



ORIGINAL RESEARCH PAPER

Law

Space Mining and Non-Appropriation Principle

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ABSTRACT

Asteroid mining could shift from science fictions to world changing reality sooner than we think. The goal is to begin transforming asteroid water into rocket fuel within a decade and eventual harvest of valuable and useful platinum-group metals from space rocks. This seems to be the next giant leap in the exploration of outer space. The legislations by both the United State and Luxembourg by allowing private investors to claim rights over minerals extracted from asteroids has shown that some countries are serious about space mining. This seems to go against the non-appropriation principle of the outer space treaty that forbids ownership of minerals in space. This paper will crucially analyse the present and future perspective of space mining, the new domestic laws on private companies mining in outer space by United State and Luxembourg and the legal challenges to space mining. This paper is not an attempt to discuss every facet of space mining but it will rather look at the non- appropriation principle and its relationship with space mining, the divergent views and interpretations of article I and II of the outer space treaty and will propose a framework that is good for space mining.

INTRODUCTION

Space has so many opportunities regarding the exploitation of extraterrestrial resources which can be explored. One of these numerous opportunities is mining in outer space which if it is done very well and in a sustainable manner can benefit mankind in so many diverse ways. In recent years, there has been an increasing interest in the identification and extraction of in-space resources, especially the ones contained in Near-Earth Objects (NEOS). Asteroid mining refers to the extraction of raw materials from celestial bodies, including minor planets and near-earth objects. NEOS have the potential of carrying new sources of rare materials that can be harvested and returned to earth or used for in-sit utilization such as construction material or rocket propellant¹.

Extracted and processed materials from Near-Earth asteroids could be useful for construction life support, agriculture, metallurgy, semiconductors, and propulsion, precious and strategic metals. These near earth asteroids are a particularly accessible subset of the asteroids that provide potentially attractive targets for resources to support space industrialization².

It is noteworthy to state that so many people like scientists, engineers, companies(Deep space industry and Planetary Resources) believes that asteroid mining is feasible and infant some are in the start up stages of long term plans to mine asteroids for valuable resources during space missions. Private-sector commercial space activity is growing at a brisk pace, while governmental activity is declining. Commercial development of outer space is outpacing governmental activities in space³.

However, this space venture or mission of mining space resources raises so many uncertainties as to the legality of mining in outer space by private companies or individuals. Article II of the Outer Space treaty states that "*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*"⁴.

Deep Space industries have announced plans to mine asteroids for water and rare earth metals. Furthermore, a controversial Space Act 2015 was introduced by the United States which promotes mining activities in outer space and also gives companies the right to own natural resources in space⁵. The Luxembourg government has also adopted a draft law in their national legislation ensuring that private operators working in space can be confident about their rights to the resources they extract in outer space⁶. The inclusion of laws in their national legislation on mining and private ownership of space extracted resources leaves other space faring countries, scholars and space lawyers to ponder on the feasibility,

sustainability and legality of these recent developments in relationship with the principle of non-appropriation of the Outer Space Treaty (OST). The property in outer space is owned by the community and every member can use the property without exclusive ownership rights⁷.

This paper will crucially analyse the present and future perspective of space mining, the new domestic laws on private companies mining in outer space by United State and Luxembourg and the legal challenges to space mining. This paper is not an attempt to discuss every facet of space mining but it will rather look at the non- appropriation principle and its relationship with space mining, the divergent views and interpretations of article I and II and will propose a framework that is good for space mining.

PRESENT AND FUTURE PERSPECTIVE OF SPACE MINING

The plan of harvesting resources from extraterrestrial sources is not a new one. Commercial prospecting missions are projected to begin as early as 2020 . Current technology and cultural interests are finally making asteroid mining a reality. This is fuelled by eager investors who anticipate mid 2020⁸'s to locate suitable asteroids for mining operations. However, in respect to the present international public space law treaty, all mining whether in planetary or space-lunar is treated alike. It is clear that countries cannot appropriate space under any claim of national sovereignty, space is reserved for the benefit and is the province of all mankind, every nation including developing countries shall have equal access to outer space and nevertheless nations are free to explore and "use" outer space. These provisions were clearly enunciated by the United States in the debate of the United Nation Committee of Peaceful Uses of Outer Space (UNCOPOUS) by clearly interpreting these to permit any nation or corporation to mine and otherwise use the resources of outer space⁹.

Governments are creating national legal frameworks that establish private property rights for materials mined from asteroids. The longstanding international law prohibits private enterprise or company from claiming ownership of what it finds in space but the United States "space resource exploration and utilization act of 2015" authorises the qualified private entities of the united states to possess, own, transport, use and sell the asteroid resources or space resources. Luxembourg is taking important steps to change the longstanding international law in order to encourage space entrepreneurship. The draft law adopted in 2016 by Luxembourg was designed to establish rules for the emerging arena of space-based property rights. The law stipulates that private enterprises would have rights to the profit from materials they mine on asteroids, while leaving the claims to sovereignty of individual asteroids out of the discussion entirely¹⁰. Luxembourg with the

draft law adopted in 2016 joins the United State as the second country in adopting rules dictating ownership rights over space resources. The United Nation general assembly has encouraged states to "consider enacting and implementing national laws authorizing and providing for entities under their jurisdiction" . This simply means that there is nothing wrong in the act and drafted law on Space Mining that United States and Luxembourg has added to their national legislation. However, it is worthy of note to know that "states must carry on space activities in accordance with principles of international law"¹² .

These two countries stance on private enterprises and ownership rights over space resources have left so many questions unanswered. These questions include how developing countries would benefit from space mining, does the outer space treaty supersedes the legislation of United State and Luxembourg? Can countries object to these so called "controversial legislations" ? Would resources or profit benefited from mining of outer space be shared among countries?

These questions would definitely be answered as debates as to the legality of private ownership of resources gotten through space mining from outer space goes on in the international arena. Mining of resources from outer space might take ten (10) years before it takes effect. It is worthy of note to state that the Outer space treaty at present supersedes any legislation made by any country including the United States and Luxembourg. Though the outer space treaty does not stop private enterprises or companies from exploiting the outer space, however, what remain unclear and controversial are the private ownership rights over space resources.

DOMESTIC LEGAL REGIME OF SPACE MINING (USA AND LUXEMBOURG)

In November 2015, the United State commercial space launch competitiveness Act (H.R 2262) was signed into law. This law recognises the right of United State citizens to own asteroid resources they obtain and encourages the commercial exploration and utilization of resources from asteroids¹³ . Section 5103 of the Act gives United State companies the right to resources mined from asteroids, although it does not give them rights to the asteroids themselves. According to the planetary resources investors, the legislation establishes the same supportive framework that created the great economies of history and will encourage the sustained development of space. Most private investors in outer space in the United States believe that the law would enable United State's continued leadership and prosperity in space. Relying on the United State legislation and policy statements, the House committee on science, space and technology issued a press release that " *the right to extract and use resources from celestial bodies is affirmed by state practise and by the US state department in congressional testimony and written correspondence*"¹⁴ . Section 403 of the act states that " *it is the sense of congress that but the enactment of this Act, the United States does not thereby assert sovereignty or sovereign or exclusive rights or jurisdiction over, or the ownership of any celestial body*" The law explicitly does not make any claims of sovereignty over celestial bodies and further states that the resources must be obtained in accordance with United State international obligations, which include adherence to the outer space treaty. The Act pays respect to the international legal obligations of the United States and applicable law on which the property rights to space resources will continue to depend¹⁵ .

Similarly, just like the United State, the Luxembourg government adopted a draft law in 2016 ensuring that private operators working in space can be confident about their rights to resources they extract in outer space¹⁶ . Article 1 of the draft law provides that space resources are capable of being appropriated in accordance with the outer space treaty. The law has been formulated in a way as to specifically grant companies the right to extract resources such as minerals, water and other resources in particular on asteroids. However, also just like the United States Space Act, the Luxembourg law does not suggest to either establish or imply in

any way sovereignty over a territory or over a celestial body. The draft which is expected to become operational in the year 2017 also lays down the regulations for the authorisation and the supervision of missions concerning space resources utilization, including both the exploration and use of such resources. It further states that whoever intends to undertake a space resources utilization mission will be required to obtain an authorisation to do so, for each specific and determined mission.

Supporters have argued in the favour of the United State Space Act in the sense that it is a bold statement that finally sets private spaceflight free from the heavy regulation of the united state regulation of the united state government. They also argued further that the language of the Act by implication acknowledges the provisions of the outer space treaty. The United state is not going to claim the moon or an asteroid as it national territory. But it is granting the right of American citizen to own minerals that they extract from celestial bodies at least it establishes rights of investors to profit from their efforts under the United State law. This argument was buttressed with the fact that people or entities that extract minerals from another world own those minerals were established during the Apollo program. Neil Armstrong, in accordance with the outer space treaty , did not claim the moon as American territory, rather, the moon rocks and soil samples that he and every other Apollo astronaut extracted during the six (6) lunar landing mission belong to the United States; ownership which is recognised by the world community¹⁷ . It is also believed that the laws made by the two countries will further aid the development of space law in the sense that it will create an avenue for other countries to contribute and perhaps make their own national legislation on space mining with the sole aim of creating an international legal framework in relationship with the outer space treaty that will regulate the regime of space mining.

However, there have been so many arguments against this assertion because space exploration is a universal activity which requires international regulation and not the regulation of the United State alone. Furthermore, at present, no United State agency has responsibility for authorizing or continually supervising the activities of all US non-governmental entities involved in space. The FAA's office of commercial space transportation regulates space launches and re-entries, but has no authority over activities such as space mining. This seem not to meet with the article VI of the outer space treaty which requires countries that agree to abide by the treaty (state parties) to authorize and continually supervise the activities of their non-governmental entities such as companies¹⁸ . Although, the Luxembourg government stated in the draft law that it will continually supervise and authorise the activities of companies in the space mining mission. Some are of the opinion that the Act goes against a number of treaties and international customary law which already apply to the entire universe. It is believed that the United State 2015 Space Act is against some settled principles of space law. These principles are found in agreements including the outer space treaty of 1967 and the moon agreement of 1979.

ANALYSIS OF THE LEGAL ISSUES THAT MAY ARISE FROM SPACE MINING

Outer space is a global commons that owned by all of humankind just like the high seas and Polar Regions. The doctrine of "global common" refers to resource domains that lay outside of any individual nation's political control, these areas are often governed by international law¹⁹ . Because outer space is part of this commons, international law and treaties are expected to regulate space activities. Space should be decided exclusively on the basis of applicable international space law, particularly the outer space treaty and the moon agreement. The term "global common" is not a legal concept but a political one that is primarily used by writers and politicians for advocating their respective policies. It is important to know that there is a clear and sustained desire among space faring nations to prospect for and eventually exploit the natural resources found in space²⁰ . The increasing number of private sector in the conduct of space activities has also aided the prospect. Exploitation of natural resources in space though has not

yet occurred but it is becoming increasingly feasible. International space law governs the conduct of space activities of any kind. The principles, rules and regulations have been codified in the five (5) space law treaties adopted under the auspices of the United Nation's Committee on peaceful uses of outer space (UNCOPUOS) between 1967 and 1979.

The 1967 outer space treaty as the most widely accepted of the five (5) United Nation space law agreements creates binding legal obligations for the countries that are party to it. Because of the widely acceptance by the international community of the principles contained in the 1967 outer space treaty, it has become customary international law more so that state practises associated with these principles has been consistent over the years. It is worthy of note to state that such principles are applicable to state parties as well as non state parties to the 1967 outer space treaty²¹.

Article I of the 1967 Treaty on principles governing the activities of states in the exploration and use of outer space including the moon and other celestial bodies 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 or scientific development and shall be the province of 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 the basis of equality and in accordance with international law and there shall be free access to all areas of celestial bodies*²².

It is important to note that the second paragraph of Article I stated expressly the limits for the exercise of freedoms of exploration, use and exploitation. States must exercise their freedom without "discrimination of any kind", "on the basis of equality" and "in accordance with international law"²³. The phrase without discrimination of any kind when interpreted with the first paragraph of Article I means that the first explorers, users and exploiters of outer space and the celestial bodies cannot use the lateness of other states as a basis for jeopardizing the freedoms of the later states to explore, use and exploit outer space. Similarly, the phrase "in accordance with international law" requires compliance with current and future principles and rules of conventional and customary international law as well as the charter of the United Nations²⁴. Article II of the outer space treaty states that *"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"*²⁵. Prohibition of appropriation specified in Article II of the outer space treaty has become a rule of customary international law and is applicable to all states whether or not they are parties to the outer space treaty. All states are under obligation not only themselves to comply with principles set out in Article II, but also ensure that their respective non-governmental entities do not in any manner or form act contrary to this important legal norm²⁶.

By the current standards of international law, a country cannot just go and create laws that function outside her borders. As far as the international community is concerned, the United State Space Act is only binding on US nationals and the precedent of international space law might invalidate the Space Act²⁷. Michael Listner, a Space lawyer, says that the United State law is incompatible with the Outer Space Treaty and risks souring international relations. He is of the opinion that other countries would want in and if there is conflict of law, things start getting dicey and that could lead to legal and political conflict²⁸. Professor Joanne Gabrynowicz from the University of Mississippi and an official observer for the international institute of space law (IISL) of the United Nations committee on the peaceful uses of outer space legal sub-committee has voiced concerns as to the content of the United State 2015 Space Act. She identified that there were many ambiguities and unresolved issues that needed attention²⁹.

It is important that the United State plans must be understood in the light of existing rules of space law. At present, corporations can exploit outer space in a number of ways including for space tourism and scientific training. Companies may also be allowed to extract certain resources, but the very first provision of the outer space treaty (1967) quoted above to which the United States and Luxembourg are signatories, is that such exploration and use shall be carried out for the benefit and in the interest of all countries. This therefore prevents the sale of space based minerals for profit³⁰. The moon agreement of 1979 has in effect forbidden states to conduct commercial mining on planets and asteroids until there is an international regime for such exploitation. While the United States and the major space faring countries have not signed up to this, it is binding as customary international law³¹.

Based on the interpretations of Articles I and II of the outer space treaty, commercial exploitation of natural resources in space would constitute appropriation unless carried out in compliance with the requirements not only of Article I but also of other provisions of the outer space treaty. It has always been a major topic for discussion among international space law writers that in a situation where the exploitation of the natural resources of a celestial body like a small asteroid is of such a scale that, in effect, the celestial body is exploited "out of existence" could be unlawful, since it would, in all likelihood, violate other principles of international space law, such as the requirement that it be for the benefit and in the interest of all states and that due regard is to be paid to the corresponding interest of all other states³².

However, there have been so many proponents in favour of both legislation of the US and Luxembourg as there is so many proponents against it as well. The proponents in favour of the legislations believe that the drafters of both legislations assert their consistency with international space law. International space law is unclear when it comes to the legal status of celestial bodies resources, the proponents in favour of the legislations believe that, Article II the outer space treaty while prohibiting the appropriation of celestial bodies, including the moon, is silent on whether such a prohibition also extends to their resources³³. On this point, two diverging views exist. The first one argues that the provisions of Article II equally apply to celestial bodies and their resources as the two cannot be separated. Furthermore, while the use of limited amount of resources for scientific reason is allowed, their large scale of utilization for private gain is inconsistent with the doctrines of the outer space treaty³⁴. The second view, instead claims that based on a similarity with the legal regime of the high seas, celestial bodies resources can be appropriated once removed from their original location and used for any kind of purpose. In view of these proponents, such an activity would fall within the scope of Article I of the Outer Space Treaty which confers upon state parties the right to explore and use outer space.

Ultimately, it is safe to argue that while not specifically authorizing it, the Outer Space Treaty does not prohibit the removal and utilization of extraterrestrial resources³⁵.

NEED FOR INTERNATIONAL LEGAL FRAMEWORK FOR SPACE MINING

With the recent development and advancement in respect to space mining, the willingness of private investors to exploit minerals from outer space and the space act of 2015 and draft law of 2016 made by United State and Luxembourg respectively, it is crystal clear that there is an urgent need to put in place an international legal framework for space mining. According to some space analyst, the international community needs to get its act together quickly because the international space law at the moment does not allow repatriation of resources for commercial purposes³⁶. Countries must come together with a regulatory framework.

There have been suggestions on drawing on existing legislation such as the United Nation convention on the law of the sea which governs how nations use the ocean. Also, the moon treaty of 1979 which deemed space to be the "common heritage of

mankind" , but failed to win the support from any space-faring nation. It is worthy of note to also know that comparisons have been drawn between the mining of space resources and the extraction of minerals from the high seas. Such comparisons might prove helpful in analyzing the need for and devising an international legal framework to govern space mining³⁷.

One theory for how best to create a framework for rights to natural resources in space is to create a new international body to establish laws governing outer space, oversee those laws and enforce them³⁸ . This proposal aligns with Article 11(5) of the Moon agreement which requires that an international regime be created to govern the exploitation of natural resources on the moon when such exploitation is about to become feasible³⁹ Furthermore, efforts should be made by intensifying discussions within the United Nations at various workshops and gatherings about both the need to strengthen international space law in general and to create a framework that guide and governs commercial space activities.

International framework must be developed in order to determine the rules of the game which should include rewarding innovation, protection of property rights, countries must create national legislation that will help them adhere to their international obligations⁴⁰ . Countries should engage in negotiations for an international agreement or non-legally binding instrument (soft law). Countries must enter into international agreement that would regulate how individual states and their citizens interact with resources mined from space⁴¹. Such agreements must recognise the rights of both extracting entities as well as non-space faring countries to benefit from the minerals as well⁴². At the international level, beyond the broad provision of the outer space and moon treaties that have been mentioned above there is nothing at the moment that regulates space resource mining but there is need for efforts to be intensified in that direction⁴³.

CONCLUSION

Space mining is the next giant leap in space exploration and its going to start very soon at some point in the future. The Luxembourg domestic legislation as well as the United States space Act of November 2015 has shown that some countries are serious about space mining and there is a movement towards that direction. It must be clearly stated that the legislations made by US and Luxembourg can only have meaningful effect when both legislations must have accorded proper regard to international law which supersedes national laws. Efforts should be made by countries to settle the actions that might go against international law because under the present legal regime of international space law, asteroids, and whatever minerals they may contain cannot be claimed by states or their nationals⁴⁴. It must be noted that so many have interpreted the outer space treaty to better suit and justify their cause but it is certain that international law on this subject is, at the very best unclear and there is no international legal framework existing at the moment that regulates or grants states or companies right to mine asteroid⁴⁵. International space law needs to be updated if it is to keep pace with modern advances and rectify the lacuna that new technologies have revealed within it.

There two different views on space mining, non- appropriation is on the sovereignty issue while mining itself may not necessarily violate it. In the future, new rules need to be forged, or it will look like fishing in the high sea. Though the idea of the high sea might not be applicable when it comes to space because they are different, however, terms as global commons may serve as models for the development of new space law treaties. Whatever extraction of minerals from the outer space should be undertaken peacefully and in the spirit of international cooperation. Space belongs to all of humanity, therefore resources extracted from outer space through space mining need to be shared by all countries including developing countries. Various formulas for sharing can be derived. Companies extracting minerals from asteroids can be mandated to pay certain percentage to the United Nation or UNESCO or any independent non-governmental organisation as the case may be. However, the companies that

invested a good sum of resources in to mining should get a higher percentage of proceeds they get from space because they would have committed so much ranging from human resources to machineries and so much money. Space mining looks so exciting and seems like the next giant leap in space but all the legal issues that surrounds space mining needs to be resolved before it can become feasible.

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