

# The Moon Village Concept: A Legal Ramification

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## Abstract

This paper tries to give orientation on which legal ramifications a plan for a Moon Village should observe. Through an analysis of the relevant provisions of international space law it shall be highlighted what kind of activities are compatible with international space law as well as which kind of legal developments of space law may be aimed at in order to make future activities of the Moon Village successful.

## 1. Introduction/History of Lunar Exploration

In 2016, ESA Director General Jan Wörner first announced the development of a new concept for cis-lunar space exploration: the Moon Village.<sup>1</sup> The

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The views set out herein lie entirely with the authors.

International Astronautical Congress, Bremen, Germany.

1 J. Woerner, "A vision for global cooperation and Space 4.0", statement at the occasion of the ESA Council of Ministers, 2016, available at: [https://m.esa.int/About\\_Us/Ministerial\\_Council\\_2016/Moon\\_Village](https://m.esa.int/About_Us/Ministerial_Council_2016/Moon_Village); J. Woerner, "Moon Village: Humans and Robots Together on the Moon", interview from 1 March 2016, available at: [https://www.esa.int/About\\_Us/DG\\_s\\_news\\_and\\_views/Moon\\_Village\\_humans\\_and\\_robots\\_together\\_on\\_the\\_Moon](https://www.esa.int/About_Us/DG_s_news_and_views/Moon_Village_humans_and_robots_together_on_the_Moon).

partial experimental and exploratory settlement on the Moon will rely on automatic, robotics and human-tendered structures<sup>2</sup> and should be used to establish a sustainable human presence on the Moon in order to do a multiplicity of experiments of scientific, astronomical, medical, pharmaceutical, astrophysical and life-sciences nature and serve as an outpost to exploration of further celestial bodies and deep space exploration. This paper is an attempt to give orientation which legal ramifications such a plan should observe. It will not consider the legal aspects of a Lunar “colonization” as this has expressly been denied as a purpose of the Moon Village, but it will look into the scope of the regulation of human activities in outer space as provided by the treaties on space law.

The history of lunar exploration started already in the 1950s with unmanned probes. First, the Soviet Luna 1 completed a fly-by at nearly 6000 km and one year later, Luna 2 landed on the Moon. Its successor, Luna 3 provided the first images of the dark side of the Moon.

The first American mission on the Moon – Ranger 4, failed in an attempt to return scientific data in 1962, but between 1964 and 1965, images provided by Ranger probes contributed to the knowledge about the lunar surface. In the following years shortly preceding the landing of the first human on the Moon, both Soviet and US missions completed successful soft landings, orbited the Moon and gathered photographic data about almost 100% of the lunar surface.

The big breakthrough of the NASA space program dates back to July 20, 1969 when Neil Armstrong and Edwin “Buzz” Aldrin reached the Moon with Apollo 11. In the years to come, eight more manned and numerous unmanned missions explored and mapped the Moon and its poles.

After the successful decades in the 1960s and the 1970s, further interest in manned moon missions was shown in the 1980s and 1990s by the USA when the Moon’s surface was mapped in wavelengths and exploratory missions were searching evidence for ice in the lunar surface. However, lunar exploration was put on hold when the administration under US President Barack Obama (2009-2017) turned away from lunar exploration.<sup>3</sup>

During the past few years, however, the interest to the Moon and its exploration and utilization have sustained growing interest, both from governmental players and space agencies, as well as from the industry.

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2 J. Wörner/B. Foing, The “Moon Village” Concept and Initiative, Report at the Annual Meeting of the Lunar Exploration Analysis Group, Nov. 1-3 2016, Columbia, Maryland.

3 The White House Office of the Press Secretary, Remarks by the President on Space Exploration in the 21st Century, John F. Kennedy Space Center, Florida, April 15, 2010.

In 2017, NASA presented a concept for a “Power and Propulsion Bus” to be launched in 2023 in an orbit around the Moon which, with bolted modules, should serve as a station in cis-lunar space and provide a research and housing facility for astronauts after the end of the operational lifetime of the ISS.<sup>4</sup> A return of humans to the Moon, after the last human landing in 1972, is in planning. After NASA had announced the plan to deploy a lunar outpost platform in cis-lunar space, the Lunar Gateway,<sup>5</sup> in October 2018 at the 69<sup>th</sup> IAC, NASA’s Administrator Jim Bridenstine stated that the NASA aims at returning to the Moon – but not in the same way as it was done in the 1960s. Most recently, SpaceX has announced a mission to fly the first private tourist around the Moon on its Big Falcon Rocket in 2023 which was renamed to Super Heavy Starship in November 2018 and with this, to establish cis-lunar and interplanetary transportation capabilities.<sup>6</sup> On December 9<sup>th</sup> 2018, the Chinese robotic moon probe Chang’e 4 landed on the dark side of the Moon which was a breakthrough as this part of our natural satellite had only been explored, but had never been landed on.

Furthermore, the private undertaking Moon Express is developing mission technology for Moon landings for commercial and government customers with the aim to expand “Earth’s economic and social sphere to our 8<sup>th</sup> continent, the Moon”.<sup>7</sup> As opposed to exploration and exploitation concepts, there are also initiatives advocating the preservation of particular Moon sites (in particular, the six human landing sites) as a heritage of all mankind, such as the non-governmental organization “For All Moonkind”.<sup>8</sup>

For the support and facilitation of the Moon Village concept, a non-governmental organization based in Vienna has been founded: the Moon Village Association (MVA).<sup>9</sup> Its goal is “*the creation of a permanent global informal forum for stakeholders like governments, industry, academia and the public interested in the development of the Moon Village*”. It currently comprises approximately 150 members from more than 34 countries around the globe, representing a diverse array of technical, scientific, cultural and

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4 NASA, Deep Space Gateway to Open Opportunities for Distant Destinations, August 24, 2018, available online at <https://www.nasa.gov/feature/deep-space-gateway-to-open-opportunities-for-distant-destinations>.

5 See e.g. NASA’s publication “NASA’s Lunar Outpost Will Extend Human Presence in Deep Space”, 2 May 2018, available online at <https://www.nasa.gov/feature/nasa-s-lunar-outpost-will-extend-human-presence-in-deep-space>.

6 SpaceX, First Lunar BFR Mission, <https://www.spacex.com/webcast>; SpaceX, Making Life Multiplanetary, <https://www.spacex.com/mars>.

7 <http://www.moonexpress.com/about-us/>.

8 <https://www.forallmoonkind.org/about/the-organization/>

9 Moon Village Association, <https://moonvillageassociation.org/about/>.

interdisciplinary fields.<sup>10</sup> The MVA fosters cooperation for existing or planned global moon exploration programs for sustainable exploration of the Moon, be they public or private initiatives. Through the collaboration between different working groups in the framework of the MVA, various aspects of the Moon Village are approached. These include architectural concepts, standards and interfaces for Moon Village systems, human factors related to the planning and implementation of the Moon Village, economic and financial forecasts, identification of critical and high-priority services, international coordination and cooperation, as well as cultural factors relevant for the Moon Village concept.

MVA partners with non-space organizations to promote international discussions and formulation of plans to foster the implementation of the Moon Village and is creating international, national and regional networks to engage civil society around the world to work together on a wide spectrum of activities.

### **1.1. Essence of the Moon Village Vision**

The Moon Village is envisaged not as a single, short-term project, but as a complex ‘vision’<sup>11</sup> and a ‘conceptual framework’ to expand humanity on the Moon.<sup>12</sup> It is designed as a free and open access platform which should serve the exploration of cis-lunar space, the Solar system and contribute to life on Earth on the basis of a partnership between its multiple users, both institutional and private.<sup>13</sup> The partial settlement or “base” on the Moon should be used for research experiments of multifold nature, including commercial ventures. The knowledge gathered through the Moon Village should contribute to various global challenges for life on Earth such as climate change, migration, resources scarcity, and military conflicts. Moreover, the Moon Village should support “longer term space exploration, utilization and commercialization goals”.<sup>14</sup>

The Moon Village is envisaged as a cooperation between spacefaring nations, experts from space agencies, the industry, policy makers, entrepreneurs,

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10 International Moon Village Workshop, Final Report, 19-21 November 2017, Strasbourg, France, published on 23 January 2017, p. 3. Available online at <https://moonvillageassociation.org/wp-content/uploads/2018/02/MVA-International-Workshop-Final-Report.pdf>.

11 Supra note \*.

12 International Moon Village Workshop, Final Report, 19-21 November 2017, Strasbourg, France, published on 23 January 2017, p. 3. Available online at <https://moonvillageassociation.org/wp-content/uploads/2018/02/MVA-International-Workshop-Final-Report.pdf>.

13 Supra note \*.

14 International Moon Village Workshop, Final Report, 19-21 November 2017, Strasbourg, France, published on 23 January 2017, p. 7. Available online at <https://moonvillageassociation.org/wp-content/uploads/2018/02/MVA-International-Workshop-Final-Report.pdf>.

investors, scientists, engineers in which each participant will be free to collaborate up to its own capacities. Through collaboration between different partners (both governmental and private) with different expertise, a variety of contributions and high effectiveness of the outcome is expected. In this way, a free and open access platform should become available for experiments, business models, and scientific and commercial activities, but also for exchange of knowledge and capabilities. These include the testing and development of new technologies, expanded research, astronomy, exploration of the lunar surface, mining operations. If these exploratory activities take place as envisaged by the 2030s,<sup>15</sup> first robotic and then human Moon missions will take place and contribute to the development of more complex and sophisticated plans for orbiting transportation, communications and observation as well as serve as an outpost for Mars exploration.<sup>16</sup>

The need for such an undertaking is highlighted by the fact that the only experimental “base” in outer space – the International Space Station – is expected to remain active for only one a few more years until 2024 or not long beyond<sup>17</sup> which poses the question on how future exploration in outer space shall look like. Furthermore, the plans for Mars missions and human Mars settlements may profit from the establishment of an experimental infrastructure located much near to the Earth as an outpost to farther destinations.

So far, some of the legal and ethical aspects of the Moon Village project have been discussed.<sup>18</sup> Furthermore, the MVA has recognized that while the governance model for the Moon Village is yet to be structured, “*there are diverse considerations under international law that enable/constrain future lunar surface activities (e.g. Outer Space Treaty)*” which “*must be taken into account in planning future government, commercial and academic lunar activities*”.<sup>19</sup>

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15 International Moon Village Workshop, Final Report, 19-21 November 2017, Strasbourg, France, published on 23 January 2017, available online at <https://moonvillageassociation.org/wp-content/uploads/2018/02/MVA-International-Workshop-Final-Report.pdf>.

16 See, e.g. G. Reibaldi/J. Mankins/C. Welch, Next Stop: The Moon, December 26, 2017, Space News magazine, <https://spacenews.com/op-ed-next-stop-the-moon/>.

17 C. Bolden, J. Holdren, “Obama Administration Extends International Space Station Until at Least 2024”, January 8, 2014, available at: <https://blogs.nasa.gov/bolden/2014/01/08/obama-administration-extends-international-space-station-until-at-least-2024/>.

18 I. Marboe, “Living in the Moon Village – Ethical and Legal Questions”, *Acta Astronautica* (2018), DOI: <https://doi.org/10.1016/j.actaastro.2018.04.033>; E. Petros, “Legal Issues of a Moon Village – from the application of current space law to the new challenges of international cooperation”, in: International Institute of Space Law, *Proceedings of the International Institute of Space Law*, 2017.

19 International Moon Village Workshop, Final Report, 19-21 November 2017, Strasbourg, France, published on 23 January 2017, p. 40. Available online at

## 1.2. The ISS Intergovernmental Agreement as a Model for Regulation in the Moon Village?

So far, there has been one international space project to which the Moon Village might be comparable: the International Space Station (ISS). The legal regime for the use and exploitation of the ISS and for humans on board is set out in the Intergovernmental Agreement (IGA).<sup>20</sup> The IGA establishes a framework for international cooperation for the design, development, operation and utilization of a permanently inhabited civil space station for peaceful purposes.<sup>21</sup> Every ISS partner retains jurisdiction and control over its element and over its personnel<sup>22</sup> so that different national laws are applicable respectively on activities as well as to persons on board the single modules. A general cross-waiver of liability restricts claims between IGA partners<sup>23</sup> Moreover, through bilateral Memoranda of Understanding between the partners, the details of cooperation are outlined – for example, the barter-free exchange of services and usage rights without exchange of funds has become a standard. Intellectual property rights are also generally regulated by the IGA and are determined according to the place of invention – e.g. by the State having jurisdiction over the respective element.<sup>24</sup>

Certainly, this cooperation model can serve as a reference for cooperation in the establishment and use of facilities, technology and human resources in the Moon Village. It remains to be seen how the exact distribution and scope of participation in this new project will be implemented in practice and what the participating partners will decide upon. Below, a focus will be put on the international legal framework for the uses of outer space and celestial bodies vis-à-vis a human settlement/outpost on the Moon

## 2. Consequences for the Moon Village Resulting from the Legal Status of the Moon

Undertaking experiments on the Moon and in cis-lunar space through collaboration between governmental and non-governmental actors which have as their ultimate goal the establishment and use of a human settlement on the Moon poses many interesting questions. They include, for example, considerations on the technological and economic feasibility of the

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<https://moonvillageassociation.org/wp-content/uploads/2018/02/MVA-International-Workshop-Final-Report.pdf>.

20 Agreement among the Government of Canada, Governments of Member States of the European Space Agency, the Government of the United States of America concerning Cooperation on the Civil International Space Station, Washington, done 29 January 1998, entered into force 27 March 2001.

21 *Ibid.*, Art. 1.

22 *Ibid.*, Art. 5.

23 *Ibid.*, Art. 16.

24 *Ibid.*, Art. 21.

undertaking, on the use and access to resources, on cosmic impact and radiation protection, on data management as well as considerations regarding ethical, cultural and environmental aspects. Nonetheless, with regard to the future of human activities in outer space in general, some of the most important questions are the legal ones.

In the following, the crucial questions regarding property rights, the legal status of persons and military activities in the Moon Village as well as some environmental considerations will be outlined.

## **2.1. Legal Status and Property Rights on the Moon**

### **2.1.1. Material Rights**

The plans for resource activities in the Moon Village framework include the establishment of habitable zones and facilities as well as the mining and utilization of lunar resources for civil space and commercial purposes.<sup>25</sup> At the same time, it has been declared that the unique heritage sites on the Moon “*represent a legacy for humanity that must be preserved despite new and ambitious activities on the lunar surface*”.<sup>26</sup>

But first of all: What is the legal status of the Moon? This question is important since in our traditional legal understanding the Earth is seen as the general point of reference for any legal regulation. There are two main legal sources providing guidance: the Outer Space Treaty of 1967<sup>27</sup> and the Moon Agreement of 1979<sup>28</sup>. According to Article I OST and Article I Moon Agreement, the Moon is a celestial body. It must be underlined that according to the non-appropriation principle which is one of the milestone provisions in international space law no one – be it governments, be it private individuals – can appropriate its territory.<sup>29</sup>

Therefore, the installment or building of equipment, modules or other facilities on the Moon that are necessary for experiments equals the

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25 International Moon Village Workshop, Final Report, 19-21 November 2017, Strasbourg, France, published on 23 January 2017, p. 40. Available online at <https://moonvillageassociation.org/wp-content/uploads/2018/02/MVA-International-Workshop-Final-Report.pdf>.

26 International Moon Village Workshop, Final Report, 19-21 November 2017, Strasbourg, France, published on 23 January 2017, p. 40. Available online at <https://moonvillageassociation.org/wp-content/uploads/2018/02/MVA-International-Workshop-Final-Report.pdf>.

27 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 27 January 1967, 610 UNTS 205 (entered into force 10 October 1967) [herein referred to as ‘OST’ or ‘Outer Space Treaty’].

28 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 5 December 1979, 1363 UNTS 3 (entered into force 11 July 1984) [herein referred to as ‘Moon Agreement’].

29 Article II OST; Article 11 para. 2 Moon Agreement.

positioning of property on sovereignty-free “no man’s land”. Such activities are not prohibited, as long as they are exercised “exclusively for peaceful purposes”<sup>30</sup> and are in accordance with the treaties on space law and international law.<sup>31</sup> More specifically, Article 8 Moon Agreement allows the landing and launching of space objects on and from the Moon,<sup>32</sup> the placement and movement of personnel, space vehicles, equipment, stations and installations both on and under the surface of the Moon<sup>33</sup> as long as with regard to the installment of stations the free access to all areas on the Moon is not impeded.<sup>34</sup>

The notion ‘exploration and use’ of outer space and celestial bodies as used in Article I of the Outer Space Treaty designates any activity that is directed towards exercising commercial or non-commercial use of outer space.<sup>35</sup> Scientific investigation is mostly covered by the term ‘exploration’. If for an experiment or another activity the situation on the Moon must be more closely investigated, this could perhaps be regarded as use or exploration beyond ‘scientific investigation’ that can be both commercial or non-commercial. An example for a non-commercial scientific use could, for example, be the taking of samples from lunar soil for purely scientific purposes to which Article 6 para. 2 Moon Agreement is applicable. In such a case, as long as the samples remain at the disposal of the international scientific community, the activity would not be subjected to any limitations. Furthermore, States Parties are not prohibited from using mineral and other substances from the Moon for their missions, unless the quantities are not ‘appropriate’.<sup>36</sup>

Thus, the types of activities to which the law might be restrictive could be commercial uses and exploration activities amounting to appropriation.<sup>37</sup> Such activities would fall in the scope of Article 11 Moon Agreement. One of the fundamental provisions concerning the right and freedom to use outer space and celestial bodies - Article I, para. 1 Outer Space Treaty – sheds

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30 Art. IV para. 2 OST; Art. 3 para. 1 Moon Agreement.

31 Art. III OST and Art. 6 para. 1 Moon Agreement.

32 Art. 8 para. 1 lit. (a) Moon Agreement.

33 Art. 8 para. 1 lit. (b) Moon Agreement.

34 Art. 9 para. 2 Moon Agreement.

35 S. Hobe, ‘Article I’, in: Hobe/Schmidt-Tedd/Schrogl (Eds.), *Cologne Commentary on Space Law*, Vol. I (2009), Carl Heymanns Verlag, p. 34 et seq.

36 Article 6 para. 2 Moon Agreement; see also Doyle, Stephen, *Using Extraterrestrial Resources under the Moon Agreement of 1979*, *Journal of Space Law* (26) 1988, p. 120; On defining how ‘appropriate quantities’ can be scientifically estimated, see R. Locha/V. Gopalakrishnan, *Lunar Exploration – The Road Ahead*, in: *IISL proceedings of the 50th Colloquium on the Law of Outer Space*, 24-28 September 2007, Hyberabad, India, AIAA, 2008, pp. 62 ff.

37 S. Hobe/F. Tronchetti, *Article 6 Moon Agreement*, in: in: Hobe/Schmidt-Tedd/Schrogl (Eds.), *Cologne Commentary on Space Law*, Vol. II (2013), Carl Heymanns Verlag, p. 370.

some more light on the general legal status of the Moon as a part of outer space. Thereby, activities of use and exploration – such as undoubtedly the envisaged Moon Village activities – may be characterized as the “province of all mankind”. While this programmatic notion is rather unspecific, it underlines the fact that space activities should be carried out in the interest of the whole international community and not to the exclusive benefit of single actors.<sup>38</sup> This stipulates that some sharing of ‘benefits’ from space exploration and use may be required. The exact mechanism or proportion of such sharing is, however, unclear. Also, the Moon Agreement in its relevant Article 11, para 7 lit. (d) does not clarify this.<sup>39</sup> What an “equitable sharing” of the benefits derived from the resources exactly means, is thus not entirely clear.

Article II OST imposes a clear prohibition on the appropriation of areas in outer space and on celestial bodies. However, it is not specifically formulated in the OST whether their resources fall under the same prohibition. The Moon Agreement in its Article 11 para. 3 specifies that not only the Moon itself, but also its surface, subsurface as well as natural resources ‘in place’ shall become property of any State, organization or person.

This clearly would pose an obstacle for State Parties to the Moon Agreement participating in the Moon Village who are planning to extract and use lunar resources in quantities larger than the needed for a scientific experiment or than the ‘appropriate’ for missions as per Article 6 para. 3 Moon Agreement. What is urgently needed in the light of upcoming upsurge of Moon activities in the near future is the establishment of a more specific regime for the use of resources, as has been basically called upon in Article 11, para. 5 of the Moon Agreement, which is in line with international law and the principles of space law.

### **2.1.2. Intellectual Property Rights and the Moon Village**

What about non-material, i.e. intellectual property? Let’s assume that the experiments carried out in the framework of the Moon Village deliver tangible results.

A rather complicated question may arise with regard to the results of experiments and inventions taking place in outer space – is there a legal obligation to share such results or do they become the intellectual property solely of the inventor? As has been pointed out, the freedom of scientific investigation<sup>40</sup> as well as the freedom of exploration and use of outer space<sup>41</sup>

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38 See, for an in-depth analysis of the notions used in Article I, R. Jakhu, *Legal Issues Relating to the Global Public Interest in Outer Space* *Journal of Space Law*, Vol. 32 (2006), pp. 31-110.

39 R. Jakhu/S. Freeland/S. Hobe/ F. Tronchetti, *Article 11 Moon Agreement*, in: in: Hobe/Schmidt-Tedd/Schrogl (Eds.), *Cologne Commentary on Space Law*, Vol. II (2013), Carl Heymanns Verlag, p. 398.

40 Article I, para. 3 Outer Space Treaty.

are guaranteed by Article I OST. The freedom of scientific investigation has barely any limitations, except for the limitations posed by Article III, Article IV and Article IX OST.<sup>42</sup>

For the enforceability of intellectual property rights in general, patentability is of paramount importance. Patents are exclusive rights granted to the patent owners allowing them to provide other parties to use the invention on mutually agreed terms. Furthermore, the distinction of inventions through trademarks could serve to identify the inventor or (licensed) user and protect them from unauthorized use.

None of the five treaties on space law contains a provision dealing with intellectual property, patents or trademarks in outer space. Nevertheless, it could be assumed that according to Art. VIII OST which ensures that every State Party retains control and jurisdiction over its space objects (or ISS modules, respectively), an analogy to Art. 21 of the IGA may be possible for the Moon Village.<sup>43</sup> With regard to inventions on board the ISS according to the IGA, the applicable law to intellectual property rights is determined by the jurisdiction of the State in which the respective module has been registered. Thus, the law of the State in whose module the invention has taken place is applicable. For example, if an invention has been made in the US Module, US law is applicable. In cases where the module is not a 'national' one, such as is the case with the European laboratory module Columbus, any European Partner State may claim that the invention has taken place within its jurisdiction and inventors may choose the law of one European Partner State as appropriate.

And according to the extended national jurisdiction over space objects under Article VIII OST, patents could be enforceable within the territorial boundaries of the respective State of registry<sup>44</sup> depending on the jurisdiction over a specific module.

As the Moon Village is conceived as a multi-national, public-private partnership of multiple stakeholders, it remains to be seen whether a similar solution as the IGA and ESA regimes will be applied. In the spirit of open and free access in the Moon Village, the generally applicable national regimes for intellectual property rights would probably have to be substituted by a specific arrangement between the Moon Village parties.

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41 Article I, para. 2 Outer Space Treaty.

42 S. Hobe, 'Article I', in: Hobe/Schmidt-Tedd/Schrogl (Eds.), *Cologne Commentary on Space Law*, Vol. I (2009), Carl Heymanns Verlag, p. 39.

43 *Supra* note 20.

44 European Space Agency: *Law at ESA, Space-related Inventions*, November 22, 2012, available online at [https://www.esa.int/About\\_Us/Law\\_at\\_ESA/Intellectual\\_Property\\_Rights/Patents\\_and\\_space-related\\_inventions](https://www.esa.int/About_Us/Law_at_ESA/Intellectual_Property_Rights/Patents_and_space-related_inventions).

## 2.2. Environmental Aspects for Activities on the Moon

What about environmental concerns? If a Moon Village is established on the Moon with the needed facilities, experimental bases, equipment, landing sites and space transportation objects, the question arises which necessary environmental standards are applicable; and what measures are to be undertaken in order to safeguard the environment of the planet Moon and its surface.

Article IX of the Outer Space Treaty provides a rather rudimentary answer as it only vaguely lays down the basis for environmental protection in outer space. In fact, no specific legal consequence can be derived from Article IX, sentences 1 and 2 as no specific obligation is imposed on State parties with regard to concretely formulated environmental standards.<sup>45</sup>

One can assume that the obligation to inform other partners about possible dangers stemming from an experiment, respectively the entitlement to request information and investigate possible dangers derived from others experiment for the own good are valid obligations under space law for any Party who undertakes experiments on the Moon.

Nevertheless, it is questionable in how far the environmental obligation of a preservation of the lunar environment contained in Article 7 of the Moon Agreement, which is more precise in comparison to Article IX OST, amounts to an enforceable legal obligation. Article 7 para. 1 of the Moon Agreement obliges States Parties “to take measures to prevent the disruption of the existing balance of the environment of the Moon through the introduction of adverse changes in that environment of otherwise”. Thus, this prohibition can be seen as an obligation which concretizes the more broadly formulated guidelines as entailed in Article IX OST. However, it should not be forgotten that the relatively low number of so far only 18 ratifications of the Moon Agreement<sup>46</sup> must be taken into consideration when considering the application of its provisions to non-State Parties.

It is yet difficult to outline all possible environmental concerns that may result from the various Moon Village uses. In any case, it will be in the interest of all partners and users of this framework that efforts are dedicated effectively to preserve the lunar surface and subsurface as well as the Moon’s atmosphere as non-impaired and as non-disrupted as possible as any negative change may be irreversible and not only damage the existing natural balance on the Moon, but also prevent or restrict its future uses.

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45 S. Marchisio, ‘Article IX’, in: Hobe/Schmidt-Tedd/Schrogl (Eds.), *Cologne Commentary on Space Law*, Vol. I (2009), Carl Heymanns Verlag, pp. 176-177.

46 Status of International Agreements relating to activities in outer space as at 1 January 2018, U.N. Doc. A/AC.105/C.2/2018/CRP3.

### **2.3. Provisions Relating to Military Uses of the Moon**

Furthermore, another relevant legal question pertinent to envisaged uses of the Moon is in how far military activities may be lawful in the framework of the Moon Village. Due to the inherently dual character of space technology, the military considerations cannot be fully excluded from any analysis of the legal framework applicable to the Moon Village vision.

What is clear according to the existing treaty law, is which military uses are prohibited by Article IV OST, namely (1) the installation of weapons of mass destruction on the Moon or their stationing in outer space; (2) the establishment of military bases, installations and fortifications, (3) the testing of all kinds of weapons and (4) the conduct of military maneuvers on the Moon.

Furthermore, as the declared purpose of the Moon Village is strictly for peaceful purposes, it should not cause any particular trouble that in accordance with the Moon Agreement, any threat or use of force and any (threat of) hostile acts as well as any stationing of military installations and fortifications as well as the placement of nuclear weapons and other kinds of weapons of mass destructions in orbits around the Moon as well as the testing of any kinds of weapons on the Moon are prohibited.<sup>47</sup> Article 3 Moon Agreement is in line with Article IV of the Outer Space Treaty and can, due to the arguably customary character of Article IV OST, be regarded as a binding obligation of all countries, including non-State Parties to the Moon Agreement.

### **3. Legal Status of Persons in the Moon Village**

Further considerations must be given to persons who will be living and working together in the Moon Village. The overarching principle for coexistence on the Moon can be found in Article IX OST, according to which States Parties shall be guided by the principles of cooperation and mutual assistance in the exploration and use of outer space.

Moreover, any stations, installations, equipment and space vehicles used in the Moon Village shall be open to representatives of other states to the treaty on a basis of reciprocity.<sup>48</sup>

Thus, the legal framework has established a climate and a basis for scientific cooperation on the Moon so that researchers from all countries may exercise their basic rights in exploring the Moon.

Apart from basic exploratory and usage rights, the question may be asked whether also other human rights are valid in outer space and in the Moon Village in particular. The answer can be found relatively easy: through Article III OST international law is applicable to outer space and to human activities

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<sup>47</sup> Article 3 Moon Agreement.

<sup>48</sup> Article XII OST.

in outer space, as far as the *lex specialis* of space law does not regulate certain matters more specifically.<sup>49</sup> Therefore, researchers and other persons on the Moon are confined not only to the freedoms contained in Article I OST but are also bearers of human rights. However, the concept of taking property on celestial bodies as an expression of the human right to property is guaranteed only in the framework of the limitations posed by Articles I and II of the Outer Space Treaty. Here, we see that due to the very specific nature of outer space as a global commons, the Outer Space Treaty provides a *lex specialis* that modifies a generally applicable human right.

The question on whether persons in the Moon Village should be regarded as astronauts and ‘envoys of mankind’ as per Article V OST and the Rescue Agreement of 1968<sup>50</sup>, must be answered differently for trained crew members of governmental missions to the Moon Village and other persons which would not enjoy the special status of ‘envoys of mankind’. It would, however, be indispensable to regulate the social model for coexistence on the Moon Village and elaborate specific rules containing rights and duties for all persons participating in this complex concept.

#### 4. Conclusion

The vision of the Moon Village, as it has been announced, does not contradict any of the provisions settled in the legal framework for human activities in outer space. Many of the questions related to the possible uses of the Moon Village and their numerous consequences will certainly have to be better specified before an in-depth legal analysis can be provided. However, it is generally undoubted that all activities in the Moon Village must respect international space law as well as applicable international general and environmental law.

The existing legal framework allows the use of the Moon and any (non-military) stations thereon and would lead to the acquirement of limited property rights with regard to inventions. However, the appropriation of any territory (e.g. areas) on the Moon is fundamentally denied. Experiments must be conducted within the specific limitations imposed by space law. With regard to the legal status of persons on the Moon and the duties and rights resulting therefrom, international space law possesses the function of *lex specialis* vis à vis general human rights.

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49 S. Hobe, S. Freeland (eds.), *Space law – a self-contained regime? In Heaven as on Earth? – The relationship of Public International Law on the Legal Regulation of Outer Space*, Institute of Air and Space Law of the University of Cologne/Deutsches Zentrum für Luft- und Raumfahrt e.V. German Aerospace Center, Cologne, 2013.

50 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Space, 12 March 1968, 672 UNTS 119 (entered into force on 22 April 1968).

For a future a legal regime for the Moon Village, the treaties on space law provide the general legal framework and the ISS IGA can serve as a valid model for cooperative use of a human-inhabited space base. With this, the starting point for regulating activities in the Moon Village is given and it will be up to the participating governmental and private participants to set out a detailed system of rules.