

DOI: 10.5281/zenodo.19262933

CONSERVATION OF LUNAR HERITAGE: A MIRAGE OR RESOURCE MINE

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Received: 05/02/2026
Accepted: 07/03/2026

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ABSTRACT

Today, the Moon is transitioning into a domain of strategic interest, as both nations and private entities seek to explore and potentially extract its resources. This study examines the interaction between legal regimes governing the Moon as the common heritage of humankind and evolving frameworks regulating the utilization of extraterrestrial resources. Protecting historic sites on the moon is little complex because the moon has a cultural meaning, and it has no territorial boundaries. Further, there are some disagreements exist that how the outer space duty should be understood in today's context. How the states will to cooperate now will be used as a precedent for later missions. Further, clear systems are required to determine accountability. The Artemis Accords recognize the importance of preserving outer space heritage and provide for the protection of lunar sites through the identification of historic areas and the establishment of safety zones to prevent harmful interference. NASA's guidelines, by realising the value of heritage, help to set standards for preserving Apollo mission areas. The instruments like the Outer Space Treaty concentrates on the prevention of national appropriation. The future space mining raises some ethical issues, and at the same time, India's decision to sign in Artemis Accord reveals the changing national positions. Although the Artemis Accords are designed to implement and reinforce the principles of the Outer Space Treaty, they are non-binding political commitments rather than formal international treaties. Archaeologists treat the space sites as a part of heritage and inform the necessity of new guidelines to avoid future impacts. The space law conventions put down the rules for responsible space operation. Article IX of the Outer Space Treaty emphasizes the principles of cooperation and due regard while Article 11 of the Moon Agreement designates the Moon and its natural resources as the common heritage of mankind and mandates that State Parties establish an international regime to govern the exploitation of such resources as such exploitation is about to become feasible. This article analyses the difficult relationship between heritage and legal rules to look for a stable and sustainable path.

KEYWORDS: Artemis Accords, Heritage Protection, International Space Law, Lunar Heritage, Moon Agreement, Outer Space Treaty, Resource Extraction & Space Governance.

1. INTRODUCTION

The moon is viewed as the central mission for countries and future resource projects. The problem is that whether we can preserve the historic heritage of the moon while utilising it as a resource hub. The lunar surface hosts significant historical sites, such as the Apollo landing areas, which many scholars and preservationists argue should be managed under a framework similar to the UNESCO World Heritage Convention. Furthermore, the astronomical community has advocated for the formal designation and protection of Sites of Extraordinary Scientific Importance (SESIs) on the Moon to mitigate the risks posed by uncoordinated lunar activities (Krolikowski and Elvis, 2024). Also, disputes may arise out of the different explanation of the Outer Space Treaty when it comes to the mining or utilization of resources. The requirement of the treaty, namely, due regards to others and prevention of potential harmful interference, will become the initial stage for disagreement (De Zwart *et al.*, 2023).

Long-term stability will depend on the recognition of different interests of actors. Early choice of working together will affect the sustainability of future lunar activity. The system needs consequences for violation to avoid non-compliance issues. The agreement can tie the access with public goods like landing paths with less dust, communication systems, and waste systems. The equitable distribution of high-value lunar resources is viewed as a necessary reform to ensure fairness and prevent the monopolization of the most accessible lunar sites (Elvis *et al.*, 2021).

2. LUNAR HERITAGE

The 1967 Outer Space Treaty prevents any country from claiming their territory on the moon. This makes it harder to apply the general heritage protection rules to the moon. Currently, the primary operational mechanism for heritage protection involves the establishment of safety zones for notification and coordination to prevent harmful interference, though this raises legal questions regarding the non-appropriation principle of Article II of the Outer Space Treaty. The conservation of these cultural sites is crucial because of the current growth of commercial space travel. Some existing guidelines focus on the responsible visits and highlight the importance of recognising artefacts to reduce the harm from the upcoming future missions. Efforts like maintaining registries will help to balance the public access with preservation. NASA has issued technical recommendations and voluntary operating procedures to guide space-faring entities

on how to protect and preserve the historic and scientific value of all U.S. Government lunar artifacts, including both human and robotic landing sites. Further, it has also stressed the scientific value of the Apollo 17 geology mission (Krolikowski and Elvis, 2024). The artifacts at Tranquility Base, including the lunar laser ranging retro-reflector, hold historical and scientific value, and the preservation of such items is akin to protecting valuable cultural resources on Earth. The United States enacted the One Small Step to Protect Human Heritage in Space Act in 2020, which requires NASA to include heritage preservation recommendations as a condition for its contracts and partnership agreements and to inform other relevant federal agencies of these best practices. While sites like Apollo 11 are considered for protection, not all sites can be preserved, and the criteria for preservation must involve international agreement. Decisions about what to protect and how to preserve lunar heritage sites should not be made unilaterally. Lunar heritage preservation is a long-term goal, but it requires flexibility due to evolving technologies, discoveries of valuable resources, and scientific determinations. Protective perimeters around heritage sites may be adjusted as needed in the future (United States Congress, 2020).

NASA released the voluntary guidance entitled *NASA's Recommendations to Space-Faring Entities: How to Protect and Preserve the Historic and Scientific Value of U.S. Government Lunar Artifacts* on July 20, 2011, exactly 42 years after the Apollo 11 mission. In October 2022, the NASA Office of Technology, Policy, and Strategy published the *Lunar Landing and Operations Policy Analysis* report, which identified human heritage preservation as a key challenge for future lunar landing and surface operations. It recommends implementing NASA's 2011 'Recommendations on the Protection of Lunar Artifacts' as a condition for contracts and agreements involving NASA. Launching states are still the owners of their spacecraft under the 1967 Outer Space Treaty. Maintaining its continuous ownership of the hardware and materials left on the Moon during the Apollo missions, the United States has implemented legislative and technical measures to safeguard these artifacts. The difficulty, though, is in defining "natural" and "cultural" heritage, and safeguarding lunar traces and spatial arrangements (Swiney and Hernandez, 2022). Lunar heritage received new attention in 2019 when the Apollo 11 lunar landing celebrated its 50th anniversary. The Hague Building Blocks recognize the importance of natural and cultural heritage in sustainable space use. Few

researchers have proposed a multinational heritage agreement modeled after the World Heritage Convention to overcome the limitations of unilateral national legislation because of existing unique challenges in space governance (Su and Li, 2025). The importance of lunar heritage is underscored by the decision of Washington State to grant historic landmark status to the Apollo lunar roving vehicles. Also, there are tensions exist when raising questions about removing samples from the lunar for scientific reasons disturbs the lunar site (Holcomb et al., 2023).

3. ARTEMIS ACCORD & NATURAL RESOURCES

Artemis Accord outlines the principles for civil space activity, which is grounded in the 1967 Outer Space Treaty. The Artemis Accords codify a specific interpretation of international law wherein the extraction of space resources is distinct from territorial appropriation, a concept heavily influenced by the U.S. Commercial Space Launch Competitiveness Act of 2015. The OST did not have explicit clauses for dealing with space mining, leading the United States to build an interpretation allowing resource extraction without land claims. NASA's Artemis program, which invites international cooperation through the Artemis Accords, aims to take humans to lunar after the historic Apollo missions of the 1960s. Since the initial signing of the Artemis Accords by eight nations in October 2020, the coalition has expanded to include nearly sixty signatories by late 2025, representing a broad international consensus on the peaceful exploration and commercial utilization of lunar resources grounded in the 1967 Outer Space Treaty. Although the Artemis Accords are non-binding political commitments, their widespread adoption and the consistent state practice they encourage could potentially catalyze the formation of Customary International Law regarding space resource utilization. However, this is contested by major spacefaring nations like Russia and China, who argue that such 'bottom-up' rule-making bypasses the United Nations (COPUOS). The growing number of nations signing the Accords may establish them as a widely shared standard for space mining, safety zones, and heritage protection, potentially shaping the future of space exploration. The Artemis Accords influence the space law, although they are not legally binding treaties. The Space Age, which officially commenced with the launch of Sputnik 1 in 1957, has now evolved into a technological venture spanning nearly seven decades. Recently, a growing awareness within the

archaeological community has recognized satellites, space junk, and planetary landing sites as components of an archaeological record. Artemis Accord highlights that protecting lunar heritage is the shared duty of the nations involved in space exploration. This connects the concerns about the rightful owner, ownership, and theft of lunar material (Deplano, 2021).

The central issue in *United States Vs. One Lucite Ball Containing Lunar Material* (US District Court, 252 F.Supp.2d 1367,2003) case is that the United States gifted a moon rock and plaque to the Republic of Honduras. Alan Rosen, who is the claimant, obtained these items from a retired Honduran colonel. The United States government argued that this item was stolen and illegally brought into the country. The case involved how Rosen acquired that property, whether it was stolen by Rosen or he legally owns it. Expert testimony on Honduran law established that the lunar material and its display plaque were classified as national property for public use, which is inalienable under the laws of Honduras. Honduran rules restrict any sale or transfer of the state property and mention that there is no authorisation for alienation. The court ordered the civil forfeiture in rem of the lunar material to the United States because the items remained stolen property under Honduran law when they were introduced into the United States, thereby violating 19 U.S.C. § 1595a(c) (Su, 2022).

This case explains that we need clear procedures to deal with issues relating to lunar heritage. In fact, the Artemis Accord was established to handle such lunar matters with care. The Accord promotes respect to ensure that artefacts, equipment and significant sites are protected similar to the moon rock and plaque. Recently, NASA has released a report from its mission, namely the OSIRIS-REx mission. This mission collected a sample from the asteroid Bennu, which is 4.5 billion years old. The initial analysis of this sample has revealed the presence of abundant carbon and hydrated minerals. The analysis of the samples from asteroid Bennu revealed abundant ammonia and nitrogen-rich soluble organic matter, providing a unique chemical record of the early solar system and the potential precursors of life (Glavin et al., 2025). The OSIRIS-REx mission brought back the carbon abundant pristine material from an asteroid ever delivered to Earth, which is expected to contribute in investigations unraveling the conditions that sparked life on our planet. Future examinations of the asteroid sample could benefit from this finding, even though more investigation is necessary to fully

comprehend the nature of the carbon compounds discovered. The material collected from Bennu will be studied for decades, giving insights into the origin, the introduction of organic molecules for life on our planet, and countermeasures against asteroid collisions with Earth (Glavin et al., 2025). India's recent signing of the Artemis Accords can be viewed positively as it may lead to more open international collaborations and the easing of export controls and technology transfer from the US. On the other hand, it could be seen as India aligning with a particular interpretation of the OST, potentially conflicting with its traditional stance on space exploration principles.

4. CONVENTIONS ON INTERNATIONAL SPACE LAWS:

This section explores on five key conventions that shape the governance of activities beyond Earth. These conventions form the backbone of principles and regulations guiding the exploration of outer space. They are:

4.1. 1967 Outer Space Treaty

The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 1967 (Outer Space Treaty) came into effect the same year it was signed. The UN General Assembly's interest in space affairs led to the creation of the treaty, which resulted in five UN space treaties. It expands upon the 1963 Declaration of Legal Principles Governing States' Activities in Outer Space Exploration and Use. As of January 1, 2020, the Outer Space Treaty had been ratified by 110 states, while an additional 23 states had signed the treaty but had not yet completed the ratification process.

The Outer Space Treaty, bedrock in international space law, delineates fundamental principles governing activities beyond Earth. The treaty prohibits placing nuclear weapons in space by emphasising its commitment to keep space a peaceful place. The treaty also requires that the moon be used only for peaceful aims, and military activities or bases or fortifications should be completely banned. The principal guiding the prevention of claims of sovereignty over the Moon is the non-appropriation principle, which establishes that celestial bodies are not subject to national appropriation. Further, the Outer Space Treaty has also set the expectations for non-governmental actors, namely, ensuring their activities align with the objective of the treaty. The treaty mentions that the countries bear the accountability for activities carried in space by requiring that each state should authorise the

conduct of non-governmental entities. International accountability for space operations rests with the states. The treaty's definition of "peaceful" space activities leaves some room for interpretation. There is a need for clearer definitions and identification of permissible or prohibited activities. Additionally, the treaty doesn't address the essence and duration of mineral rights for exploiting celestial resources, which has led to calls for its revision (de Zwart et al., 2023).

4.2. 1968 Rescue Agreement

The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, 1968 (Rescue Agreement) lays out states' rights and responsibilities with regard to the rescue of people in space. The United Nations General Assembly adopted the Rescue Agreement in Resolution 2345 (XXII) on December 19, 1967, and it entered into force on December 3, 1968. It provides more clarity and detail by expanding on the law present in Article V of the 1967 Outer Space Treaty (Marboe, 2019). As of January 1, 2019, the Rescue Agreement had 95 States Parties, with several international intergovernmental organizations having formally declared their acceptance of the rights and obligations contained therein. According to the Rescue Agreement, any state party must alert the UN Secretary General and the launching authority as soon as it learns that a spacecraft's crew is in distress. It requires state parties to offer rescue workers who have landed on their soil due to accident, distress, emergency, or unintentional landing every assistance that they can muster. State parties in a position to help in rescue effort must fulfill the mandate if distress arises in an area outside of their country's borders (Frandsen, 2022).

The document uses the term "personnel of a spacecraft" instead of the word "astronauts". Though this offers clarity, some confusions still exist to classify the space tourist. Another positive thing to be noted in the document is the compensation to be paid when the space object lands in another state party territory. The launching state must reimburse the cost of recovery in those cases. Further, the agreement recognises the latest ideas like in-flight rescues on spacecraft, which development may help as an escape system (Padhy and Tyagi, 2024). The Rescue Agreement has come under fire for being overly ambiguous, especially when it comes to defining who qualifies for rescue and what constitutes a spacecraft and its parts. It also lacks provisions addressing the cost burden of rescue

missions, such as the expenses related to the rescue of astronauts (Lucas-Rhimbassen, 2022).

4.3. 1972 Liability Convention

The Convention on International Liability for Damage Caused by Space Objects, 1972 (Liability Convention) set out rules and provides measures for injury or damage caused by space objects. The convention's relevance became more apparent following the 1978 Soviet satellite Cosmos 954 in Canadian territory (Schmalenbach, 2022). In 1972, the convention was completed and made available for signatures. Later that year, it came into effect. As of January 2019, it had been ratified by 96 states, signed but not ratified by 19, and recognized by multiple international organizations in terms of rights and obligations. In pursuance of Article II of the Convention, the launching state is fully responsible for any harm it causes to aircraft that are in flight or to the Earth's surface. The definition of "damage" is broad, covering loss of life, personal injury, property damage, and damage to international intergovernmental organizations. Further, the definition of the convention of the word space object is circular and can lead to debate about whether the term includes space debris (Schmalenbach, 2023). The space debris creates severe liability problems due to the large number of debris existing in orbit. All participating states are jointly and severally liable for damages caused by their object (Newman et al., 2021).

The convention also states that the procedure for claims applies only to the states, under which private individuals are exempt from bringing claims for damages. The liability convention also faces problems while dealing with harms which are caused indirectly through space debris. The convention did not originally consider space debris, which has become a significant concern due to potential collisions (Ziemblicki and Oralova, 2021). It does not address liability related to space debris, and incidents such as collisions between satellites and space debris have occurred without claims under the convention. Jurisdiction and control over space objects and their components, including debris, are explicitly addressed by Article VIII of the Outer Space Treaty and the Registration Convention, which assign authority to the state of registry (Long and Huang, 2024).

4.4. 1975 Registration Convention

States are required by the Convention on Registration of Objects Launched into Outer Space, 1975 (Registration Convention) to use their national

space agencies to register any object launched into Earth orbit or space. Beginning in 1962, the UNCOPUOS Legal Subcommittee deliberated and negotiated this convention for many years before it was finally adopted. According to Resolution 3235 (XXIX), the Registration Convention was adopted by the United Nations General Assembly on November 12, 1974. It was made ready for signature on January 14, 1975, and enforced on September 15, 1976 (Hofmann, 2024). As of January 1, 2019, the Registration Convention had 69 States Parties, including major space-faring nations such as the United States, Russia, and China. The convention required states to furnish the UN with information regarding the orbits of their space objects. These specifics include the details of the launching country, the registration number of the space object, the location of launch and date, orbital parameters, and the object's overall purpose. The Registration Convention allows for the easy identification of space objects and determining the liability of states in the case of accidents or collisions. It requires the state to maintain national registries and ask those registries to be forwarded to the United Nations (United Nations Office for Outer Space Affairs, 2023). Further, the Registration Convention enhances cooperation by mandating the information to be shared regarding the space objects, which may help the other space-faring nations to avoid collisions. Also, the states joining the space treaties and subsequently implementing it into their national law is visible through the annual resolution of the UNCOPUOS (Blount, 2021).

4.5. 1979 Moon Treaty

Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1979 (Moon Agreement or Moon Treaty) provides the law to govern activities on celestial bodies. This agreement provides a set of rules for peaceful exploration, especially concerning the moon. It highlights that all of these actions have to abide by international law, which includes the United Nations Charter (Nie, 2025). The Moon Agreement entered into force on July 11, 1984, following the deposit of the fifth instrument of ratification by Austria. As of January 1, 2019, 18 states were parties to the Moon Agreement, although the total number of parties was impacted by Saudi Arabia's withdrawal notification in 2023. The big space-faring nations such as the United States and Russia have not yet signed the agreement (Yu and Nie, 2023).

This treaty presents the moon as the common heritage of mankind. The treaty blocks the national

appropriation of the resources and prevents any state from claiming sovereignty over such resources. The treaty calls for an international regime, which will supervise the responsible use of resources. The treaty also restricts actions that will contaminate the environment of these bodies. The Moon Agreement does not provide any specific guidance as to how to utilise the lunar resources, including the mining rights or property rights over the extracted materials. The treaty has not kept up with new space activities, namely the mining of lunar resources (de Zwart et al., 2023). The agreement has initially aimed to prevent sovereignty over the moon, and its limited ratification has reduced its relevance today. Some national legislations like the US Commercial Space Launch Competitiveness Act of 2015 have emerged to provide rules for resource mining. The need for a more comprehensive and widely accepted framework to monitor the use of these resources becomes increasingly apparent (Deplano, 2021).

5. INTERNATIONAL CONVENTIONS ON PROTECTION OF NATURAL RESOURCES

Article IX of the Outer Space Treaty establishes the guiding principles of cooperation and mutual assistance, requiring states to avoid harmful interference and the contamination of celestial bodies. Article IX emphasizes cooperation and mutual assistance among Parties to the Treaty in the utilization of resources while avoiding contamination of celestial bodies and impairment of Earth's environment (de Zwart et al., 2023). This Article underscores the law of conducting activities and encourages consultation if there is a concern that a planned activity may cause harmful interference. While Article IX serves as a basis for cooperation, divergent national interpretations have emerged. For instance, the Sino-Russian 'International Lunar Research Station' (ILRS) promotes a governance model emphasizing state-led partnership, contrasting with the Artemis Accords' focus on commercial rights and private priority. Article 11, paragraph 5 of the Moon Agreement requires State Parties to establish an international regime to govern the exploitation of the Moon's natural resources, with the objective of ensuring the orderly development and equitable sharing of those resources. As previously mentioned, the international regime sets out procedures to ensure a fair sharing of benefits with special attention to developing states. Article 11 of the Moon Treaty lays down the structure of governance under the shared advantages from resource use (Su, 2022).

6. INTERNATIONAL CONVENTIONS ON

PROTECTION OF HERITAGE SITE

The Artemis Accord is applied to other countries that take part in the Artemis mission. This mission aims to develop a lunar orbiting station called Gateway, through which the presence of humans on the moon can be long-term. Further, it acts as a test environment for missions to Mars (Deplano, 2021). The usage of extracted space resources is neither expressly regulated nor prohibited by current Outer Space treaties, such as the 1967 Outer Space Treaty of the United Nations. The Moon and outer space are exempt from national appropriation, according to the Outer Space Treaty, although it is vague on how resources are to be used. The legal foundation for utilizing valuable space resources to support the Artemis missions is made clear by the Artemis Accords (Deplano, 2021). Although they are portrayed as "implementing the provisions of the Outer Space Treaty," they do not establish legally binding obligations under international law. The Accords make it clear that the utilization of resources from space will not fall under the scope of national appropriation. Under the interpretation provided by the Artemis Accords, the extraction and utilization of space resources do not constitute national appropriation, allowing entities to obtain rights over the materials they extract. Since there is no regulatory framework in place, states that have the resources to get there first may benefit from space resources on a preferential basis (Deplano, 2021).

The Accords utilize 'safety zones' (Section 11) to implement the OST's Article IX 'due regard' obligation, technically defining them as areas where notification and coordination are required to avoid harmful interference, rather than as sovereign territory. The Outer Space Treaty does not provide safety zones, instead it asks activities to be conducted with "due regard" to others (Deplano, 2021). Further, the Accords aim to preserve outer space heritage by creating safety zones around historic sites. However, determining historic sites in outer space is a new challenge. Unilateral declaration of a site as historically valuable could be seen as an appropriation, and the Accords recommend multilateral efforts to develop rules for heritage protection (Lixinski et al., 2021).

Donald Trump, the US president, signed (during the earlier presidency), signed the "One Small Step to Protect Human Heritage in Space Act" (S. 1694) into law. Its goal is to safeguard historical places on the Moon. The bill initially mandated that organizations granting permits for lunar operations guarantee that those applying will comply with the 2011 report's recommendations regarding the

preservation of lunar artifacts. This was applicable to more agencies. The final version of the Act directs NASA to include artifact protection requirements in its own contracts and agreements and to inform other federal agencies of these recommendations, though it does not mandate those agencies to impose such requirements on private licenses (United States Congress, 2020). The law encourages partners with NASA to follow NASA's internal policies, but it does not confer new regulatory authority. It places a strong emphasis on maintaining the Apollo program's scientific, engineering, historical, anthropological, and archaeological achievements. The World Heritage Convention offer guidance which can be adopted for outer space (Su and Li, 2024).

7. CONCLUSION

The protection of lunar heritage is essential because of the historical landing sites like Apollo, which hold major cultural meaning. National efforts, such as the One Small Step Act, emphasize responsible visitation and the protection of the historic and scientific value of U.S. government lunar

artifacts through mandatory conditions in NASA partnership agreements. Though the Artemis Accord is not binding, it attempts to promote openness and sustainable practices. To resolve the dichotomy between heritage protection and resource utilization, this paper recommends the adoption of a 'Lunar Governance Charter' that harmonizes safety zones with international consultation, preventing them from becoming de facto 'keep-out zones'. While the foundational United Nations space treaties establish essential principles, they lack the specific regulatory detail required to manage the contemporary challenges of commercial resource extraction and sustained lunar operations. An amendment or new agreement may be required to fulfil these gaps. The tools like safety zones appear in the Artemis Accord help to reduce the harmful interference with the historic site and the One Small Step To Protect Human Heritage in space Act creates national systems for heritage protection. Future lunar governance must transcend current geopolitical divisions to establish interoperable standards for heritage preservation and resource utilization, ensuring that protective measures do not serve as de facto mechanisms for territorial enclosure.

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