# CREATING AN INTERNATIONAL RÉGIME FOR PROPERTY RIGHTS UNDER THE MOON AGREEMENT

Ricky J. Lee*

Since time immemorial, the Moon has been a constant source of fascination and imagination for human civilisation. Over the past fifty years, however, the Moon has became an ideological symbol, as the two superpowers competed in a space race that resulted in outstanding achievements both in terms of political and ideological competition as well as technological advancements. With the end of the Cold War and the astonishing growth of the commercial space industry, the existing legal régime that was created in the climate of intergovernmental rivalry has been exposed as hopelessly inadequate in providing for and facilitating commercial enterprise in space.

There is probably no venture in space more exciting and commercially attractive than the mining of mineral resources and human settlement on the Moon and other celestial bodies, such as near-Earth asteroids. The prospect of generating electricity from space, for example, is no longer a fictional fantasy. It is generally believed that any large-scale human operation in space would be more cost-effective if the Moon is utilised, both as a launching base and as a source of minerals and fuels. These will remain dreams and fantasies unless the current international legal régime governing activities in space can provide for some form of property rights to protect and facilitate such ventures.

## COMMERCIAL ACTIVITIES ON CELESTIAL BODIES

### A. Extraterrestrial Mining

The celestial bodies within the Solar System, including the Moon and the near-Earth asteroids, contain a vast supply of virtually all types of mineral resources now used extensively on Earth.[1] On the lunar surface, for example, there are significant deposits of oxygen, silicon, aluminium, iron, calcium, magnesium and many others in trace amounts.[2] These materials could be used in their natural form or refined into various structural, thermal or electrical materials.[3] On an asteroid the mineral resources are likely to provide richer rewards. "Each one-kilometer sized metallic asteroid will provide 1 billion tons of iron, 200 million tons of nickel, 10 million tons of cobalt and 20,000 tons of platinum metals: net market value, about [U.S.]$1 trillion."[4]

Celestial body resources would probably be used initially in the construction of items in space, such as launch platforms, satellites and space stations where it would be more cost-effective to mine on the Moon or an asteroid than to be launched from Earth.[5] Indeed, it is likely to be the only feasible means of constructing any installations in Earth orbit because of the prohibitive costs involved in

* LLB(Hons) BA(IntSt)(Hons). Member of the International Institute of Space Law. Lawyer, Minter Ellison, Canberra, Australia.

launching components from Earth. Furthermore, as transportation costs decrease and the scarcity of natural resources on Earth worsens, it will eventually become economically competitive to exploit extraterrestrial resources for use on Earth.[6]

Eventually, technological and capital requirements will no longer be obstacles in the development of celestial body resources. In the early 1980s, scientists developed a "mass driver" magnetic catapult that could hurl mined materials into orbit from the Moon or an asteroid, thus identifying a cheap and efficient means of transporting mined resources.[7] This has the potential of reducing the cost of building space installations by 20,000 times.[8] They have also conceived a technique for capturing stray asteroids and placing them into the Earth's orbit to facilitate mining. At least one United States company is currently pursuing plans for a commercial asteroid mining project.[9] Experimental missions could begin within the next five years.[10]

### B. Energy Generation in Space

An exciting proposal for the use of lunar and asteroid minerals is as fuel for a solar-powered satellite electricity generation system (SPS). The system would collect solar energy in space, convert it to electricity and transmit it to Earth via microwave beams.[11] This has the potential of generating cheap electricity, reducing our dependency on fossil fuels and other more expensive and environmentally damaging sources of energy on Earth. The construction and fuel sources of the SPS would be more economically viable if it was done on a celestial body such as the Moon, since it would be much cheaper to construct such large installations on bodies with less gravitational pull than the Earth.

An average orbiting SPS could provide 10 million kilowatts of power, which is sufficient to provide a metropolitan area of four million people with electricity.[12] The SPS would receive about fifteen times the solar energy received on Earth and would be available around the clock.[13] In the future, as larger scale space installations are constructed, an SPS could greatly benefit such projects by providing a cheap and reliable source of electricity.

### C. Hydrocarbons and Helium-3 Mining

One little known fact is that hydrocarbons, similar to petrochemicals fuelling human civilisation today, are abundant throughout the solar system, especially on comets, asteroids and the satellites of other planets.[14] Removing hydrocarbons from comets are relatively feasible and Halley's Comet, for example, contains hydrocarbons comparable to the Earth's entire reserves.[15]

Helium-3, an isotope used in the cleanest form of nuclear fusion, is virtually non-existent on Earth as it escapes easily from our atmosphere. The solar wind carries massive quantities of helium-3 which are then deposited in huge quantities on the Moon and which could fuel Earth's fusion needs for centuries. The 1989 market value of helium-3 was US$15 billion per metric ton, while platinum had a price of approximately US$20 million per ton.[16]

## EXISTING LEGAL PRINCIPLES AND THE MOON AGREEMENT

While the desirability of developing outer space resources is economically undeniable, the biggest obstacle to commercial space development is the lack of international agreement over the development of binding legal rules to govern the development of celestial body resources. Extraterrestrial resources cannot be developed without an adequate legal framework that is consistent with existing principles of space and international law. Without an international legal régime providing certainty and security, it is unlikely that any large-scale commercial venture in space can take place.

Since the Sputnik I satellite was launched by the Soviet Union three decades ago, space law has became a specialist branch of international law and is derived from treaties and conventions, customary international law and recognised general principles. The two declarations adopted by the United Nations General Assembly in the early 1960s as well as the 1967 Outer Space Treaty, which has been ratified by over ninety-eight nations, set out several significant and relevant legal principles of space law, including the following:

1) Space, including celestial bodies, is the province of mankind and developed for the benefit of mankind;[17]

2) Space, including celestial bodies, is free for exploration, use and exploitation by all;[18]

3) Celestial bodies cannot be appropriated by any nation;[19]

4) Celestial bodies shall be used only for peaceful purposes;[20] and

5) International law extends to space and celestial bodies.[21]

Three treaties since the Outer Space Treaty have established legal frameworks for the rescue of astronauts and the recovery of objects,[22] the liability for damage caused by space objects,[23] and space vehicle registration.[24] However, there is no agreement on the international legal framework to govern celestial body resource development.[25]

After a decade of extensive negotiations, catalysed by the return of so-called "Moon rocks" from the NASA Apollo Lunar Landing Program, the United Nations Committee on Peaceful Uses of Outer Space (COPUOS) agreed to the text of the Moon Agreement in 1979. The treaty entered into force on 11 July 1984 when Austria, following Chile, the Philippines, Uruguay and the Netherlands, lodged the fifth instrument of ratification with the United Nations Secretary-General. Since then, Australia, Mexico and Morocco are the only other countries to have ratified the agreement, bringing the total number of states to eight.[26] A further five countries, being France, Guatemala, India, Peru and Romania, are signatories to the treaty but they have as yet made no effort to ratify the provisions of the treaty.[27]

The Moon Agreement substantially reaffirms or extends the existing body of space law, especially the 1967 Outer Space Treaty. Unlike the other space law treaties, the Moon Agreement imposes specific obligations on parties undertaking the exploration and exploitation of celestial body resources. For example, the use of celestial bodies "shall be carried out for the benefit and in the interest of all countries, irrespective of the degree of economic or scientific development"[28] and "due regard shall be paid to the interest of present and future generations as well as to the need to promote higher standards of living".[29]

More controversially, the treaty provides in Article 11 that "the Moon and its natural resources are the common heritage of mankind" and requires the establishment of an international régime, "including appropriate procedures, to govern the exploitation of the natural resources of the Moon as its exploitation is about to become feasible".[30] One of the main purposes of this international régime is, among other purposes, "an equitable sharing by all State Parties in the benefits derived from those resources, whereby the interest and needs of the developing countries, as well as the efforts of those countries which have contributed either directly or indirectly to the exploration of the Moon, shall be given special consideration".[31]

The United States and most developed countries objected to the interpretation of the "common heritage" principle as given by the developing countries in the concurrent debates on the Convention on the Law of the Sea. The central concepts of this interpretation, which include the lack of private property rights in property deemed to be the common heritage of mankind, the creation of an supranational organisation and the distribution of benefits to the developing nations regardless of the level of participation, eventually compelled the United States to withdraw support for the Moon Agreement.[32]

## COMMON HERITAGE OF MANKIND AND PROPERTY RIGHTS

### A. Common Heritage of Mankind and the Moon Agreement

The concept that certain locations and resources are the common property of mankind is not unique in the Moon Agreement. It was suggested in 1910, for example, that Antarctica should become the common possession of the international community.[33] The same concept was proposed for outer space, with Argentina and the United States submitting draft treaties to COPUOS in the 1970s stating that "the natural resources of the Moon and

other celestial bodies shall be the common heritage of all mankind".[34]

Debates on the same provision in the 1982 Convention on the Law of the Sea quickly caused the United States and other developed countries to abandon the principle and its support for the Moon Agreement. While the United States argued that the principle did not "embody any substantive rules or a predetermined legal régime to regulate activities", they nonetheless refused to take the risk of being imposed an interpretation that is adverse to its interests.[35] The developing countries, on the other hand, interpreted the principle as incorporating the following concepts found in the interpretation of the Convention on the Law of the Sea:

a) An international authority will govern resource exploitation;

b) The international authority will be empowered to undertake mining activities on celestial bodies;

c) Exploitation of resources that will adversely affect the economies of developing countries are prohibited;

d) Profits will be taxed and distributed among all nations; and

e) The technology relating to the extraction of the resources must be transferred to the international authority.[36]

## B. The Deep Seabed Analogy

With the Law of the Sea Convention, an International Seabed Authority is created and is charged with the responsibility to licence and regulate mineral exploration and exploitation in the seabed.[37] The Convention also creates an intergovernmental mining company to participate in the exploration and exploitation of resources in competition with licensed private companies.[38] This is the result of a long disagreement between the developed and developing countries being resolved in recent years.

Under the original Law of the Sea régime, a private mining company must be "sponsored" by a state party to the Convention and apply to the International Seabed Authority. The company is required to pay a specific portion of its mined resources or profits to the Authority and must transfer the technology utilised in its mining efforts to the intergovernmental mining company on a "fair and reasonable commercial basis".[39] The Authority covers its own costs from the compulsory payments of the mining companies and distributes the profits to developing countries.[40] The number of licences awarded to a country and the amount of resources to be extracted from a specific location within a specified time period is limited by the Authority.[41]

Furthermore, the developing countries collectively control the licences for the exploitation and use of deep seabed resources.[42] Most developed countries, including the United States, Japan and numerous Western European countries, refused to sign the Convention and instead signed a Provisional Understanding Regarding Deep Seabed Matters between themselves in 1984, resolving the issues governing deep seabed mining between themselves.[43]

This conflict relating to the law regulating the deep seabed continued until the Convention was about to come into force in 1990. As a result of the desire to bring the developed countries into one common régime, the Convention on the Law of the Sea was revised, reducing the application and annual fees of the licences as well as other changes, including the abolition of mandatory transfers of technology and production ceilings. The distribution of revenue and resources were to be determined by the Committee of the Authority at a later time, with the United States given a more powerful role in the control of the Authority.[44] The United States and several other developed countries subsequently became signatories to the Convention.

## C. Differences in Interpretation of the Moon Agreement

Many scholars have argued that there are significant differences between the Moon Agreement and the Convention on the Law of the

Sea, requiring the "common heritage of mankind" provision of the Moon Agreement to be interpreted differently. Wording similar to Article 11 of the Agreement, which provides for "the equitable sharing ... in the benefits derived from those resources", is absent in the Convention on the Law of the Sea. This lends further support to the proposition that the comparison cannot be made between the two treaties.[45]

There are several other points raised by the proponents of the Moon Agreement with respect to the interpretation of the "common heritage of mankind" provision. Firstly, the principle applies only to the resources of the celestial bodies prior to their removal, which means that ownership may be exercised over them after mining.[46] Secondly, since the treaty provides for the sharing of "benefits", rather than "resources" or "profits", to be distributed on an "equitable", rather than "equal", basis, the treaty provides for the mining State to determine how, and in what manner, it will share in these benefits.[47] Furthermore, Article 11(2) has been seen to expressly forbid the "common property" approach advocated by developing nations, involving an implied joint ownership over the resources.[48]

Regardless of the numerous differences pointed out by the United States and other developed countries, it is unlikely that the developing countries would adopt an interpretation which is adverse to their own interests. Even if the Moon Agreement régime does not eventually parallel that of the International Seabed Authority, "the sharing of benefits mandated by the developed countries' interpretation ... would effectively stifle the development of celestial body resources by private enterprise".[49] The international community needs an interpretation of the "common heritage of mankind" provisions that would be acceptable to all countries as well as maintaining commercial interests in lunar mining projects.

## D. Prohibition of the Grant of Private Ownership

With respect to property rights, the Moon Agreement explicitly prohibits the creation of them on celestial bodies. This coincides with the legal characterisation of space as being the "common heritage of mankind" and therefore it should not be subjected to any form of private ownership.

In addition, there are also many policy reasons for this prohibition. Firstly, should national governments begin to legislate for the granting of property rights on celestial bodies, different governments may grant similar rights to the same asteroid, for example, to two different companies. While it is unlikely that a skirmish in space would occur between the two disputing claimants, this would undoubtedly cause endless litigation to take place with no apparent international legal solution.

Secondly, the creation of private property rights may exclude future exploration and exploitation ventures on the celestial bodies in question. Where a country like Tonga, which has no space capability, has managed to profit substantially by exploiting the flaws of the "paper satellite" dilemma, many other countries may similarly establish ownership over many valuable resources in space, preventing future exploitation.

Thirdly, the creation of private property rights would make the uniform preservation and conservation of the celestial environment impossible. Being the "common heritage of mankind", the world should ensure that the environments of the celestial bodies are significantly protected — an aim that would be defeated, at least in part, by the creation of national property rights.

## E. Forms of Property Rights Available under the Agreement

Notwithstanding the express prohibition of private ownership, the Moon Agreement clearly intends for limited property rights to be available for future resource development on celestial bodies. Article 11 Paragraph 3 of the Agreement states that "the foregoing provisions are without prejudice to the international régime referred to in Paragraph 5 of this Article."

In other words, Paragraph 3 only serves to expressly prohibit the creation of full property rights amounting to ownership by national governments and the granting of property rights by possession and occupation. It does not prevent

for the creation of property rights, even full ownership, by an international régime regardless of the absence of physical occupation. It is clearly anticipated that the international régime, when created, would provide for leases or licences for the purposes of mining and other forms of exploitation in a similar way to which domestic mining leases are granted in Australia.

## THE NEED FOR A NEW RÉGIME

Since existing space law does not allow for sovereignty or ownership in outer space, there is the difficulty of maintaining the interest and investment of governments and private individuals on Earth that have the necessary resources and technology but no guarantee of a stable legal environment. This failure of space law to provide any form of legal security for investments and ventures remains a strong inhibitor in commercial space development.[50]

However, the biggest problem with the existing Moon Agreement is that it does not create an international régime but instead calls for one to be set up by the State Parties to the treaty. The vague uncertainties surrounding the requirement to distribute the benefits derived from the exploitation and use of the resources from celestial bodies remains a crucial disincentive for investing in commercial space activities. For the future of outer space exploitation of resources, an international legal régime should be created.

The Moon Agreement provides that the State Parties shall meet ten years after the treaty entered into force to review the treaty provisions and negotiate the creation of the international régime.[51] That date passed on 11 July 1994 with no hint of any imminent negotiations between the State Parties on establishing the legal régime. With a similar régime being adopted for the exploitation of deep seabed resources and with the developing countries more willing than ever before to balance commercial priorities with their "new economic order", there appears to be no better time to establish and implement a new legal régime than the present.

While the provisions of the Moon Agreement remain unsatisfactory, there are certain advantages to remain within the framework of the treaty. For instance, the State Parties are accorded basic exploitative rights that are not accorded to non-parties. While, among the signatories, only Australia, France and India can be considered to have space capabilities, national entrepreneurs may well be already looking for flag-of-convenience countries as bases for communications and remote sensing activities.[52]

Furthermore, only the State Parties to the treaty will have a role in creating the new Moon organisation and it will be these countries that determine the powers and duties of the organisation. Similarly, only the State Parties to the treaty can effect distribution of benefits on an equitable basis, while taking into account the interests of the less-developed countries, as well as the efforts of the states engaged in space exploitation. While there is a possibility that an alternative system may well be created by countries not parties to the Moon Agreement, it is unlikely that such a system would be negotiated without consultation and participation by existing State Parties to the treaty.[53]

It was for these reasons that the Space Law Committee of the International Law Association urged the early ratification of the treaty by the United States in 1982, a decade before the dispute over the interpretation of the "common heritage of mankind" clause in the Convention on the Law of the Sea was resolved to the satisfaction of the United States.[54] Indeed, the United States and the developed countries of Western Europe would benefit greatly from participating in the development of a new régime satisfactory to their interests rather than keeping themselves out of playing a substantial role in achieving what they want out of the new system.[55]

## CREATING AN UNIQUE RÉGIME

Since the Moon Agreement was finalised in 1979, there have been many proposals relating to legal régimes for the exploitation of celestial body resources, ranging in ambition from a basic implementation of the terms of the Moon Agreement to a complete overhaul of the existing space law framework. There is considerably

scholarly disagreement over the nature, composition, powers and functions that such a régime should have and it is unlikely that an acceptable régime could be agreed upon and implemented in the near future.

### A. Composition

As Webber has suggested, an autonomous panel of individuals who are not dominated or controlled by any nationalistic entities should govern the régime. He proposed that a small working group of delegations within COPUOS could formulate a list of space law scholars with the necessary qualifications to be considered. These nominees would not be approved without obtaining the consensus of all COPUOS members. "The COPUOS working group should nominate individuals with the legal and technical expertise necessary to guide lunar resource development and a global vision that transcends national boundaries" and persons that represent their governments in any official capacity should be excluded from selection.[56]

### B. Functions and Powers

The régime would mainly constitute a licensing system that takes into consideration commercial viability, future access and environmental protection. This licence, to be granted for a sufficiently long period of time, should not be regarded as a conferral of permanent property rights over the area but the resources should be exclusively controlled by the licensee.[57] Under such an international régime, the licence should be sufficient to provide adequate protection for investors seeking security in their investments.

### C. Sharing of Profits

Some scholars have suggested that a taxation system that would provide the funds to the international authority as a means to cover costs and even a moderate sharing of profits to developing countries.[58] This is unlikely to be acceptable to developed countries, such as the United States, as this would provide an uncomfortable precedent for international organisations being given the power of taxation over the activities of private individuals.

Realistically, notwithstanding the views of the commercial entrepreneurs, the developing countries are likely to insist on at least a moderate sharing of profits. Hoffstadt proposes a Lunar Commission that sets a maximum return on investment for the privately-owned company in a similar way that Public Utilities Commissions in the United States operate.[59] The company would keep any profits under this maximum and any surplus is either split between the company and the Commission or given totally to the Commission.[60] The Commission would adjust the maximum periodically, keeping into account the commercial risks involved and the level required to attract investors to any commercial space venture. The portion of the surplus collected by the Commission could be used to defray its own costs or channelled into an international organisation such as the World Bank and distributed to the developing nations.[61] Such a system should be satisfactory to the majority of developing countries.

### D. Property Rights

The absence of sovereignty and property rights in space expose commercial space ventures to risk. Proposals to amend the space treaties to provide for private land ownership or mining leases are inconsistent with the lofty principles of outer space law and would not prevent the "paper satellite" problem that has plagued the International Telecommunications Union in its allocation of the geostationary orbit.[62]

The suggested Lunar Commission, with its grant of licences, should provide adequate security provided that the régime is recognised and respected by the international community. In addition, a lunar patent system guaranteed for a certain number of years would protect the investment returns on any developed lunar technology, after which it would become freely available to the world.[63] Together, such a system should be adequate to provide investors with sufficient confidence that the products and technologies produced are secure from expropriation, at least for a substantial period of time.

## E. Timing

The Lunar Commission should be established before nations or private enterprises begin to acquire economic interests on the Moon by commencing the development of lunar resources. It would be difficult to assert external control and jurisdiction once national entities establish a commercial presence on the Moon.[64] As Webber pointed out, "Celestial bodies offer an unique opportunity to implement a global approach to problems in an environment untainted by nationalistic interests."[65] The fact that there are no national territorial claims, nor any proclaimed development or economic rights, on the Moon or any other celestial body would assist in enabling the international community to agree to a uniform régime.

As mentioned above, with the revision of the Convention on the Law of the Sea and with the developing countries expressing an unprecedented willingness to accommodate commercial priorities and interests on international issues, this is the best time to negotiate and implement a new régime.

## CONCLUSION

The existing legal framework, as provided by the space law treaties, is clearly deficient in that it has failed to establish a régime for the commercial exploitation of resources on the Moon and other celestial bodies. This deficiency is due to the failure of countries to agree to an international legal régime rather than any express provisions in the treaties themselves that are adverse to commercial interests.

As technology continues to develop, the absence of a stable and uniform legal framework remains the primary obstacle to any commercial development in outer space. Before people develop the mentality that space is a lawless realm where occupation and force, should be used to protect commercial interests in space, a celestial body resource régime that is free of national influences and promotes the interests of all mankind in the exploration and peaceful use of space as well as facilitating commercial development should be established.

[1] U.S. Senate Committee on Commerce, Science and Transportation, 96th Congress, 2nd Session, *Report on Agreement Governing the Activities of States on the Moon and Other Celestial Bodies* (1980) at 414.

[2] Heim, "Exploring the Last Frontiers for Mineral Resources: A Comparison of International Law Regarding the Deep Seabed, Outer Space and Antarctica" (1990) 23 Vand J Trans L 819 at 831.

[3] Lunar and Planetary Institute of the NASA, *Extraterrestrial Materials Processing and Construction* (1980) NSR 09-051-001.

[4] Lewis and Lewis, *Space Resources: Breaking the Bonds of Earth* (1989) at p 394. This valuation was in 1989 and would be significantly higher today.

[5] Webber, "Extraterrestrial Law on the Final Frontier: A Régime to Govern the Development of Celestial Body Resources" (1983) 71 Georgetown LJ 1427.

[6] Vassilevskaya, "Notions of 'Exploration' and 'Use' of Natural Resources of Celestial Bodies" (1977) *Proceedings of the 20th Colloquium on the Law of Outer Space* 473.

[7] U.S. Senate Committee Report, *supra* note 1, at 416.

[8] "The combination of lower real transportation costs from Earth to low Earth orbit and the 1000:1 mass payback ratio for asteroidal volatiles and metals should permit lowering the cost of large-scale space activities in near Earth space by a factor of 20,000". Lewis and Lewis, *supra* note 4, at p 393.

[9] *Ibid.* at 418.

[10] Webber, *supra* note 5, at 1428.

[11] Hoffstadt, "Moving the Heavens: Lunar Mining and the 'Common Heritage of Mankind' in the Moon Agreement" (1994) 42 UCLA L Rev 575 at 577.

[12] Mayur, "Solar Power Satellite and Third World Energy Future in Space Manufacturing" (1991) 7 *Space Resources to Improve Life on Earth* 158.

[13] Twibell, "Space Law: Legal Restraints on Commercialisation and Development of Outer Space" (1997) 65 UMKC L Rev 589 at 631.

[14] Zuppero, "Discovery of Abundant, Accessible Hydrocarbons Nearly Everywhere in the Solar System", in Johnson, *Engineering, Construction and Operations in Space* (1996), p 791.

[15] Twibell, *supra* note 13, at 632.

[16] Lewis, *Mining the Sky* (1983) at 138.

[17] Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, GA Res 1962, 18 UN GAOR Supp (No 15) at 15 (UN Doc A/5515) and Article I of the Outer Space Treaty (1967) 610 UNTS 205; 18 UST 2410; 6 ILM 386. In space law, "province of mankind" has the same meaning as "benefit of mankind": Christol, *The Modern International Law of Outer Space* (1982) at p 252.

[18] All the early United Nations declarations include this notion. Article I of the Outer Space Treaty provides that "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." This applies also to the exploitation of natural resources: Christol, *supra* note 18, at p 39 and Ogunbanwo, *International Law and Outer Space Activities* (1975), at p 65.

[19] The resolutions stated the intention of the international community that it should "avoid the extension of present national rivalries into this new field": GA Res 1348, 13 UN GAOR Supp (No 18) at 5 (UN Doc A/4090). Article II of the Outer Space Treaty has not been interpreted to limit appropriation of celestial body resources: Ogunbanwo, *supra* note 19, at p 217; and Christol, *supra* note 18, at p 227. However, the contrary view can be found in Marcoff, "Accords Particulars et droit international general de l'space" (1972) *Proceedings of the 15th Colloquium on the Law of Outer Space* 167.

[20] Although the General Assembly declarations recognised that space should be used exclusively for peaceful purposes, Article IV of the Outer Space Treaty limits the peaceful purposes provision in scope to the Moon and other celestial bodies. See Christol, *supra* note 18, at pp 22-36.

[21] Article III of the Outer Space Treaty provides that "international law, including the Charter of the United Nations", applies to outer space and celestial bodies.

[22] The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (1968) 672 UNTS 119; 19 UST 7570; 7 ILM 149 (the Rescue Agreement).

[23] The Convention on International Liability for Damage Caused by Space Objects (1972) 24 UST 2389 (the Liability Convention).

[24] The Convention on Registration of Objects Launched into Outer Space (1975) 1023 UNTS 15; 28 UST 695; 14 ILM 43 (the Registration Convention).

[25] For a brief discussion on the provisions of these treaties and its relevant to celestial body resource development, see Raclin, "From Ice to Ether: The Adoption of a Régime to Govern Resource Exploitation in Outer Space" (1986) 7 J Intl L Bus 727 at 732-735.

[26] U.N. O.O.S.A., *United Nations Treaties and Principles on Outer Space* (1994).

[27] *Ibid.*

[28] Article 4(1) of the Moon Agreement.

[29] *Ibid.*

[30] Article 11 of the Moon Agreement.

[31] *Ibid.*

[32] U.S. Senate Committee, *supra* note 1, p 134.

[33] Carroll, "Of Icebergs, Oil Wells and Treaties: Hydrocarbon Exploitation Offshore Antarctica" (1984) 36 Stan L Rev 207 at 219.

[34] Menter, "Commercial Space Activities Under the Proposed Moon Agreement" (1979) 7 Syracuse J Intl L 183 at 188.

[35] Raclin, *supra* note 26, at 738-739.

[36] White, "The Common Heritage of Mankind: An Assessment" (1982) 14 Case W Res J Intl L 509 at 535, citing Borghese, "Preface to the Emerging Ocean Régime" in *Pacem in Maribus* (1971) at p 161.

[37] Articles 156-169 of the Convention on the Law of the Sea.

[38] Article 170 of the Convention on the Law of the Sea.

[39] Articles 173 and 144 as well as Annex III of the Convention on the Law of the Sea.

[40] Article 140 of the Law of the Sea Convention.

[41] Article 15 of the Law of the Sea Convention.

[42] Raclin, *supra* note 26, at 742.

[43] Young, "Antarctic Resources Jurisdiction and the Law of the Sea: A Question of Compromise" (1985) 11 Brook J Intl L 45 at 62; and Malone, "Law of the Sea and Oceans Policy" [October 1981] *Department of State Bulletin* at p 48.

[44] Hoffstadt, *supra* note 11, at 598-605.

[45] Menter, *supra* note 40, at 188; and White, *supra* note 42, at 529. In contrast, the Convention on the Law of the Sea left it to the countries themselves to decide how the "common heritage of mankind" clause was to be given effect.

[46] US Senate Committee, *supra* note 1, at 30.

[47] *Ibid.*, at 18; and White, *supra* note 42, at 530.

[48] Rana, "'Common Heritage of Mankind' and the Final Frontier: A Revaluation of Values Constituting the International Legal Régime for Outer Space Activities" (1994) 26 Rutgers LJ 225 at 248-249.

[49] Webber, *supra* note 5, at 1446-1447. Arguably, even if the US interpretation of the treaty prevailed, "no private enterprise or ... government ... [w]ill invest billions of dollars in developing new commercial applications of space technology if most of the world disputes its legal right to deploy and profit from that technology": Dula, "Free Enterprise and the Proposed Moon Agreement" (1979) 2 Hous Intl LJ 3 at 16. However, some have taken a contrary view: see Menter, *supra* note 40, at 37.

[50] Keefe, "Making the Final Frontier Feasible: A Critical Look at the Current Body of Outer Space Law" (1995) 11 Computer & High Tech LJ 345 at 361.

[51] Article 18 of the Moon Agreement.

[52] Christol, "Current Development: The Moon Agreement Enters into Force" (1985) 79 AJIL 163 at 166.

[53] Raclin, *supra* note 26, at 755.

[54] International Law Association, [1983] *Report of the Sixtieth Conference* at 12.

[55] After all, they could withdraw at any time during the negotiations, as the United States did during the debates on the Convention on the Law of the Sea.

[56] Webber, *supra* note 5, at 1451-1452.

[57] *Ibid.*, at 1453-1454.

[58] *Ibid.*, at 1456.

[59] Hoffstadt, *supra* note 11, at 614-615.

[60] Naturally the former option would be more appropriate as it provides an incentive for the company to obtain profits over and above the maximum return on investment set by the Commission.

[61] Kamenetskaya, "On the Establishing of World Space Organisation: Some Considerations and Remarks" (1989) *Proceedings of the 32nd Colloquium on the Law of Outer Space* 358 at 359.

[62] While amendment of the Outer Space Treaty and the Moon Agreement is relatively simple, this would require a

wholesale rethinking of the space law framework and is thus impractical; Twibell, *supra* note 13, at 635. A proposed system of leases regulated by an international body would have similar flaws; Keefe, *supra* note 56, at 366-367.

[63] Hoffstadt, *supra* note 11, at 616-617.

[64] Taubenfeld, "A Régime for Outer Space" (1961) 56 NW U L Rev 129 at 166; and Christol, *supra* note 18, at 1.

[65] Webber, *supra* note 5, at 1451.