



more concrete form - from this conquest. It was from this viewpoint that proposals were made to the United Nations<sup>4</sup> for an international treaty concerning the Moon to be drafted. On 29 November 1971, the United Nations General Assembly adopted Resolution 2770 (XXVI) and requested the Committee on the Peaceful Uses of Outer Space (COPUOS) to consider the question of elaborating a draft international treaty concerning the Moon. The expectations of long or short-term benefits to be derived, whether economic, peaceful or non-aggressive, the military and reconnaissance advantages in the interests of the developing countries as well as those of most industrialized states - be it exploitation of natural resources or political prestige - explained the requests for preparing a Moon treaty, as quickly as possible.<sup>5</sup>

Despite the diligent speed and attempts made to reach an agreement, many years passed before a result was achieved. On 5 December 1979 an "Agreement Governing the Activities of States on the Moon and Other Celestial Bodies" was adopted by the General Assembly, and opened for signature thirteen days later.<sup>6</sup>

Thus, as we plan our trips to the Moon (and then to Mars), we ought keep in mind the international legal framework that already exists. However - while many general principles can be found in the other space treaties<sup>7</sup> - it has often been considered that mostly - if not only - the Moon Agreement is

likely to play a prominent role or serve as an example of the kind of legal rules governing the future exploration and use of the Moon and other celestial bodies and related activities, in outer space. Unfortunately, as matters now stand, it seems that this is not the role the Moon Agreement is likely to play : it being ignored so far by the major players in the anticipated space ventures, it might be dismissed as of no consequence. In the twelve years gone by since it was opened for signature, only 8 States have ratified the Moon Agreement.<sup>8</sup> The major space powers, United States and Russia, have not become parties to it.

Why this is so - and what, if anything - can be done to remedy this situation, will be considered below. But, before beginning the discussion of the existing and future legal implications of the exploration and uses of the Moon and other celestial bodies, it would be useful to give a brief description of some of the activities that could be undertaken, on the Moon/Mars, in the years to come.

## II. A Return to the Moon and a Journey to Mars

The SEI is to provide a focus so as to allow the United States "to gain control of [her] destiny in space".<sup>9</sup> *Inter alia*, the SEI will involve missions by robots and humans; it is aimed at advancing science and engineering and at re-establishing the leadership of the United States in space; the SEI will provide direct and

indirect benefits to us on earth; it is intended to push the commercialization of space to the forefront; etc.<sup>10</sup>

Thus, a plan has been placed before us, a plan to go to the Moon and Mars, to stay there, to explore them, and to exploit their resources. There is no doubt that these bodies are rich in natural resources. The Moon, for example, has aluminium, calcium, iron, silicon, and small amounts of chromium, magnesium, manganese, and titanium.<sup>11</sup> In addition, it has oxygen and sulphur, which - along with other minerals - will allow for the manufacture of ceramics, concrete, and metallic compounds which could be used to build roads and housing and other structures.<sup>12</sup>

An American company, Carbotek Inc. of Houston has come out with a process whereby oxygen can be extracted from lunar materials.<sup>13</sup> The oxygen can be used, by Moon settlers, as fuel and as air, and the waste products of the process could be made use of as building materials.<sup>14</sup> Then, it is estimated that a stable isotope of helium - helium-3 - around 1 million tons of which exists just below the Moon's surface, can be used to generate power.<sup>15</sup> Detailed research has also been undertaken regarding the planning of a "Lunar Power System" whereby solar energy would be collected on the surface of the Moon and beamed down to earth.<sup>16</sup>

To add briefly to the above enumerations, zero gravity derived drugs and other materials, the geological historical records of the Moon

that could throw light on the origins of the universe, the absence of any atmosphere that would greatly enhance the utility of telescopes in astronomy, etc.,<sup>17</sup> are other attractions that lie on or in the earth's natural satellite.

The attractions that Mars holds for us are many. In addition to its natural resources, it is believed that life may have existed on that planet, in its past.<sup>18</sup> This alone could be a reason for travel to Mars.

The question now arises whether we have the wherewithal to undertake these missions. At the present moment, it is doubtful if either the money or the technology exists to send humans to the Moon and thereafter to Mars, as per the SEI scenario.<sup>19</sup> However, it is certain that, at this moment in time, we are technically capable of sending robots to these celestial bodies, as precursors to human missions. By way of assisting and complementing human presence on these bodies, plans are being made to launch such missions to the Moon,<sup>20</sup> and to Mars,<sup>21</sup> and this has thus led to the development of automation and robotic (A&R) technologies.<sup>22</sup>

Robotic missions would gather information vital for human missions; for example, they would obtain geological, gravitational and atmospheric data, assist in choosing landing sites, study the chemical compositions of the celestial bodies, vibration in the Martian crust, and so on.<sup>23</sup> Unfortunately, latest reports indicate that the United States may have to curtail even these

activities, due to lack of funds and possibly due to unfavourable reaction by the American public.<sup>24</sup>

In addition to the United States, other countries intend to send robotic missions to the Moon and Mars. For example, Russia has plans to send robots and scientific devices to Mars, with some such instruments being provided by France, cameras by Germany, and the European Space Agency making a financial contribution towards a computer memory.<sup>25</sup> Japan is aiming for a 1996 satellite launch to Mars, to investigate Martian solar winds.<sup>26</sup> Initially, the Russian effort ran into financial problems, but France and Germany have agreed to aid the missions.<sup>27</sup>

Presuming then, that in time, humans do go to the Moon/Mars, and settle there, the next problem that will have to be addressed is : what resources are - or could be made - available so as to enable us to stay on these bodies and explore and exploit them ?

The consensus is that, once our astronauts have reached the Moon/Mars, the best way of maintaining them there is to see that they become self-reliant, self-sufficient, using the materials and minerals they find at hand to wean themselves from earth-based support.<sup>28</sup> As one author has aptly put it, "[T]he lunar base inhabitants must be given technological, political and philosophical capabilities to expand the base at their own rate, for their own needs, and in their own way. . . . The lunar base must not be forced

into a mode where expansion of living area is dependent on the Earth-bound fabrication of another tin can, or on the politics of budgets and launch schedules. The base crew must be able to expand their quarters or resources using local materials . . ."<sup>29</sup>

It has been acknowledged that an abundance of power is another essential that would be needed to ensure the survival of a base on the Moon or Mars<sup>30</sup> and it has been argued that nuclear technology would be preferable, for reasons of cost, long life-time and reliability, for use in transportation to and from the celestial bodies in question, and for use in power systems thereon.<sup>31</sup>

The use of nuclear power in space is a very controversial issue. The danger the nuclearization of space poses to the environments of both outer space and of earth, and the fear that it will be used for military non-peaceful purposes in outer space are but two objections that have been put forward against the use of nuclear power in space.<sup>32</sup> However, the practical advantages of having nuclear-powered energy sources cannot be denied, for the reasons given in the preceding paragraph. Hence, it is time the international community had another look at the use of nuclear power in outer space. Acknowledging the fact that as we, on earth, do not want a repeat of the *Cosmos 954* incident,<sup>33</sup> we could consider the safe use of nuclear power for the journey to Mars, and also for its very carefully

regulated use on the Moon/Mars.

### III. The Moon Agreement

Before embarking on a discussion of the Moon Agreement, a quick look at the other space treaties<sup>34</sup> assure us of their applicability to the activities discussed above.<sup>35</sup> The Outer Space Treaty generally regulates the activities of humans - and their machines - in outer space and on the celestial bodies. The Rescue Agreement, the Liability Convention, and the Registration Convention are detailed elaborations of certain specific provisions of the Outer Space Treaty.

As regards the Moon Agreement, it was seen above that it was adopted in 1979, about 8 years after the U.N. General Assembly requested COPUOS to begin work on a draft treaty for the Moon. The "tortuous progress of deliberations"<sup>36</sup> was a result of differences of opinion with respect to, basically, three issues. These were the issues concerning the scope of the treaty, information to be furnished concerning activities on the Moon, and the manner in which the Moon's natural resources should be used. There was general agreement, however, that the question of the use of the Moon's natural resources was the most important factor, and it was this issue that held up the conclusion of the treaty.

Consensus was finally reached with respect to these subjects and the Agreement was opened for signature. However, as stated above, just a handful

of States are parties to it.<sup>37</sup>

The most important reason for this state of affairs is the refusal of the United States to accede to the Agreement. Her ratification is being delayed, or opposed outright, by her private industry, which has articulated concern that, by ratifying the Agreement, the United States would be abandoning major interests without obtaining anything in return.<sup>38</sup> This argument stems from the controversial "Common Heritage of Mankind" (CHM) concept, and the so-called "international regime", that is to be formed, to exploit the CHM.

Before beginning a discourse on the CHM concept, a general examination of the more important Articles of the Moon Agreement could prove to be an instructive exercise, to determine which of these provisions could be amended, if needed to make the treaty more clear.

The Agreement - an elaboration of certain principles provided for in the Outer Space Treaty - is a composite of general principles and specific provisions outlining permissible activity on the Moon and other celestial bodies. There are three key provisions in the Moon Agreement which serve to establish state conduct for the Moon and other celestial bodies.

Article IV (1) provides, *inter alia*, that the exploration and use of the Moon shall be "the province of all mankind and shall be carried out for the benefit and in the interests of all countries".

How this benefit is to be measured and when and how it is to be passed to these countries is not explained in the Agreement. This is one provision that requires elucidation to make it more comprehensible.

The second key principle of the Agreement is that freedom of scientific investigation must be undertaken without discrimination and on the basis of equality and in accordance with international law (Art. VI, para. 1). The third principle is that the Moon and its natural resources are declared to be the common heritage of mankind (Art. XI, para. 1). We will come back to Article XI later.

Thus, we have a treaty that aims at the regulation and conduct of human activities on the Moon and other celestial bodies.<sup>39</sup> Therefore, it might be said that, in theory, a legal regime for Mars already exists. But this is neither here nor there, because the major space powers are not party to the Moon Agreement; the treaty does not create either obligations or rights for them, without their consent.<sup>40</sup> Although the rules set out in the treaty can become binding on third States through international custom,<sup>41</sup> there is no doubt that, at least with respect to the CHM principle (the one main issue that has kept the United States from ratifying the Agreement), no norm of international customary law has yet been formed.<sup>42</sup> It is not to be denied that, though the CHM concept is, to some, nothing

more than a mere statement of attitude, it is, to others, a recognized, even if nascent, principle of international law.

The CHM concept is incorporated into Article XI, the "heart" of the Agreement,<sup>43</sup> without which the treaty would merely serve to define and to develop the provisions of the other space treaties, "in relation to the moon and other celestial bodies".

The Moon Agreement has the distinction of being the first treaty in force to give effect, in international law, to the CHM concept. It has also been given normative recognition in the United Nations Convention on the Law of the Sea.<sup>44</sup> Five "elements" of the common heritage principle have been identified, in general: a) the area under consideration cannot be subject to appropriation; b) all countries must share in its management; c) there must be an active sharing of the benefits reaped from the exploitation of resources; d) the area must be dedicated to exclusively peaceful purposes; and, e) the area must be preserved for future generations.<sup>45</sup>

The distinctive characteristic of the Common Heritage principle is the commitment that all countries must share in the management of the area in which the exploitable natural resources are found. This resolution has been expressed in the Moon Agreement in Article XI, paragraphs (5),<sup>46</sup> (6),<sup>47</sup> and (7).<sup>48</sup>

The "international regime" that the States Parties to the Moon Agreement "undertake to establish", as soon as

exploitation of the natural resources of the moon becomes "feasible", is the key that holds the solution to the future of the Moon Agreement. It is to this aspect of Article XI, we now address ourselves.

#### IV. The International Regime

##### a) Present situation

Article XVIII of the Moon Agreement provides for the revision or the review of the Moon Agreement ten years after it has come into force.<sup>49</sup> This tenth year will be 1994. We thus have before us an opportunity to make the Agreement more acceptable to the international community. This chance should not be lost.

However - before embarking on a discussion on what possible solutions may lie with regard to a revision of the Agreement - we have to keep in mind one very important fact. Present technology may not allow practical implementation of a full-scale exploitation of moon resources. It has been pointed out that we are yet to identify lunar surface technologies.<sup>50</sup> In fact, the new NASA administrator, Daniel S. Goldin, has admitted that the return to the Moon and the trip to Mars "would take decades and require a greater depth of planning than is currently available".<sup>51</sup>

Therefore, taking into consideration what was said in the preceding paragraph - although we could, in our imaginations, let our technologies take us, without restraint, in all directions in outer space - we ought, as we today contemplate regulation of

the anticipated journeys to the celestial bodies, heed the principle *nécessité fait loi* (necessity makes law). Thus, we must make rules not for what is fantasized, but for what is required. Let us not regulate in haste so that our children may repent at leisure !

It is obvious that, today, the CHM, is one area where the principle *nécessité fait loi* can be - and should be - applied. It is necessary that the insecurity created by Article XI's CHM components (international control and sharing of benefits) that have been the principal causes for U.S. non-ratification of the Agreement, be cleared up.

More importantly, creating legal certainty with respect to these issues may well lead to a joint international effort to develop the technology to profitably exploit the resources of the moon.

It is Article XI, paragraph 5 which lays down the sequence in which an international regime is to be created : only in the event that the exploitation of the moon's natural resources are "about to become feasible", then the States Parties to the Agreement "undertake to establish an international regime ... to govern the exploitation" of these resources.

Currently, only the United States and, possibly, the Russian Federation, have the means to undertake feasibility studies into the "exploitation potential" of the moon's resources. The U.S. has even demonstrated its ability to place men and materials on the moon to conduct such studies.

A substantial financial investment will be required for merely making a feasibility study, even assuming that current technology permits such an undertaking. In the long run, at least where the United States is concerned, private industry will play a part in this venture, and in future resource exploitation. Indeed, it is a well-accepted fact that if private enterprise takes an interest in the SEI, it will develop quickly.<sup>52</sup> However, it is this private sector that has been the most vociferous in opposing U.S. ratification of the Agreement, because it is not willing to invest large sums of money on a moon project, and thereafter not get an adequate return. An international regime set up after substantial investments have been made in exploring the possibilities of exploiting the resources of the moon, could possibly hinder the efforts of U.S. industry to collect any profits made from its lunar projects. As seen above, this legal uncertainty has kept the United States from ratifying the Agreement.

It must be kept in mind that, if there is no exploration, we will not be able to determine when "exploitation is about to become feasible", to use the wording of Article XI (5). More importantly - as the provision is currently phrased - if an international regime is established before the near feasibility of exploitation is determined, this could be regarded a violation of Article XI (5) !

Thus, in the 1994 review,

what is required is that the Agreement be revised or modified, so as to first create the "international regime". This regime would undertake to explore the Moon, make a feasibility study of the exploitation of the resources of the moon, conduct any exploitation, and ultimately share out the benefits derived. Conditions for membership in the regime, contributions to be made, the method of distributing profits, if any, etc. would all be predetermined by the agreement that would form the international regime, and thus lend certainty to the endeavour.

Thus, it is recommended that the sequence of events, as currently laid out in Article XI, paragraph 5, be modified, so that the establishment of the international regime is not made conditional on the anticipated feasibility of the exploitation of the Moon's resources.

Once it has been finalized that an international regime should be formed, the next issue to be decided would concern its structure. Any attempt to discuss possible mechanisms to regulate lunar exploitation should take into consideration structures which have already been successful in the use of outer space for economic purposes.

One such organization is the International Telecommunications Union (ITU), which provides the technical management and machinery to ensure optimum use of the geostationary orbit and radio frequencies. However, the ITU could be an unsuitable model because it coordinates



individual national efforts, and resource utilization depends on the State's technical and financial capabilities.<sup>53</sup> The investment in money and time required, to fully explore and exploit lunar natural resources, is global in nature, needing the attention of more than just one State.

However, it must be said here that the ITU provides an excellent example of the principle of *nécessité fait loi*. At the ITU, law expanded with technology and its application through periodic World Administrative Radio Conferences: all member States benefit as such from equitable, economic, efficacious, and interference-free radio communications through ITU's control of the radio spectrum and the geostationary orbit.<sup>54</sup> It is this characteristic of ITU that is desirable in the Moon Agreement. It has to have this flexibility to survive.

A more appropriate model would be INTELSAT,<sup>55</sup> the International Telecommunications Satellite Organization. This world-wide organization is user-oriented, encouraging the most efficient and least expensive service.<sup>56</sup> Members have an interest proportionate to their financial contributions. The rule of the road is that *one shares as one consumes*.

INTELSAT was established in accordance with United Nations Resolution 1721, of 20 December 1961. It has a four-tiered organizational structure: the *Assembly of Parties*, composed of all the Member States which are parties to the INTELSAT Agreement.<sup>57</sup> It is the

"long-planning" organ of the organization; the *Meeting of Signatories*, composed of all signatories. At this second level, member governments, directly or through their telecommunications entities, have the opportunity of participating in the activities of INTELSAT; the *Board of Governors*, the principal managing organ of the organization; and, an *Executive Organ*, headed by a Director General who is the chief executive and legal representative of INTELSAT.<sup>58</sup>

The Assembly makes the decisions on matters which concern Members as sovereign entities. The voting procedure is based on equality of States, each Member having one vote. However, commercial and operational aspects of the system, conducted by the Board of Governors, is based on weighted voting.

From its inception, INTELSAT has been extremely successful. A strong international organization has come into being, founded on the principles of international cooperation and the Common Heritage of Mankind, as well as on a sound commercial principle and a transfer of technology. In the years to come, it will remain an example of success as an international organization based upon a cooperative spirit and a new form of commercial venture. Its impressive achievements are due to the bold and practical way in which States' sensibilities and proclaimed fundamental principles, such as absolute sovereignty, 'de facto' equality, and independence,

have been reconsidered, readjusted and limited, in order to achieve a new breed of international cooperation. These classical concepts of international law are being restructured in this world of interdependence, especially economic interdependence. The theory that *necessity makes law* is now being coupled with the concept that *business makes law!*

The INTELSAT model shows that no country, especially the developing States, need be "closed out from enjoyment of the benefits of outer space".<sup>59</sup> INTELSAT has been well tried out. Its low costs have made it easier for developing countries to participate in the organization.<sup>60</sup> More importantly, these low rates for service to developing countries have been seen as the distribution, to them, of "special benefits".<sup>61</sup>

In INTELSAT, the size of a State's investment share is derived from the utilization of the INTELSAT space segment. This experience has evolved sufficiently to ensure the participation of the world community in a functional system. In a similar way, the international regime - to be formed to conduct feasibility studies and thereafter exploit the resources of the moon - would be financed internationally. The organization, like INTELSAT, would be a business. The more a State invests, in terms of time, technology, and money, the more its returns would be. The return of a State's share would define the "equitable sharing" of Article XI,

paragraph 7 (d).

As has been pointed out, the concept of sharing exists in organizations such as the United Nations: the form this sharing takes, assesses rich nations "more than developing nations for its support, and its aid goes to developing nations".<sup>62</sup> With respect to the lunar international regime, this sharing could, in addition, take the form of some kind of tax on the profits<sup>63</sup> the States make, not taxing those States whose contributions do not exceed a specified amount. The tax collected could then be plowed back into the business, provide aid to developing countries, repay debts incurred by the regime, be applied towards the costs of scientific and other similar missions in outer space, etc. In this manner, the "needs of the developing countries", as called for in Article XI, paragraph 7 (d), could be taken care of.

The legal certainty that the lunar international regime would provide, with respect to returns made on investments in the exploitation of the moon's resources, should encourage the United States (and others who have not ratified the Moon Agreement for the same reasons), to finally adhere to the Agreement. If the Moon Agreement becomes accepted, then it could as well be applied to Mars.

The lunar international regime could serve as a blueprint for a similar structure that could be established to explore and exploit Mars (and other celestial bodies). The legal framework remaining the

same, changes could be made, as required. More importantly, there would be no need to rush into making new law every time a new celestial body is explored. A Moon Agreement, including an adequate lunar international regime, would ensure that international law travels with spaceships.

#### b) Other approaches

In 1986, the (then) U.S.S.R., by way of a letter from the Chairman of the Council of Ministers, Mr. Ryzhkov, to the Secretary-General of the United Nations, Mr. Pérez de Cuéllar, made a proposal regarding a "world space organization", the establishment of which would "institutionalize international cooperation".<sup>64</sup>

The 1990 International Academy of Astronautics study referred to above has produced a draft "Memorandum of Understanding on the Establishment of an International Lunar Planning Office (ILPO)", which organization would draft a charter of the "Lunar Development Agency (LDA)".<sup>65</sup> The LDA would be responsible for the "preparation and execution of plans for the development of lunar resources".<sup>66</sup>

Then, it would not be out of place here to make mention of the Report produced, regarding the "International Mars Mission" (IMM), by the *International Space University* (ISU), at its 1991 session, held at Toulouse, France.<sup>67</sup> The Report - emphasizing the importance of international cooperation - recommends the

formation of an *International Space Exploration Organization* (ISEO), which would coordinate the efforts of large-scale, long-duration space exploration activities.<sup>68</sup>

Last, but not least, it is encouraging to note that academic institutions have begun, directly or in association with legal experts, to play an active role in this area. For example, reference can be made to the draft for a "Convention on Manned Space Flight", which has been the result of a research project involving three institutions.<sup>69</sup> In this respect, a colloquium,<sup>70</sup> involving these institutions, and others, like McGill University's Institute and Centre of Air and Space Law, was held in May 1992 to discuss important issues related to future space activities, aimed at the exploration or use of the Moon and other celestial bodies, as well as their respective environments.<sup>71</sup>

#### V. Other Issues

The environment is another important issue that will briefly be considered here. Without going into deep details of the legalities of the problem,<sup>72</sup> it can be stated that the principle of *nécessité fait loi* also applies where the environments of the Moon and Mars are concerned. The outer space treaties aside, before we formulate rules regulating the environments of these celestial bodies, it is essential that we first undertake studies to understand the environments in question, define them, and then

go about seeking to protect them. Without this knowledge, terms like "harmful contamination" (does this, for example, mean that contamination is permitted, as long as it is not "harmful"?) and "adverse changes", two phrases in common to the Outer Space Treaty and the Moon Agreement,<sup>73</sup> mean little. After it has become clear what we are dealing with, then we should elucidate, within this new context, vague terms like "harmful contamination". Hence, we have to appreciate what first we seek to preserve before we work out how to go about doing so.

Yet another matter of importance is that of the legal - and other - issues concerning the safety and rescue of our astronauts. We have to guard against a host of perils which await our spacefarers. Space debris is one hazard.<sup>74</sup> The dangers of radiation, fire, solar flares, and equipment degradation<sup>75</sup> or failure, which could lead to life-threatening problems, are others. The presence of chemicals on board spacecraft,<sup>76</sup> the psychological stress caused by long-term isolation,<sup>77</sup> etc. are yet more dangers. The legal aspects of these and many other issues of safety and rescue will have to be further addressed by the international community before we embark on our trips to the Moon/Mars.

## VI. Conclusion

When technological and socio-economic factors dictate that the "nécessité fait loi"<sup>78</sup> principle must prevail, it is

imperative that the establishment of an appropriate legal regime be founded on the effective participation of all mankind. The International Telecommunications Union, mentioned above, is but an example of world cooperation based on this principle as is also INTELSAT, one also based in a business-like manner. A lunar international regime - also created on the consideration that "business makes law" - will ensure the effective participation of all mankind. Even if the benefits derived from the exploitation of the lunar resources do not meet expectations, the common effort made towards obtaining these benefits may well prove to be a gigantic step on the path to establishing a new order of international cooperation - indeed, a new international order for survival.<sup>79</sup>

It has been rightly stated that mankind's future can only be assured on the basis of global cooperation. The lunar international regime offers an opportunity for such cooperation, which may solve the financial problems that are faced by the nations of the world.

International cooperation also offers a chance not only to keep alive the Common Heritage of Mankind concept, but to also put it into practice. In this respect, "Common Heritage of Mankind" should involve "Common Effort", "Common Expense" and "Common Endeavour" of mankind.

The entire debate surrounding the CHM concept has been - in the past - largely

based on distrust between the developed and developing countries. With the recent geographical, political, and economical world-wide changes, concessions will have to be made by all the Parties. The lunar international regime provides this opportunity.

This could truly internationalize the exploration of the final frontier. The future of the Moon Agreement lies in the United Nation review, which is to take place - which should take place - two years hence. The review is urged to modify the sequence of events as currently laid out in Article XI (5) of the Moon Agreement.

If a review conference of the Moon Agreement fails to increase State ratification of the treaty, especially by countries who are leaders in space technology, then this could lead to bilateral or more restricted agreements being concluded for the actual exploration and exploitation of outer space, as far as the Moon and other celestial bodies are concerned.<sup>80</sup>

A failure to attract States to the Moon Agreement may well result its review becoming, instead, its requiem!

**\*\* Thanks are expressed to Mr. Jitendra Thaker, (Researcher, Institute & Centre of Air and Space Law, McGill University), for his assistance in the preparation of this paper.**

---

#### ENDNOTES

1. *America at the Threshold* :

*Report of the Synthesis Group on America's Space Exploration Initiative* (Washington, D.C. : Superintendent of Documents, U.S. Government Printing Office, 1991) at 2 [hereinafter *SEI Report*].

2. *Ibid.*

3. *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, Opened for signature at London, Moscow and Washington on 27 January 1967, 610 UNTS 205; 1967 ATS 24; 1967 CTS 19; 1968 UKTS 10; 18 UST 2410, TIAS 6347; (1967) 6 ILM 386 [hereinafter *Outer Space Treaty*].

4. Most of the important documentation (for example Argentina's proposal to the Legal Sub-Committee of the Committee on the Peaceful Uses of Outer Space, the draft moon treaty submitted by the (then) Soviet Union, etc.) can be found in (1981) 9 *J. Space L.* 128ff.

5. For a history of the drafting of the Moon Agreement, see, N.M. Matte, "Legal Principles Relating to the Moon" in N. Jasentuliyana & R.S.K. Lee, eds., *Manual on Space Law*, vol. 1 (New York : Oceana Publications, Inc., 1979) 253.

6. *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, Opened for signature at New York on 18 December 1979, 1986 ATS 14; (1979) 18 ILM 1434 [hereinafter *Moon Agreement*].

7. These being : i) Outer Space Treaty, *supra*, note 3; ii) Agreement on the Rescue of Astronauts, The Return of Astronauts and the Return of Objects Launched into Outer Space, Opened for signature at London, Moscow and Washington on 22 April 1968, 672 UNTS 119; 1986 ATS 8; 1975 CTS 6; 1969 NZTS 5; 1969 UKTS 56; 19 UST 7570, TIAS 6599, (1968) 7 ILM 151 [hereinafter Rescue Agreement]. iii) Convention on International Liability for Damage Caused by Space Objects, Opened for signature at London, Moscow and Washington on 29 March 1972, 961 UNTS 187; 1975 ATS 5; 1975 CTS 7; 1975 NZTS 9; 1974 UKTS 16; 24 UST 2389, TIAS 7762 [hereinafter Liability Convention]. iv) Convention on Registration of Objects Launched in Outer Space, Opened for signature at New York on 14 January 1975, 1023 UNTS 15; 1986 ATS 5; 1976 CTS 36; 1978 UKTS 70; 28 UST 695, TIAS 8480; (1975) 14 ILM 43 [hereinafter Registration Convention].

8. These States, as of 11 May 1992, were : Australia, Austria, Chile, Mexico, The Netherlands, Pakistan, The Philippines, and Uruguay. The Agreement came into force on 11 July 1984.

9. SEI Report, *supra*, note 1 at 2.

10. *Ibid.* at 2-3.

11. E. Galloway, "Law, Science and Technology for the Moon/Mars' Missions" (1990) 33 Coll. L. Outer Space 195 at 198 [hereinafter Galloway].

12. S. Howe, "Lunar Bases Must

Be Self-Sufficient" *Space News* (16 March 1992) 15 [hereinafter Howe]. Also see the detailed study made by the International Academy of Astronautics, *The Case for an International Lunar Base* (Paris : IAA, 1990) at 4ff., as to other reasons for going to the Moon and for establishing there a permanent base [hereinafter ILB].

13. "Lunar Oxygen Plant" (March/April 1991) *Ad Astra* at 7, 28.

14. *Ibid.* Also see, A. Lawler, "Lunar Oxygen Venture Begins", *Space News* (24 February 1992) 3.

15. H. Schmitt, "Lunar Mining Makes Good Sense" *Space News* (24 February 1992) 19, 25 [hereinafter Schmitt].

16. See, M.N.A. Peterson, D. Criswell & D. Greenwood, "Rationale and Plans for a Lunar Power System" (Published in the Proceedings of the Battelle Pacific Northwest Laboratory Power Beaming Workshop, 14-16 May 1991) [hereinafter Peterson].

17. SEI Report, *supra*, note 1 at 2ff. Also see, ILB, *supra*, note 12 at 10ff. for a detailed explanation of the activities that could be carried out on the Moon.

18. *Ibid.* at 4.

19. A. Lawler & D. Polsky, "Griffin : Start Small on Exploration Project" *Space News* (18 November 1991) 3, 29 [hereinafter Lawler].

20. *Ibid.* Also see, "One Small

Step to a Lunar Lander" *Space News* (27 January 1992) 2, and L. David, "NASA Reviews Cheap Moon Mission Ideas" *Space News* (9 March 1992) 18.

21. D. Polsky, "JPL Proposes Small, Cheap Mars Landers" *Space News* (2 March 1992) 6 [hereinafter *Polsky*].

22. See, "Exploring the Moon and Mars : Choices for the Nation" (U.S. Congress, Office of Technology Assessment, Report Brief, July 1991) [hereinafter *OTR Brief*].

23. *Ibid.*, Lawler, *supra*, note 19 at 29, and Polsky, *supra*, note 21.

24. D. Isbell, "Political Aides Predict Tough Year for Space" *Space News* (17 February 1992) 6, and A. Lawler, "Poll Shows Americans Like Earth Observation" *Space News* (23 March 1992) 14 (the article reports that there is very strong public support for earth observation satellites used for environmental purposes, and very little for robotic missions, the space station, and human exploratory missions to the Moon and Mars).

25. P.B. de Selding, "French Agree to Prop Up Mars Missions With Cash" *Space News* (17 February 1992) 21 [hereinafter *de Selding*].

26. K.P. Dawson, "Japan to Begin Design Work for Mars Exploration Satellite" *Space News* (10 February 1992) 26.

27. See : J.-T. Dahlburg, "Down to Earth : Like Socialism, the Soviet Space Program has Fallen

from Orbit" *The [Montreal] Gazette* (28 March 1992) B6; W. Boyer, "Russians : Mars Missions in Desperate Need of Western Cash" *Space News* (10 February 1992) 10; de Selding, *supra*, note 25, at 3; and, P.B. de Selding, "Germany Seeks Cash Infusion to Save Russian Mars Mission" *Space News* (6 April 1992) 22.

28. For example, see : SEI Report, *supra*, note 1 at 52; Galloway, *supra*, note 11 at 197; Howe, *supra*, note 12; and, W.W. Mendell, "A Strategy for Investment in Space Resource Utilization" 26 (1992) *Acta Astronautica* 3 at 6 [hereinafter *Mendell*].

29. Howe, *supra*, note 12 at 15.

30. *Ibid.*

31. See, SEI Report, *supra*, note 1 at 4, Galloway, *supra*, note 11 at 198, and Howe, *supra*, note 12 at 15.

32. A detailed discussion of the legal implications of the use of nuclear power sources in outer space being beyond the scope of this paper, the interested reader is referred to V. Kopal, "The Use of Nuclear Power Sources in Outer Space : A New Set of United Nations Principles ?" (1991) 19 *J. Space L.* 103ff.; and, J.C. Clayton, "Nuclear Power Sources for Outer Space" 32 (1989) *Coll. L. Outer Space* 286, for an overview of the legal issues involved.

33. See, for example, Mircea Mateesco Matte, "Cosmos 954 : coexistence pacifique et vide juridique" (1978) III *Annals*

*Air & Space L.* 483; E. Galloway, "Nuclear-Powered Satellites : the U.S.S.R. Cosmos 954 and the Canadian Claim" (1979) 12 *Akron L. Rev.* 402; and, "Canada : Claim Against the Union of Soviet Socialist Republics for Damage Caused by Soviet Cosmos 954" (1979) 18 *ILM* 899.

34. *Supra*, note 7.

35. For example, Art. I of the Outer Space Treaty very clearly declares the freedom of exploration and use of outer space, including the Moon and other celestial bodies. The freedom to "use" the celestial bodies can, of course, be interpreted to mean the freedom to "settle" on these bodies. The fact that the establishment of military bases, etc. on the Moon is specifically prohibited by Art. IV of the Outer Space Treaty, implies that the establishment of civilian bases is allowed.

The wording of the Rescue Agreement (e.g., Arts. I, III, IV, etc.: "any place not under the jurisdiction of any state), the Liability Convention (e.g., Art. III : damage caused "elsewhere than on the surface of the earth"), and the Registration Convention (e.g., Art. II (1) : "space object launched into earth orbit or beyond"), indicate that these treaties are applicable to the celestial bodies.

36. D. Wadegaonkar, *The Orbit of Space Law* (London : Stevens & Sons, 1984) at 30.

37. *Supra*, note 8.

38. See, for a more detailed

discussion, N.M. Matte, "The Common Heritage of Mankind and Outer Space : Toward A New International Order for Survival" (1987) XII *Annals Air & Space L.* 313 at 322ff.; and, M.A. Billie, "Exploiting the Final Frontier : The Law of Space Resources (1990 Winter) *AIAA Student J.* 2 at 4ff. [hereinafter *Billie*].

39. Art. I (1) of the Agreement states : "The provisions of this Agreement relating to the moon shall also apply to other celestial bodies within the solar system other than the earth, except in so far as specific legal norms enter into force with respect to any of these celestial bodies".

40. See Art. 34 of the *Vienna Convention on the Law of Treaties*, Opened for signature at Vienna on 23 May 1969, 1155 UNTS 331; 1974 ATS 2; 1980 CTS 37; 1971 NZTS 4; 1980 UKTS 58; (1969) 8 *ILM* 679 [hereinafter *Vienna Convention*].

41. *Ibid.* at Art. 38.

42. G.M. Danilenko, "The Concept of the 'Common Heritage of Mankind' in International Law" (1988) XIII *Annals Air & Space L.* 247 at 263.

43. S.B. Rosenfeld, "A Moon Treaty ? Yes, But Why Now ?" (1980) 23 *Coll. L. Outer Space* 69 at 71.

44. *United Nations Convention on the Law of the Sea*, Opened for signature at Montego Bay on 10 December 1982, (1982) 21 *ILM* 1261; Cmnd. 8941 [hereinafter *UNCLOS*]. Art. 136 states that, "The Area and its resources are



the common heritage of mankind". Part XI (Arts. 133 to 191) of the Convention lays out the rules concerning "The Area".

45. This list of points is derived from Pardo's note verbale of 17 August 1967, made to the 22<sup>nd</sup> Session of the U.N. General Assembly. See, COPUOS, Legal Sub-Committee, Sixth Session, U N Doc. A/AC.105/C.2/SR.75 (13 November 1967).

46. Paragraph 5 reads as follows: "States Parties to this Agreement hereby undertake to establish an international regime, including appropriate procedures, to govern the exploitation of the natural resources of the moon as such exploitation is about to become feasible. This provision shall be implemented in accordance with article XVIII of this Agreement."

47. Paragraph 6 requires the Parties to the treaty to inform, amongst others, the Secretary General of the United Nations, "to the greatest extent feasible and practicable, of any natural resources they may discover on the moon."

48. Reference is made in paragraph 7, to the main purposes of the future international regime. These purposes shall include:

"(a) The orderly and safe development of the natural resources of the moon;

"(b) The rational management of

those resources;

"(c) The expansion of opportunities in the use of those resources;

"(d) An equitable sharing by all States Parties in the benefits derived from those resources, whereby the interests 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."

49. Art. XVIII reads as follows: "Ten years after the entry into force of this Agreement, the question of the review of the Agreement shall be included in the provisional agenda of the United Nations General Assembly in order to consider, in the light of past application of the Agreement, whether it requires revision. However, at any time after the Agreement has been in force for five years, the Secretary-General of the United Nations, as depository, shall, at the request of one third of the States Parties to the Agreement and with the concurrence of the majority of the States Parties, convene a conference of the States Parties to review this Agreement. A review conference shall also consider the question of the implementation of the provisions of article XI, paragraph 5, on the basis of the principle referred to in paragraph 1 of that article and taking into account in particular any relevant technological developments."

50. Mendell, *supra*, note 28 at 6.

51. "Aerospace Spotlight" (May 1992) *Aerospace America* 1 at 1.

52. Schmitt, *supra*, note 15 at 19, and Lawler, *supra*, note 19 at 29.

53. E.R. Finch, Jr. & A.L. Moore, "The 1979 Moon Treaty Encourages Space Development" (1980) 23 *Coll. L. Outer Space* 13 at 16 [hereinafter *Finch*].

54. See, N.M. Matte, *Aerospace Law : Telecommunications Satellites* (Toronto : Butterworth & Co. (Canada) Ltd., 1982) at 104ff. [hereinafter *Matte*].

55. See, E. Galloway, "Issues in Implementing the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies" (1980) 23 *Coll. L. Outer Space* 19 at 21, for a suggestion that the International Maritime Organization (INMARSAT) be used as a model.

56. *Ibid.*

57. *Agreement Relating to the International Telecommunications Satellite Organization and Operating Agreement Relating to the International Telecommunications Satellite Organization*, Signed at Washington on 20 August 1971, 1973 *ATS* 6; 1973 *CTS* 10; 1973 *UKTS* 80; *TIAS* 7532; (1971) 10 *ILM* 909, 946. As at 13 May 1992, 122 States were members of INTELSAT.

58. For more details, see

*Matte, supra*, note 54 at 116ff.

59. Finch, *supra*, note 53 at 17.

60. *Ibid.* at 16.

61. Billie, *supra*, note 38 at 6.

62. *Ibid.*

63. *Ibid.*

64. H.A. Wassenbergh, *Principles of Outer Space Law in Hindsight* (Dordrecht, The Netherlands : Martinus Nijhoff Publishers, 1991) at 59 [hereinafter *Wassenbergh*]. For a description of the WSO, see V. Vereshchetin & E. Kamenetskaya, "On the Way to a World Space Organization" (1987) *XII Annals Air & Space L.* 337. It was suggested that the WSO would deal, *inter alia*, with the legalities concerning the celestial bodies.

65. *ILB, supra*, note 12 at 60.

66. *Ibid.* at Art. 1.

67. See, for more details, the International Space University, *International Mars Mission Final Report* (Toulouse, France : ISU, 1991).

68. See, *ibid.* at 32ff., and Appendix 1 for a detailed description and the Charter of this organization. The Charter consists of a Preamble and 28 Articles which cover, *inter alia*, the organizational structure of ISEO, rights and obligations of contracting parties, financial contributions, jurisdiction, liability, environmental

issues, etc.

69. The draft has been presented as a common research project by the Institute of Air and Space Law, Cologne University, Germany (represented by Prof. Karl-Heinz Böckstiegel); the Institute of State and Law, Academy of Sciences of the (then) USSR (represented by Prof. Vladlen Vereshchetin); and the Research and Study of Space Law and Policy Center, University of Mississippi Law School, U.S.A. (represented by Prof. Stephen Gorove). The text of the draft can be found in (1990) 18 *J. Space L.* 209ff.

The text, in addition to a Preamble, concerns itself with Definitions (Art. I), Registration (Art. II), Jurisdiction and Control (Art. III), Rights and Obligations of Persons on Manned Space Flight (Art. IV), Ensurance of Safety (Art. V), Mutual Assistance in Space (Art. VI), Responsibility and Liability (Art. VII), Intellectual Property (Art. VIII), Consultation and Settlement of Disputes (Art. IX), Application to International Organizations (Art. X), and Concluding Provisions (Art. XI).

70. "Manned Space Flight : Legal Aspects in the Light of Scientific and Technical Development", held at Cologne from 19-22 May 1992.

71. Topics for discussion include "astronauts and cosmonauts in international cooperation", "intellectual property", "safety and rescue", etc.

72. The legal issues resulting from outer space environmental activities and hazards have been dealt with in, for example, N.M. Matte, "Environmental Implications and Responsibilities in the Use of Outer Space" (1989) 32 *Coll. L. Outer Space* 489 [hereinafter *Environmental Implications*]; K.-H. Böckstiegel, "Procedures to Clarify the Law Regarding Environmental Aspects of Activities in Outer Space" (1989) 32 *Coll. L. Outer Space* 65; and, for an excellent article on the question of using Lunar Power Systems to reduce pollution on earth, see Peterson, *supra*, note 16.

73. Outer Space Treaty, *supra*, note 3 at Art. IX, and Moon Agreement, *supra*, note 6 at Art. VII (1).

74. See, for example, *Environmental Implications*, *supra*, note 72; S. Gorove, "Space Debris in International Legal Perspective" (1989) 32 *Coll. L. Outer Space* 97; and H. Baker, "Current Space Debris Policy and its Implications" (1989) 32 *Coll. L. Outer Space* 59, for details.

75. SEI, *supra*, note 1 at 4.

76. J.E. Oberg & A.R. Oberg, *Pioneering Space : Living on the Next Frontier* (New York : McGraw Hill, 1986) at 122.

77. SEI, *supra*, note 1 at 4.

78. Or, as has been correctly stated by Prof. Christol, "as challenges mount law can accommodate them" : see, C.Q. Christol, "The Moon and Mars Missions : Can International

Law Meet the Challenge ?"  
(1991) 19 *J. Space L.* 123 at  
127.

79. See, N.M. Matte, *Space  
Programmes Today and Tomorrow :  
The Vanishing Duopole* (Montreal  
: Institute and Centre of Air  
and Space Law, 1980) at 130.

80. Wassenbergh, *supra*, note 64  
at 82, note 28, referring to  
observations made by Milton L.  
Smith.