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Authored By: Ms. Lepakshi Naik (BBA. LL.B ((Honours), School of Law,
Christ (Deemed to be) University.
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“All great ideas have a flavor of science fiction. Otherwise, it’s an ordinary idea”

-Neil Degrassi Tyson

ABSTRACT

“It is said that humanities’ future as a space-faring species is just around the corner, but how are we really going to get there? The answers are asteroids. These seemingly unimpressive lumps of rocks have the potential of becoming intergalactic pit stops for exploring the universe. They have the potential to become cosmic gas stations and building blocks for human habitats in space, but their potential remains untapped (literally). This is where the concept of space mining comes in. In order to further our limits of space exploration, satisfying the growing economic demands of raw materials, allowing earth to replenish its natural reservoir of raw materials and also possibly reverse climate change, humans have to stop mining earth and start exploring the space for resources to mine.

This process has already begun, but the main drawback of slowing investment in this industry is the uncertainty in the laws. International treaties like the outer space treaty and the moon agreement have been the pillars of space law, but the makers of these laws did not imagine the possibility of space mining and the latter is considered as only an educational exercise as it has been ratified by only 20 nations that do not have significant space exploration agencies.

The main purpose of this paper is to highlight this issue and provide a plausible solution to this problem in order to actively avoiding the possibility of a space war in the final frontier over resources like on earth. This paper aims at proposing a mechanism which would free the humankind from the nationalistic view of sovereign power and creating a humanitarian government for progressing in the final frontier as a species rather than different nations. This research goes through some property rights theories proposed by scholars and applies relevant

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aspects of it as a plausible solution to the property rights issue in outer space and its resources.”

I. INTRODUCTION:

What we know about life is that, as life evolves, it fills whatever ecological niche or system it has, and then it finds a way to jump to the next level. We are right now just at the time when we have the technology to make the leap into space, this is as significant as the time when fish came upon the land leading to the evolution that formed the modern man. Outer Space is considered as the final frontier for humankind, to expand, explore and find a new niche. There are laws which govern the outer space, which states that it belongs to all but cannot be owned by one, it is called the province of mankind¹. In order to maintain the peace and humanitarian integrity in outer space, The Committee on the Peaceful Uses of Outer Space (*COPUOS*) was set up by the General Assembly in 1959 to govern the exploration and use of space for the benefit of all humanity: for peace, security and development. The Committee was tasked with reviewing international cooperation in peaceful uses of outer space, studying space-related activities that could be undertaken by the United Nations, encouraging space research programmes, and studying legal problems arising from the exploration of outer space. This committee is instrumental in developing the five major treaties relating to peaceful use of outer space that is the main governing treaties with respect to outer space.²

I.I TREATY ON PRINCIPLES GOVERNING THE ACTIVITIES OF STATES IN THE EXPLORATION AND USE OF OUTER SPACE, INCLUDING THE MOON AND OTHER CELESTIAL BODIES, 1967 (OUTER SPACE TREATY hereinafter "OST"):

¹ John G. Wrench, Non-Appropriation, No Problem: The Outer Space Treaty Is Ready for Asteroid Mining, 51 Case W. Res. J. Int'l L. 437 (2019).

² Sustainable Development Goal 16: Peace, Justice and Strong Institutions (Jan 20th, 2021 10:50Pm) <https://www.unoosa.org/oosa/en/ourwork/space4sds/sdg16.html> .

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As of June 2020, 110 countries are parties to the treaty, another 23 countries have signed the treaty, but not completely ratified it. The main objective of OST, 1967 is to allow for the exploration and use of outer space for the benefit and in the interests of all countries, while outer space being the province of mankind. It also states that outer space shall be free for exploration and use by all states, while it is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.³

The OST under its Article I States that under this provision the exploration of outer space is supposed to be conducted “in the interest of all states”, i.e., no state shall be allowed to gain profits from the activities performed in outer space with respect to its exploitation of the celestial bodies. It also states that no ownership rights can be acquired on any celestial bodies as the treaty mentions that outer space is the “province of mankind” which refers to space systems and activities in general. This approach by the Ost essentially denounces any claims of sovereignty over the outer space. Article II of this treaty states that the outer space, including the moon and other celestial bodies, would not be amenable to national appropriation by claim of sovereignty. Both private and government entities are prohibited from claiming ownership over celestial bodies.⁴ Some of the other main tenants of the OST state that outer space should be used only for Peaceful use of resources and exploration, inspired by the Antarctic treaty.

No national appropriation by a claim of sovereignty⁵, wishing to avoid the extension of present national rivalries into this new field (outer space), desiring to promote energetically the fullest exploration and exploitation of outer space for the benefit of mankind, conscious that recent developments in respect of outer space and opened new possibilities for the increase of

³ Maria Manoli, Mining Outer Space: Overcoming Legal Barriers to a Well-Promising Future, 58 Proc. Int'l Inst. Space L. 739 (2015). Eric Husby, Sovereignty and Property Rights in Outer Space, 3 J. Int'l L. & Prac. 359 (1994).

⁴ Mitchell Powell, Understanding the Promises and Pitfalls of Outer Space Mining and the Need for an International Regulatory Body to Govern the Extraction of Space-Based Resources, 19 Pitt. J. Tech. L. & Pol'y 1 (2018-2019).

⁵ Wolff Heintschel von Heinegg, Neutrality and Outer Space, 93 Int'l L. Stud. Ser. US Naval War Col. 526 (2017).

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knowledge and the improvements of his life, recognising the great importance of international co-operation in study and utilisation of outer space for peaceful purposes, believing that the development in this field will materially help to achieve international peace and corporation even on earth, which was established by the general assembly resolution 1348 XIII of October 17 1963.

I.II AGREEMENT GOVERNING THE ACTIVITIES OF STATES ON THE MOON AND OTHER CELESTIAL BODIES, 1986 (MOON AGREEMENT):

The moon agreement was a subsidiary to the OST, its main objective was to strengthen the rules laid down by the OST and fill in certain loopholes. This agreement failed to attract major countries with well-functioning space exploration agencies as it has stricter implementations. So far only 18 countries are a part to this treaty. This treaty describes outer space as “common heritage of all mankind”, this approach release the materials or objects in question. This approach was criticised owing to its inherent nature of mandating all the countries to share the fruits of explorations irrespective of whether they have the ability to participate in space missions or programs.

Article 11, paragraph 2 of this treaty states that the moon including other celestial bodies is not subject to national appropriation by any claim of sovereignty, by means of occupation or any other means. Thus, ensuring that no entity lay a claim of ownership upon anything in outer space, regardless of the purpose of the claim. This treaty further goes on to state explicitly that the surface, subsurface and the natural resources in place on the moon and other celestial bodies will not become property of any State, international inter-government, non-governmental organisation, national organisation, non-governmental entity or of any natural person. Simply stating the moon agreement strictly prohibits both private and governmental entities from making commercial claims over the moon or any other celestial bodies in the solar system, it also expressly mentions that the same would apply to the resources found on any asteroid in

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outer space.⁶ These strict regulations of the moon agreement are laudable as its main focus has been to conserve the natural and structural integrity of outer space, it is also the reason for its low approval in the international community. This treaty allows for countries with no experience and no monetary investment in space exploration receive all the information of the exploration through other countries' investments, which demotivates the interest of entities investing in space exploration and research. Research without commercial gain has rarely been supported. The harsh restrictions on commercial use of space are the reason countries have shied away from this treaty.

II. WHAT IS SPACE MINING?

The concept of space mining is no longer a myth or a technology that will be developed in the distant future, this technology exists now and it is going to be used by several countries for economic gains. With the depletion of earth's resources and development of new, more reliable and cheaper technology in this field, it is practical for the international community to embrace the new technology and work with it. The UN should come up with rules regulating the privatisation of celestial bodies, if not planets, at least the mineral rich asteroids. Almost 8,00,000 asteroids are drifting untamed in the solar system. Most of them are drifting in the solar belt of Mars and Jupiter, we do not have to go that far, there are 16,000 near earth asteroids laced with any material from gold, water, carbon, platinum, palladium, titanium etc., waiting to be harvested. The main question surrounding this is that could these resources be brought back to earth? The answer is, for profits many important resources like phosphorous, zinc, tin, lead, silver, gold and everything else that can be mined be brought back to earth. The main component that drives the need for space mining is space exploration.⁷ Another aspect that

⁶ Ross Meyers, The Doctrine of Appropriation and Asteroid Mining: Incentivizing the Private Exploration and Development of Outer Space, 17 Or. Rev. Int'l L. 183 (2015).

⁷ Scientists say that it takes the same amount of fuel for a rocket to travel 300km from earth to escape its gravitational force and 300 million km after leaving the earth's orbit. Thus, fuel is the only limiting factors which holds the space exploration industry handicapped. Mining for water in outer space will provide cosmic gas stations for the spacecrafts and also provide astronauts with life supporting elements like water and oxygen. William G. Schmidt, Law in Outer Space, 21 Update on L. Related Educ. 45 (1997). Jeremy L. Zell, Putting a Mine on the Moon: Creating an International Authority to Regulate Mining Rights in Outer Space, 15 Minn. J. Int'l L. 489 (2006).

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limits space mining is the cost of mining and acquiring the mined materials from space to earth. This cost has surprisingly reduced by up to 40 time.⁸ Many industries and countries have started working on plans to mine outer space, the research as development as of 2020 is at a sample collection phase which was first triggered by the Japanese mission to mine the 25143 Itokawa asteroid in 2005. They successfully launched the Hayabusa 1 and recovered surface materials and retired to earth in 2010. Following which the Japanese and Luxemburg space agencies teamed up and launched another probe Hayabusa 2 collected materials from another asteroid Ryugu in 2019 scheduled to return to earth on December 6, 2020. NASA's Osiris-rex touched down on an asteroid named Bennu on October 20, 2020, it already collected successfully a sample of it to return back to earth by 2023 Companies like Deep Space Industries, Planetary Resources, TransAstra are the upcoming pioneers in the space mining industry who have released plans and equipment to mine outer space.

III. PROPERTY RIGHTS:

In the widest sense property includes all the legal rights of an individual of any description, property of an individual is all that is permitted by the law to be exclusively owned by an individual. Property rights are right in rem. They are the rights which one individual acquires over the rest of the world, where he does not have a right over the property, but every other person has a positive duty not to disturb his enjoyment of the property. This positive duty of not to disturb the owner or the possessor of the property from enjoying the property is enshrined upon the by the sovereign over the rest of the world.⁹ When property rights are enshrined upon an individual, he acquires three distinctive and irrefutable rights to exclusive possession of the property, right to use the property and right to transfer the property. To protect these above-

⁸ A standard bottle of water weights 1lb and at spacex's rates it cost 2,430\$ to launch 1lb of water into space from earth. As long as it takes that much money to launch water, building structures and raw materials into space, space exploration and colonization are going to move at a very slow and costly rate, thus the solutions are asteroids which contain unlimited amount of resources that can be harvested to use as raw materials in space and earth. John G. Wrench, Non-Appropriation, No Problem: The Outer Space Treaty Is Ready for Asteroid Mining, 51 Case W. Res. J. Int'l L. 437 (2019).

⁹ V. D. MAHAJAN, JURISPRUDENCE AND LEGAL THEORY, FIFTH EDITION, 359, 400-404 (2010).

mentioned rights there has to be a sovereign power, this sovereign power is not defined with respect to outer space.¹⁰

III.I THEORIES OF PROPERTY RIGHTS:

III.I.I Salmonds View on Modes of Acquisition of Property:

Any property according to Salmond can be acquired in 4 ways, possession, prescription, agreement and inheritance. For the problems highlighted in this paper, the mode of agreement and inheritance would not be applicable as outer space and its resources are not under the possession of anyone.¹¹ Possession is the objective realization of ownership, possession of a material object is a title to its ownership. There is a *de facto* relationship between the person and thing brings the *de jure* relation along with it that is, he who claims a piece of land (in this case resources of outer space or outer space itself) and has possession of it, not being challenged by any other claims of ownership would in law own his claim. In a scenario where the property belongs to no one, the first possessor would have the exclusive right on the property. This theory cannot be applicable to outer space because outer space and its resources belong to all while belonging to no one. Thus, when a private individual acquires possession of outer space or any of its resources, he cannot claim it as his own and trade it, acquiring profits out of those resources as it would amount to using resources that belong to all. This has been interpreted by the OST where the phrase “province of all mankind”¹² has been used to describe the final frontier along the OST also expresses that “exploration and use of outer space should be carried on for the benefit of all peoples irrespective of the degree of their economic or scientific development” making application of this philosophy violative of the OST¹³. This problem can be solved by the introduction of a humanitarian government which is comprised of all of human

¹⁰ KURT ANDERSON BACA, PROPERTY RIGHTS IN OUTER SPACE, 58 J. AIR L. & COM. 1041 (1993).

¹² John G. Wrench, Non-Appropriation, No Problem: The Outer Space Treaty Is Ready for Asteroid Mining, 51 Case W. Res. J. Int'l L. 437 (2019).

¹³ Ross Meyers, The Doctrine of Appropriation and Asteroid Mining: Incentivizing the Private Exploration and Development of Outer Space, 17 Or. Rev. Int'l L. 183 (2015).

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life, governed at an international level, where there can be an access benefit sharing principle applicable in order to satisfy the principle laid down in the OST (This is further discussed in detail). The second applicable mode of appropriation that Salmond suggests is prescription, he suggests that in order to eliminate the issue of coincidence of possession and ownership of fact and of right. Usually, owners are possessor and possessors are owners. Fact of possessing a property and the right of owning a property are normally coincident, therefore the former is the evidence of the later. Thus, the property that is not possessed raises a presumption that it is not owned either. Seeking possession is evidence for seeking the title, longer the desire to possess, longer the evidential value, thus when a property is not possessed by anyone, there is a presumption that the property is available for those who seek possession of the property.

When this theory is applied to the outer space and its resources, it can be observed that as there are no possessors of the outer space and its resources, there is a growing demand to seek possession of outer space and gain the title to outer space and its resources. Thus, we can witness the growing demand to mine outer space for its resources in order to fulfill the demand on earth. This theory is the most applicable one in this case, leaving one loophole which is there is no limit to how much the first-person reaching space will possess. This could lead to the creation of a monopoly, with low competition there will be less innovation and a standstill in the progression of science and technology.

III.I.II The Labour Theory by John Locke:

According to Locke, man owns himself, and by extension, everything that he produces. He proposed the first possessor theory where the first person to possess a property for his own use and deriving an economic gain, the property belongs to him on the grounds of equity. This theory is not the most favourable one to follow when it comes to the property of outer space, as there has always been heavy competition among various developed countries to acquire knowledge and resources. Since the cold-war era U.S.A and Russia have been in a constant competition since the launch of Sputnik. When first possessory rights are allowed nations well

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developed nations will want to acquire possession of outer space as quickly as possible which may lead to the militarization of outer space.¹⁴ The Outer Space Treaty is considered to the most valued and recognized space law which has been internationally recognized and adopted. This treaty clearly states that no country can attain sovereignty in outer space. Locke in his publication of ‘Two Treatises of Government’ stated that the state is necessary for the existence of property rights, without which there cannot exist any governance and protection of property rights.

III.I.III Economic Theory:

Some of the main supporters of this theory are John Stuart Mill, David Ricardo, Adam Smith, Jean-Baptiste Say and Thomas Robert. This theory states that private property will maximise the productivity of the property as all the private parties are inclined to utilise the resources at high efficiency costs in order to gain maximum profits. The competition in growing the market share of each private party will result in the most efficient way of distribution of the outer space resources. The Outer Space Treaty states outer space as the “province of mankind” and the Moon Treaty states that outer space is the “common heritage of mankind”. Loosely stated as outer space to belong to everyone, the whole of mankind. When this theory of private parties acquiring possession and ownership of the outer space is allowed there will be mass exploitation of the resources of outer and this will be acquired by a small portion of the rich and wealthy individuals of developed countries, denying the share of outer space resources to the third world or developing countries. By the time the other smaller and poorer countries acquire the technology and funds to utilize the resources of outer space, there would be significant depletion of the outer space resources.¹⁵ This would violate the Outer Space Treaty and the Moon Treaty. The second problem with this type of property rights allocation is the initial allocation of property. Questions like “Who would allocate the private property?”, “Who

¹⁴ EZRA J. REINSTEIN, OWNING OUTER SPACE, 20 NW. J. INT’L L. & BUS. 59 (1999).

¹⁵ EZRA J. REINSTEIN, OWNING OUTER SPACE, 20 NW. J. INT’L L. & BUS. 59 (1999).

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would judge the efficiency of the use of private property?”, “In case of inefficient utilisation of the property, who would be held responsible?” will come up, without a sovereign power there is no regulation of the private property and no enforcement of protection of the private property from external force and damages.

III.II WHY ARE WE DISCUSSING ABOUT PROPERTY RIGHTS WITH RESPECT TO OUTER SPACE?

*“The first trillionaire is going to be the first person who exploits space resources on
asteroids and comets” - Neil Degraasi Tyson*

Asteroids are lumps of leftover dust and rocks from when the planets were forming in our solar system. They contain many raw materials which are being exhausted on earth or cannot be formed on earth. The M-asteroids are the ones that contain metals like palladium, iridium, gold, silver and more used vastly in present smartphones and other electronics. Mining which on earth creates a lot of pollution and destruction to terrestrial mines. The asteroids due their collisions in outer space, they are considered pure forms of raw materials which require minimum effort in the segregation and acquiring process. Considering the example of the asteroid 16 Psyche, has a 140-mile diameter, and 95% of it is made up of metals like iron, nickel, gold and platinum. Which the Bloomberg estimated to be a theoretical \$700 quintillion in today’s economy (\$700,000,000,000,000,000,000).

Following which is the near earth asteroid Davida with a resource value of \$27 quintillion USD (\$27,000,000,000,000,000,000). Along with this great demand, mining for raw materials on earth would reduce the pollution caused on earth by the process of mining and possibly reverse climate change, this could also yield many jobs in industries related to space mining. There are also many speculations of using the material Helium-3 which is readily available on the moon’s surface to create more efficient and clean energy. Which why the debate of furtherance of space mining is taking place, while some countries have already created private laws to allow space mining.

IV. PRESENT PRIVATE SPACE MINING LAWS WHICH EXIST:

IV.I Municipal Law:

The OST and the Moon Agreement have had express prohibitions on the process of exploitation of the moon and other celestial bodies. The moon agreement is the stricter version of the OST which provides for strict and unbreakable provisions prohibiting space mining for commercial purposes by anyone by the use of the phrase "common heritage of all mankind". On the contrary the OST being more accepted by the international community has many loopholes that have been exploited by the municipal laws of various countries. The OST states that outer space is the "province of mankind" which denounces the claims of any sovereign nation, the same does not apply to individual entities. Companies, private individuals have complete autonomy to mine and exploit resources of space. The use of the term "resource" plays an essential role in this discussion. The companies and private individuals have been recognised to have the ownership of the resources that are being mined in space rather than the celestial body in itself. The OST laid down prohibitions over ownership by sovereigns only over the moon and other celestial bodies, and not its resources. This can be considered as a valid argument only if OST is strictly interpreted, if not the essence of this letter of law states that the treaty also covers resources of outer space. With respect to this paper two municipal legislations allowing its private entities to commercially exploit outer space will be discussed below.

IV.I.I The U.S. Commercial Space Launch Competitiveness Act, 2015:

This legislation was brought into effect in 2015, formally in-order to regulate funding the outer space programs, International Space Station by the government, its main intention has been laid down in the end under Title IV of the Act which provides that the president acting through the appropriate federal agency to facilitate the commercial exploration of outer space for commercial recovery of outer space resources by U.S. citizens. It discourages the government barriers to the development of economically viable, safe and stable industries for the

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commercial exploration for commercial recovery of space resources in manners consistent with the U.S. international obligations. It also promotes the right of U.S. citizens to engage in commercial exploration for commercial recovery of space resources free from harmful interference, in accordance with such obligations and subject to authorisation and continuing supervision by the federal government. A U.S. citizen engaged in commercial recovery of an asteroid resource or a space resource shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use, and sell it according to applicable law, including U.S. international obligation. The final provision which grants the ownership right of any space-obtained resource to individual American citizens. This provision was, and still is, truly radical and represents the first time that a space-faring nation has, in writing, provided a private citizen a legal property right to celestial resources and seems to be at odds with the generally agreed upon notion, as referenced by the language in the various COPUOS treaties, that space shall belong to and benefit all of mankind.¹⁶

IV.I.II Law on Exploration and Use of Space Resources, 2017:

The U.S. Commercial Space Launch Competitiveness Act, 2015 was the driving source for the construction of this act by the Luxembourg's government. Luxembourg became the first European nation to recognise private rights in outer space.¹⁷ With the continuous decline in their oil resources, Luxembourg established this act to promote the economic value of outer space in-order to protect its economy. The Luxembourg legislation is very similar to that of the U.S., it provides private entities to earn commercial gain from the resources of outer space. In 2017, Japan entered into a five-year agreement with Luxembourg for mining operations in outer space, at present Japan has two rovers Minerva II-1 of JAXA landed on the surface of

¹⁶ Eric Husby, Sovereignty and Property Rights in Outer Space, 3 J. Int'l L. & Prac. 359 (1994).

¹⁷ Article 4 of this act states that the authorisation for a mission shall only be granted if the applicant is a public company limited by shares or a corporate partnership limited by shares or a private limited liability company of Luxembourg law of European Company having registered office in Luxembourg. Article 7(1) states that the authorisation shall be subject to the production of evidence showing the existence in Luxembourg of central administration and of the registered office, including the administrative and accounting structures of the operator to be authorised.

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the asteroid Ryugu in 2019. Portugal and UAE also signed similar agreements with Luxembourg.

V. A PLAUSIBLE SOLUTION:

Outer space according to the outer space treaty is the province of mankind, where no sovereign claims can be authorized. Following this theory which is accepted as an international norm (like a paralegal rule), private parties can access the materials in outer space as there is no restriction on the claims made by private individuals in outer space. Allowing this practice, the United States of America and Luxemburg have their own private laws that support this practice of space mining by private individuals across all nationalities. In the absence of an international regulation awarding private individuals the right to mine outer space, there is a sovereign authority that is exercised by countries having private laws granting the right to mine outer space. This concept is directly violative of the OST as the right is granted by a sovereign power (the sovereign of USA and Luxenberg respectively), which implies that the right to mine outer space arises from the sovereign's claim on outer space. Thus, there is a necessity for an international regulation where, sovereign claims don't arise and space can be mined by private individuals for their own economic benefit to satisfy the demand for raw materials on earth, maintaining a humanitarian government in outer space, rather than dragging the limiting beliefs of the current society in the name of nationality, race, gender, age etc., discriminations to outer space. Where the whole of mankind is going to reap environmental and economic development benefits from this activity.

VI. CONCLUSION:

Space mining is the inevitable new future that many countries and industries are striving towards. It has a high investment and an even higher revenue. It also helps us to combat the problems of climate change and environmental degradation, also helps us to restore the earths raw materials. Thus, it is better to design an international law rather than allowing the extension of present national rivalries into new outer space and maintain peace in outer space as a step towards building a more humanitarian society in outer space.