*⁶ agreement that preclude the use of outer space resources.⁷ At first, a provisional system for protecting the environment while allowing the use of natural resources will be established, most likely on the Individual Transferable Quota basis used in international fisheries. This will simultaneously allow exploration and limited exploitation, limit possible environmental damage because of its limited nature, and allow the world community to see the process in action, so that any necessary changes can be made later. It

does not matter so much whether this provisional system is set up under the auspices of the United Nations, some other international organization, or a group of the space faring nations. The important issue is that this system will allow a great deal of freedom for the pioneers while their activities are overseen by the provisional authorities, ensuring that the ecosystem of the Moon is not greatly damaged. As the Czech scholar Vladimir Kopal has noted, “unlike other areas of the global commons, the institutional arrangements to govern the exploitation of space mineral resources might be rather modest and flexible in the beginning, to be further developed in accordance with the attainability of these resources, the real growth of the activities concerned and the role of states and other entities involved.”⁸ It will also allow the provisional authorities to investigate what type of environmental protection for the moon is necessary. The Moon is very different from the earth, and as there is neither current settlement nor plans for future settlement, its environmental needs are very different from that of the earth. Indeed, it may be better in the long run, if it is cost-efficient, to increase the exploitation of the resources of the moon and decrease similar activities on earth. In the end, the provisional system will allow the space law community to see what problems will arise in the experimental atmosphere, enabling them to perfect, when activities on the moon become so widespread that a permanent system is needed, a legal framework that both encourages commercial activities and protects the rights of all the citizens of the earth to the moon, especially that of keeping

space free from preventable and pointless environmental damage.

2. THE OUTER SPACE TREATY AND THE MOON AGREEMENT

Of the *corpus iuris spatialis*, the two treaties that most concern our inquiry are the 1967 Outer Space Treaty and the 1979 Moon Agreement. Though the Moon Agreement is the more recent and relevant, it has been very poorly ratified. Only 13 nations have both signed and ratified it, none of which are major space faring nations.⁹ The Outer Space Treaty, on the other hand, is the cornerstone of the international space law regime and has been signed and ratified by 98 countries. While the Moon Agreement is certainly not customary international law, it is likely that the provisions of the Outer Space Treaty are. However, the overlap between the two, and the suspense of whether the Moon Agreement is likely to come into force over the major space faring nations, has caused a great deal of legal uncertainty which has hurt economic development in space. Carl Christol has noted that there are two regimes for private property rights on the moon: one for those countries that have signed and ratified the Moon Agreement, and one for every other country, based on the Outer Space Treaty.¹⁰ As the noted Dutch space law scholar Frans von der Dunk has pointed out, “as to the legal regime applicable to the moon, for private enterprise a fragmented picture arises, with many gaps and many overlaps.”¹¹

At this point it will be useful to give a brief description of the different types of property in international law. Bin Cheng notes four different types: national territory; *res nullius*, or territories that can be acquired as national territories; *res extra commercium*, territories that cannot be acquired as national territory but whose resources can be exploited (for example, the oceans and space) and the common heritage of mankind (CHM), a Moon Agreement principle.¹² Briefly stated, the Common Heritage of Mankind are areas which are not only in themselves not subject to national appropriation in a territorial sense, but the fruits of which are also deemed to be the property of mankind at large- an important distinction from *res extra commercium*.¹³ Under the Outer Space Treaty, the moon is most likely *res extra commercium*. While the principle of CHM is very controversial, it need not concern us here, as it is a Moon Agreement principle and not strictly relevant to our discussion. What is important is the status of the moon and other celestial bodies as *res extra commercium*.¹⁴ This status allows private companies to engage in economic activities on the moon and remove minerals from the moon and “own” those removed minerals, though they cannot, under the non-appropriation clause of Article VI of the Outer Space Treaty, “own” the land from which the minerals are taken. As Carl Christol has pointed out, “absent the adoption of the Moon Agreement by the space-resource States they can conduct their moon activities pursuant to the *res communis* and Province of Mankind principles of the Outer Space Treaty.”¹⁵

The Outer Space Treaty is quiet on environmental issues, stating that “outer space, including the moon and celestial bodies, shall be free for exploration and use by all States.”¹⁶ The Moon Agreement mentions the need to protect the environment of the Moon, but that is bound up with the non-applicable Common Heritage of Mankind issues.¹⁷ Effectively, the Outer Space Treaty is silent on the issue of protecting the environment of the moon; it is only recent events here on earth which has pressed this issue to the forefront.

3. DISCUSSION OF DIFFERENT POSSIBLE SYSTEMS

As stated previously, the establishment of an organization to assess and recognize property rights is a precondition for dealing with the environmental issues, for without activities on the moon there can be no environmental consequences. According to scientists, there are enormous mineral resources on the moon. For instance, on the lunar surface, there are significant deposits of oxygen, silicon, aluminum, iron, calcium, and magnesium.¹⁸ Large quantities of helium-3, used for nuclear fusion purposes, is located on the moon. As long ago as the early 1980s scientists developed a mass driver magnetic catapult that could hurl mined minerals into orbit from the moon or an asteroid.¹⁹ There certainly exists a market for resources. How can this market be set up so that both commercial rights and the environmental ecosystem of the moon are protected?

There are a number of different possibilities, which come from the ocean world, both fishing and deep-sea mining. As the oceans are the areas of the Earth that come closest to the status of the moon- not available for national or private appropriation, but available for private profit under certain limitations- it is fitting that space should draw its examples from here. The first relevant example we will discuss as a template for a similar system on the moon is the United States 1980 Deep Seabed Hard Mineral Resources Act, passed during the discussions over the Law of the Sea and, perhaps not coincidentally, the year after the publication of the Moon Agreement.²⁰

The Deep Seabed Hard Mineral Resources Act gave the U.S. jurisdiction over U.S. citizens and vessels, and foreign persons also subject to jurisdiction, that were engaged in the mining of resources in international waters. This common legal practice is similar to Article VI of the Outer Space Treaty, which states that “The activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty.”²¹ The Deep Seabed Act then goes on to renounce any U.S. claims to “any areas or resources in the deep seabed,”²² just as the Outer Space Treaty forbids national appropriation of outer space.²³

The key for our purposes is the enforcement mechanisms for the Deep Seabed Act. The National Oceanic and Atmospheric Administration (NOAA), an

agency of the U.S. federal government, was ordered to “establish procedures for the orderly exploration and commercial recovery of manganese nodules from the deep seafloor.”²⁴ While for a variety of reasons this has not yet come to fruition, a bureaucratic mechanism has already been established in the world’s leading space faring nation for dealing with claims from *res extra commercium* territories.

A problem inherent in *res extra commercium* territories where there are no specific property rights over individual parcels is the issue known as “tragedy of the commons.” To use a noted example, in ocean fishing stocks, the incentive for every fisherman is not to conserve the stocks, but rather to catch as many fish as possible, because any uncaught fish is likely to be caught by competing fisherman tomorrow.²⁵ While this is not as big an issue when dealing with resources in place on the moon that are not going to simply swim to another parcel in the future, it is an issue because the lack of ownership rights over individual parcels would cause businesses to pay less attention to either conservation of resources or the environment, simply because it is not in their interest to do so. Governments have attempted to regulate fishing activities on the high seas. It has not been as successful as hoped, but the mechanics of the system are still worth careful scrutiny.

The largest and most successful system, Individual Transferable Quotas, has been adopted by Iceland and New Zealand and is being experimented in certain areas by the United States.²⁶ An ITQ is an

individual quota that entitles the holder to catch a specific percentage of the total allowable catch, specified by a government agency.²⁷ This eliminates the tragedy of the commons and ends the incentives to overfish. In addition, the quotas are transferable, so that companies can trade them among themselves depending on their needs and plans. The advantages of this for both commerce and environmental purposes on the moon are enormous. It is a simple method to ensure that a small and easily verifiable amount of mineral exploitation is done, and allows plenty of time for the kinks to be worked out of the system, especially since this system would reward those companies that have the most innovative and original engineering concepts for working on the moon.

The main problem, of course, is to decide who gets to set the different quotas. One possibility, and certainly the easiest to arrange and administer, would be that individual states could set them, perhaps in co-operation with the other major space faring nations (the ones most likely to be involved in mining on the moon.) A related possibility is an inter-governmental agreement between the major space faring nations that would set the national quotas, with the national government dividing the quotas as they saw fit. The individual companies could register their quotas, perhaps in a system based on that of the Cape Town Convention for registering interests in mobile equipment, in which the interest is recorded electronically in a Shannon, Ireland based database.²⁸ Under Article VI of the Outer Space Treaty,

countries will still be responsible for bearing “international responsibility for national activities in outer space” so the likelihood of any major problems is reduced.²⁹ Also, states can undertake to register internationally any company involved in economic activity on the moon, perhaps even using the already existing United Nations framework of the Registration Convention. This is, perhaps, the best, most likely, and most likely to succeed set-up.

A more bureaucratic and international approach, which implies that it would take years to establish and would be difficult to change, is one based on Article 161 of the United Nations Convention On the Law of the Sea, which deals with the composition of the International Seabed Authority.³⁰ The International Seabed Authority has 36 members, chosen from among the major consumers of minerals, largest investors in deep seabed mining, major land-based producers of minerals, developing countries, and an overall equitable geographic distribution of states.³¹ This sounds reasonable in theory, though it is more of a template for the permanent organization that will be set up after there has been activity on the moon, rather than a provisional organization that can deal quickly and decisively with problems as they occur for the first time, as will be necessary at the beginning of the exploitation of the moon.³²

Another possible solution that comes from the fishing world is the concept of Territorial Use Rights in Fisheries (TURF). This system gives exclusive rights over a

certain area of the sea to specific companies.³³ This has been used in the coastal areas of the United States, and applies to fish that do not move, such as oysters. While this system would perhaps be more effective on the moon than the ITQ, the main stumbling block is that it implies sovereignty over the sections of the ocean being divided. While this is possible in coastal areas of a nation, it contradicts the provision in the Outer Space Treaty over non-appropriation of the celestial bodies. The TURF system would be useful in a space world where an International Seabed Authority-like regime was in place, but not in the provisional system that should precede it.

A similar fishing example that comes from Japan, and that has much the same problems as TURF’s, is the Fishing Cooperative Association (FCA). Under Japanese law, FCAs own the fishing rights to specific territories within Japanese territorial waters.³⁴ While this government-sanctioned community system has its advantages, it again faces the problem that the system implies sovereignty over the areas being discussed. An international authority could probably dispense use rights to different areas of the moon, and make this system practicable; but again, this may include too much red tape for the system at the beginning.

4. CONCLUSION

Many challenges lie ahead before there is widespread economic activity on the moon, and thus the need to safeguard the moon’s environment. One of the main

arguments of this paper is that in order to fully protect the moon's ecosystem, it is necessary to provide a provisional framework that simultaneously allows private enterprise to flourish, and protects the environment, rather than just letting exploitation take place first and then attempt to find a way to clean up the mess. It is also important, however, while providing this framework, to also give private enterprise a certain leeway so that they can discover the correct balance between the two. As Anderson and Leal point out, "By linking wealth to good stewardship through private ownership, the market process generates many entrepreneurial experiments; and those that are successful will be copied, while those that are failures will not. The question is not whether the right solution will always be achieved, but whether good decisions are rewarded and bad ones penalized."³⁵

The best way to achieve both innovation and economic growth for the world, while protecting the environment, is through the concept of the Individual Transferable Quotas. This allows for limited exploration and exploitation to occur, so that companies can profit, and the space law and scientific community can observe the environmental effects of the activities. The quota, however, would be set high enough in the beginning so that is unlikely that any company would be forced to limit its activities in order to comply with the quota. As a practical matter, a company would first have to explore the moon to find the exact locations of the minerals they are searching for, a time-consuming and expensive process. The moon is large enough so that it

is highly unlikely that any permanent environmental damage can be caused by these provisional forays into the void. Once a company becomes active, they can request an increase in their quota if necessary. The purpose of the quotas, at the beginning at least, is not to limit production, but rather to provide a safeguard in case things begin to go badly, so that the scientific community can investigate the consequences.

The most difficult and important issue with regard to the quotas is who will determine them. While an International Seabed Authority-like regime may be necessary once economic activity on the moon become prominent, an easier and simpler solution is required for the provisional system. This can take one of two forms: either the major space faring nations can issue quotas on their own (perhaps with unofficial consultations among themselves) or an official note on the issue, perhaps in the same spirit as the Intergovernmental Agreement of the International Space Station.³⁶ This will allow both oversight and a great deal of freedom for the pioneers of moon capitalism, allowing them to both profit themselves and the people of Earth through their activities and avoid a celestial tragedy of the commons.

¹ See Mirmina, Steven A. "The Ballistic Missile Defense System and its Effects on the Outer Space Environment." *Journal of Space Law*, Number 2, 2005, ppg. 287-313.

² Agreement Governing the Activities of States on the Moon and other Celestial Bodies (hereafter Moon Agreement) New York, done 18 December 1979, entered into force 11 July 1984.

³³ Frans G. von der Dunk et al. "Surreal estate: addressing the issue of 'Immovable Property Rights on the Moon.'"

~Space Policy~ (2004), 149-156, 154.

⁴ Cheng, Ben. ~Studies in International Space Law,~ Oxford, Clarendon Press, 1997, page 358.

⁵ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (hereafter Outer Space Treaty) London/Moscow/Washington, done 27 January 1967, entered into force 10 October 1967.

⁶ The *Corpus iuris spatialis* is the body of space law.

⁷ Townsend, Joann Clayton. "Property Rights and Future Space Commercialization." Proceedings of the 42th Colloquium on the Law of Outer Space, 1999, 159-173, 160.

⁸ Kopal, Vladimir. "What kind of institutional arrangements for managing space mineral resource activities should be done in a foreseeable future?" Proceedings of the 41th Colloquium on the Law of Outer Space, 1998, 12-22, 12.

⁹ Australia, Austria, Belgium, Chile, Kazakhstan, Mexico, Morocco, Netherlands, Pakistan, Peru, Philippines, and Uruguay. France, Guatemala, India, and Romania have signed but not ratified it.

¹⁰ Townsend, Joann Clayton. "Property Rights and Future Space Commercialization." Proceedings of the 42th Colloquium on the Law of Outer Space, 1999, 159-173, 162.

¹¹ Von der Dunk, Frans G. "The Dark Side of the Moon: the Status of the Moon: Public concepts and Private Enterprise." Proceedings of the 40th Colloquium on the Law of Outer Space, 1997, 119-124, 119.

¹² Cheng, ~Studies~, p. 357.

¹³ Ibid.

¹⁴ At a number of previous Colloquiums there has been a great deal of discussion over the different meanings of "national appropriation" and whether that allows or precludes private appropriation. This paper will assume that private appropriation of land on the moon is not allowed; however, even under a system where private ownership is forbidden it is not difficult to construct a system that allows private companies to operate and profit.

¹⁵ Christol, Carl Q. "The Natural Resources of the Moon: the Management Issue." Proceedings of the 42th Colloquium on the Law of Outer Space, 1999, 3-11, 5. As Christol points out, even if companies wanted to rely on the Moon Agreement, they would be legally forced to rely on the Outer Space Treaty, since the organization suggested in the Moon Agreement to regulate these issues does not exist.

¹⁶ Outer Space Treaty, Article 1.

¹⁷ Resolution 1/2002 of the 70th Conference of the International Law Association has suggested that "the common heritage of mankind concept has developed today as also allowing the commercial uses of outer space for the benefit of mankind."

¹⁸ Lee, Ricky J. "Creating an international regime for property rights under the Moon Agreement." Proceedings of the 42th Colloquium on the Law of Outer Space, 1999, 409-418, 409.

¹⁹ Ibid.

²⁰ Pub. L. 96-283; 94 Stat. 553; 30 U.S.C. 1401 et seq.

²¹ Outer Space Treaty, Article VI.

²² Pub. L. 96-283; 94 Stat. 553; 30 U.S.C. 1401 et seq., Section 3. (a).

²³ Outer Space Treaty, Article II.

²⁴ United States Congress Office of Technology Assessment. ~Polar Prospects, a minerals treaty for Antarctica: summary~, Washington D.C., 1989, p. 27.

²⁵ Anderson, Terry L., and Donald R. Leal, ~Free Market Environmentalism~, Palgrave, New York, 2001, p. 109.

²⁶ Ibid, ppg. 112-114.

²⁷ Ibid.

²⁸

<http://www.lkshields.com/htmdocs/publications/pub236.htm>, last accessed 7 September 2007.

²⁹ Article 6, Outer Space Treaty

³⁰ United Nations Convention on the Law of the Sea, December 10, 1982, Article 161.

³¹ Ibid.

³² Carl Christol suggests that "no practical experience with the seabed authority can act as reference or comparison since there has been only a limited mining of these resources." While this is true, the preliminaries and suggested organization are worth a discussion. See Joann Clayton Townsend, "Property Rights and Future Space Commercialization." Proceedings of the 42th Colloquium on the Law of Outer Space, 1999, 159-173, 164.

³³ Anderson and Leal, ~Free Market~, p. 116.

³⁴ Ibid.

³⁵ Ibid, p. 6

³⁶ See <http://lois.justice.gc.ca/en/C-31.3/>, last accessed on 7 September 2007.