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The Lunar Water Rush: Space Resource Rights, Safety Zones, and India's Regulatory Concern

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ABSTRACT

The Moon is becoming a realistic site for scientific missions, permanent research facilities, and commercial activity. One resource has become especially important: water ice near the lunar south pole. Lunar water is extremely valuable for future commercial space operations. Yet international space law does not clearly answer who may extract it, own it after extraction, exclude others from a working area, or resolve conflicts between competing missions. This paper examines the legal gap between the non-appropriation rule in Article II of the Outer Space Treaty 1967 and the growing practice of commercial space-resource extraction. It argues that the most difficult issue is not simply whether a company can own extracted lunar water. The harder issue is whether “safety zones” around lunar operations may become de facto exclusive areas, allowing powerful States and companies to control the most useful sites without formally claiming sovereignty. The Artemis Accords support resource extraction and coordination zones, while the United Nations Committee on the Peaceful Uses of Outer Space is developing non-binding principles on space-resource activities. India's Space Policy 2023 also allows non-government entities to commercially recover, possess, own, transport, use, and sell space resources. The paper argues that India should create a transparent national licensing framework before Indian private entities undertake lunar-resource activities. The framework should require mission authorisation, registration of extraction areas, time-limited safety zones, environmental and heritage safeguards, data sharing, financial responsibility, and a dispute-resolution mechanism. Such a model would permit Indian participation in the lunar economy while protecting the principle that the Moon cannot be appropriated by any State.

Keywords: Lunar water, space resources, Outer Space Treaty, Article II, Artemis Accords

I. INTRODUCTION

The Moon has long been a symbol of scientific discovery. It is now becoming a possible site of regular human and robotic activity. States and private companies are planning missions that

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may explore the lunar surface, establish research facilities, use lunar materials, and develop technologies for long-duration operations beyond Earth.

Lunar water is central to these plans. Water ice is believed to exist in shadowed regions near the lunar poles, especially the south pole. Water can be used for drinking, hygiene, cooling, and scientific work. It can also be separated into oxygen and hydrogen. Oxygen may support life, while hydrogen and oxygen together may be used as rocket propellant. For this reason, lunar water could make future missions less dependent on supplies launched from Earth.¹

This possibility creates a new problem for space law. The Outer Space Treaty 1967 (“OST”) states that outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.² At first sight, the rule appears simple: no State can own the Moon. However, the Treaty does not expressly state whether a State or private company may extract resources from the Moon and own them after extraction.

Different States take different positions. The United States and the States that join the Artemis Accords support the view that the extraction of space resources does not inherently amount to national appropriation.³ Other States and scholars worry that large-scale resource extraction, especially at rare useful locations, may create practical control that is very close to ownership. The disagreement becomes more serious when one considers “safety zones” around lunar operations. A safety zone may be described as a temporary coordination area to avoid harmful interference. But if it is too large, lasts too long, or blocks access to a scarce lunar site, it may become a de facto exclusive zone.

India is directly relevant to this debate. India has successfully conducted lunar missions and has announced ambitious plans for greater human and commercial space activity. The Indian Space Policy 2023 permits non-government entities to engage in the commercial recovery of asteroid resources or space resources and gives them the right to possess, own, transport, use, and sell such resources, subject to applicable law and India’s international obligations.⁴

¹ See Press Release 20-105, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, *NASA’s SOFIA Discovers Water on Sunlit Surface of Moon* (Oct. 26, 2020), <https://www.nasa.gov/news-release/nasas-sofia-discovers-water-on-sunlit-surface-of-moon/>.

² Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies art. II, *opened for signature* Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 (entered into force Oct. 10, 1967) [hereinafter Outer Space Treaty].

³ The Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids for Peaceful Purposes § 10(2), Oct. 13, 2020, <https://www.nasa.gov/wp-content/uploads/2022/11/Artemis-Accords-signed-13Oct2020.pdf> [hereinafter Artemis Accords].

⁴ DEPARTMENT OF SPACE, GOVERNMENT OF INDIA, *Indian Space Policy – 2023*, para. 4(13) (2023), https://www.isro.gov.in/media_isro/pdf/IndianSpacePolicy2023.pdf [hereinafter Indian Space Policy 2023].

This paper identifies the central legal issue as the lunar water rush. The issue is not merely whether lunar resource extraction is lawful. It is whether early actors can use safety, infrastructure, and technological advantage to gain practical control over the most valuable lunar sites. The paper argues that India should not leave this question entirely to general policy language. Before private Indian entities begin lunar-resource activities, India needs a clear licensing and accountability framework.

II. WHY LUNAR WATER MATTERS

The Moon is not equally useful in every location. The lunar poles are especially important because some areas may contain water ice. Permanently shadowed regions receive little or no direct sunlight. This can allow water ice to survive for long periods. At the same time, nearby high points may receive extended sunlight, which can support solar power. The combination of ice, sunlight, and relatively favourable terrain makes some locations unusually valuable.⁵

Water is a strategic resource for space operations. A mission that carries all its water from Earth must pay for launch, transport, storage, and protection of that water. Launching material from Earth is expensive because a rocket must escape Earth's gravity. If water can be obtained from the Moon, a future mission may use it locally rather than carry every kilogram from Earth.

This does not mean that large-scale lunar mining is easy or immediate. Extracting ice from extremely cold, shadowed regions presents serious technical problems. Machines must operate in difficult temperatures, communicate from challenging locations, avoid damaging scientific sites, and process resources without creating hazards. Nevertheless, the legal question must be considered before extraction becomes routine. Law developed after the first conflict may be too late to prevent unfair control of scarce sites.

Lunar water also creates a distributional problem. If water-rich locations are limited, the first few missions may obtain a major advantage. They may place infrastructure, landing systems, power systems, communication equipment, and processing units around a site. Later missions may find that access is difficult, expensive, or unsafe. The first operator may not formally own the land, but it may have practical control over the only workable route or location.

This is why the issue should not be described only as "property rights in extracted resources". The legal problem also concerns access, coordination, environmental protection, scientific

⁵ See Press Release 22-089, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, *NASA Identifies Candidate Regions for Landing Next Americans on Moon* (Aug. 19, 2022), <https://www.nasa.gov/news-release/nasa-identifies-candidate-regions-for-landing-next-americans-on-moon/>.

research, and equality among States. The Moon is legally a shared space, but technology may make access unequal in practice.

III. THE OUTER SPACE TREATY FRAMEWORK

A. Freedom of exploration and use

Article I of the Outer Space Treaty provides that outer space, including the Moon and other celestial bodies, shall be free for exploration and use by all States without discrimination. It also provides that there shall be free access to all areas of celestial bodies.⁶

This rule supports the idea that no small group of States should permanently close off a part of the Moon. It also supports scientific access and international cooperation. However, Article I does not explain how free access should work when multiple missions need to operate safely in the same small area.

A lunar lander, drilling machine, power cable, communication station, or processing unit cannot operate safely if another spacecraft lands directly beside it or drives through the area. Therefore, freedom of access cannot mean that every actor may interfere with an ongoing operation. A legal system must balance access with safety.

B. The non-appropriation rule

Article II of the OST states that outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.⁷ This is the foundation of the non-appropriation principle.

The rule clearly prohibits a State from declaring that a part of the Moon is its territory. It also prohibits a State from gaining sovereignty merely by occupying or using an area. The rule was designed to prevent a race for territorial claims similar to colonial claims on Earth.

The difficulty is that Article II speaks of the national appropriation of outer space, including the Moon and other celestial bodies. It does not expressly mention extracted resources. One view is that a State may not own lunar territory but may own a resource once it has been extracted, just as a person may catch fish on the high seas without owning the ocean. Another view is that large-scale extraction from a scarce site can become a form of appropriation, especially if it prevents others from accessing the same resource.

The Treaty does not give a final answer. Therefore, States are developing national laws, bilateral arrangements, and soft-law principles. This is creating a new field of legal uncertainty.

⁶ Outer Space Treaty, *supra* note 2, art. I.

⁷ *Id.* art. II.

C. Due regard and harmful interference

Article IX requires States to conduct activities with due regard to the corresponding interests of other States Parties. It also requires consultations where a State has reason to believe that an activity planned by it or its nationals would cause potentially harmful interference with the activities of another State.⁸

Article IX is important for lunar water operations. It provides a legal basis for coordination and consultation. If two missions plan to use the same region, each must consider the other's interests. However, Article IX does not define the size of a safe operating area, the procedure for consultation, the duration of coordination measures, or the consequences of refusal to cooperate.

This is the space-resource governance gap. The OST provides principles but not detailed operational rules. It tells States not to appropriate territory and to avoid harmful interference. It does not tell them how to manage a crowded and resource-rich lunar region.

D. State responsibility for private activities

Article VI provides that States are internationally responsible for national activities in outer space, whether undertaken by governmental agencies or non-governmental entities. Private space activities require authorisation and continuing supervision by the appropriate State.⁹

This Article is especially important for India. If an Indian company extracts lunar water, India will remain internationally responsible for supervising the company's activity. A broad policy permission is therefore not enough. India needs a practical system for authorising missions, setting conditions, monitoring conduct, and responding to violations.

IV. THE ARTEMIS ACCORDS AND SAFETY ZONES

The Artemis Accords are political commitments adopted in 2020 to guide civil space exploration and cooperation. They are not a treaty and do not replace the Outer Space Treaty. Their importance comes from the fact that many States, seventy-six by September 2026, have signed them and use them to shape a common understanding of responsible lunar activity.¹⁰

Section 10 of the Artemis Accords states that the extraction and utilisation of space resources should be executed in a manner that complies with the Outer Space Treaty and in support of

⁸ *Id.* art. IX.

⁹ *Id.* art. VI.

¹⁰ NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, *Artemis Accords*, <https://www.nasa.gov/artemis-accords/> (last visited Oct. 11, 2026) (San Marino became the seventy-sixth signatory on Sept. 25, 2026).

safe and sustainable space activities. It further affirms that the extraction of space resources does not inherently constitute national appropriation under Article II of the OST.¹¹

This provision supports the view that resource extraction is legally distinct from territorial sovereignty. A State may not claim the Moon, but an operator may recover and use a resource. India, which signed the Accords on 21 June 2023, broadly follows this position in its Space Policy 2023 by permitting commercial recovery and ownership of extracted space resources, subject to law and international obligations.¹²

Section 11 of the Artemis Accords deals with deconfliction of space activities. It states that the signatories intend to provide notification of their activities and commit to coordinating with any relevant actor to avoid harmful interference. The area wherein this notification and coordination will be implemented is referred to as a “safety zone”.¹³

Safety zones may be useful. A lander, mining equipment, or scientific experiment needs protection from careless nearby activity. A temporary coordination zone can reduce the risk of collision, dust contamination, disruption of communications, or damage to sensitive instruments. Safety zones can therefore give practical effect to Article IX’s duty of due regard.

The legal concern is that the phrase “safety zone” has no universally agreed definition. The Accords themselves say that the size and scope of a zone should be determined in a reasonable manner, that zones will ultimately be temporary, ending when the relevant operation ceases, and that signatories will respect the principle of free access to all areas of celestial bodies in their use of safety zones; but these are political commitments among the signatories, and the size and duration of any particular zone are left to the operating State.¹⁴ If an operator declares a very large zone, maintains it indefinitely, and refuses access to others, the zone may look like an exclusive claim over lunar territory. This would be difficult to reconcile with Article II and Article I’s guarantee of free access.

The issue becomes sharper near the lunar south pole because useful locations may be scarce. A safety zone around a common flat area may have little effect on others. A safety zone around a rare ice deposit, sunlight-rich ridge, or landing corridor may deny practical access to other missions. Thus, the legality of a safety zone should depend not only on its label but also on its size, duration, necessity, location, and effect on others.

¹¹ Artemis Accords, *supra* note 3, § 10(2).

¹² Indian Space Policy 2023, *supra* note 4, para. 4(13); *see also* Press Release 23-073, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, *NASA Welcomes India as 27th Artemis Accords Signatory* (June 23, 2023), <https://www.nasa.gov/news-release/nasa-welcomes-india-as-27th-artemis-accords-signatory/>.

¹³ Artemis Accords, *supra* note 3, § 11(7).

¹⁴ *Id.* §§ 1, 11(6), (7)(a)–(c), (8), (11).

A proper safety zone must remain a safety measure, not a disguised property boundary. It should be proportionate to the actual risk. It should be publicly notified. It should last only as long as the activity requires. It should be reviewed periodically. Most importantly, it should not prevent peaceful access that can occur without harmful interference.

V. INDIA'S SPACE POLICY AND THE REGULATORY GAP

India's Space Policy 2023 is a significant step because it expands the role of non-government entities in the space sector. The Policy allows non-government entities to engage in the commercial recovery of asteroid resources or space resources. It provides that such an entity is entitled to possess, own, transport, use, and sell resources obtained in accordance with applicable law, including India's international obligations.¹⁵

This wording is commercially important. It signals that India does not treat all resource recovery as unlawful. It gives Indian companies a policy basis to plan future resource-related activities. At the same time, the phrase "in accordance with applicable law, including the international obligations of India" is essential. It means that private rights are not unlimited. They must be exercised consistently with the OST and India's obligations under international law.

The Policy also gives IN-SPACe a central role in authorising and promoting non-government space activity. IN-SPACe has issued Norms, Guidelines and Procedures for implementation of the Policy. These reproduce the Policy's provision on commercial recovery of space resources and add that any plan to extract or utilise resources in space requires a separate authorisation from IN-SPACe, which may grant or refuse it having regard to, among other things, the necessity of the extraction or utilisation for the space activity concerned and the likelihood that it will cause harmful interference with the space activities of other States or of persons authorised by them. However, India still lacks a detailed statute dealing specifically with lunar-resource licensing, safety zones, environmental protection, registration, liability, benefit sharing, and dispute resolution.¹⁶

This is the regulatory gap. A policy statement can encourage activity, but it cannot answer every difficult legal question. If an Indian company seeks to extract lunar water, India will need to decide what information must be submitted, what proof of technical competence is required,

¹⁵ Indian Space Policy 2023, *supra* note 4, para. 4(13).

¹⁶ INDIAN NATIONAL SPACE PROMOTION AND AUTHORIZATION CENTRE, *Norms, Guidelines and Procedures for Implementation of Indian Space Policy-2023 in Respect of Authorization of Space Activities (NGP)*, IN:ISP2023:NGP2024/V1.0, ch. III, para. 25, at 14–15, 142–43 (May 2024), https://www.inspace.gov.in/sys_attachment.do?sys_id=5d532e37877102503b0f0d060cbb35cf.

how the company will avoid interference, how long it may use a safety area, what insurance it must hold, and how it will respond if another mission objects.

The absence of a dedicated Indian space law makes these questions more urgent. India should not wait until a private company has spent large amounts of money on a mission before deciding the conditions of authorisation. Clear rules are needed before investment and operational commitments become irreversible.

VI. THE UN PROCESS AND THE NEED FOR COMMON RULES

The Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space has established a Working Group on Legal Aspects of Space Resource Activities. In March 2025, an initial draft set of recommended principles for space resource activities, prepared by the Vice-Chair of the Working Group, was circulated for the Subcommittee's 2025 session.¹⁷ An updated draft was before the Subcommittee in April 2026, when the Working Group agreed to continue its work and to prepare a consolidated draft, which was circulated in July 2026.¹⁸ The draft process is important because it shows that States recognise the need for common guidance.

The draft principles emphasise that outer space, including the Moon and other celestial bodies, is free for all States to conduct space resource activities and that nothing in the principles should authorise national appropriation. They also emphasise peaceful purposes.¹⁹ These ideas are consistent with the OST.

The UN process may help develop shared expectations on notification, consultation, information sharing, sustainability, and non-interference. However, the principles are not a binding global treaty. Even after they are finalised, they will remain non-binding: the consolidated draft describes them as guidance that does not create new legal rights or obligations.²⁰ Their effectiveness will depend on whether States incorporate them into national licences and operational practice.

¹⁷ COMMITTEE ON THE PEACEFUL USES OF OUTER SPACE, Legal Subcommittee, *Initial Draft Set of Recommended Principles for Space Resource Activities: Note by the Vice-Chair of the Working Group on Legal Aspects of Space Resource Activities*, U.N. Doc. A/AC.105/C.2/L.339 (Mar. 27, 2025), <https://docs.un.org/en/A/AC.105/C.2/L.339> [hereinafter Initial Draft Principles].

¹⁸ COMMITTEE ON THE PEACEFUL USES OF OUTER SPACE, *Report of the Legal Subcommittee on Its Sixty-Fifth Session, Held in Vienna from 15 to 22 April 2026*, U.N. Doc. A/AC.105/1374, annex II, ¶¶ 7–8, 12–13 (May 4, 2026), <https://docs.un.org/en/A/AC.105/1374>; WORKING GROUP ON LEGAL ASPECTS OF SPACE RESOURCE ACTIVITIES, *Consolidated Draft Set of Initial Recommended Principles for Space Resource Activities* (July 2026), https://www.unoosa.org/unooosa/uploads/documents/pdf/copuos/lsc/space-resources/Consolidated_draft_set_of_initial_recommended_principles_to_be_circulated.pdf [hereinafter Consolidated Draft Principles].

¹⁹ Initial Draft Principles, *supra* note 17, annex, pt. 1, prins. 2–3.

²⁰ Consolidated Draft Principles, *supra* note 18, pmbl.

A global treaty would provide the strongest legal certainty, but treaty negotiations may take many years. In the meantime, national laws and authorisation systems will shape actual practice. States with active lunar programmes may create facts on the ground before a universal agreement is reached. This makes transparent national regulation especially important.

India can play a constructive role. It can support resource extraction subject to strict non-appropriation, sustainability, and non-interference conditions. It can also argue for rules that protect access by developing States rather than allowing the first technologically advanced actors to dominate the best sites.

VII. A PROPOSED INDIAN LUNAR-RESOURCE LICENSING MODEL

India should adopt a dedicated framework for private lunar-resource activities through legislation or detailed rules under a future national space law. The framework should begin with a mission authorisation requirement, giving statutory form and detailed criteria to the separate authorisation that IN-SPACe already requires. No Indian company should undertake prospecting, extraction, processing, transportation, or sale of lunar resources without prior approval from IN-SPACe and any other competent authority.

The licence application should explain the purpose of the mission, the proposed location, the nature of the resource, extraction method, expected duration, technical reliability, communication plan, contingency plan, and financial capacity. It should also include an assessment of potential harmful interference with other activities and a plan for consultation where necessary.

Every authorised mission should be entered in a public Indian register and notified through appropriate international channels. The notice should state the general location and expected operating period without forcing disclosure of commercially sensitive engineering information. Transparency is necessary because other States cannot avoid harmful interference if they do not know where an operation is occurring.

Safety zones should be time-limited and proportionate. An Indian operator should be allowed to request a coordination area only where it can show a real operational risk. The area should be the smallest reasonably necessary. It should be reviewed periodically and reduced or removed when the risk ends. A safety zone should never be described as ownership of lunar land.

The licence should impose environmental and heritage safeguards. Although the Moon does not have an Earth-like ecosystem, lunar activity may still create irreversible harm. Dust may

damage equipment or scientific experiments. Drilling may disturb geological records. Historic landing sites and artefacts may have scientific and cultural importance. Operators should minimise unnecessary disturbance and avoid protected heritage areas.

The framework should also require financial responsibility and insurance. A private operator may cause harm through collision, contamination, equipment failure, interference with another mission, or uncontrolled re-entry of a return vehicle. India remains internationally responsible under Article VI, and may also face liability issues under the Liability Convention. The company should therefore maintain adequate insurance and indemnify the Government within the limits permitted by law.

Finally, the framework should create a dispute-resolution process. A dispute may arise between two Indian operators, an Indian operator and a foreign operator, or India and another State. The first stage should be technical consultation. The second stage may involve mediation through IN-SPACe or a designated international forum. Arbitration should be available where parties agree. A clear dispute process will reduce the risk that operational disagreement becomes political conflict.

VIII. CONCLUSION

Lunar water may become one of the most valuable resources in future space activity. It could support scientific missions, human presence, and transport beyond Earth. But its value also creates legal and political risks. The most important risk is that early operators may gain practical control over scarce lunar sites while formally denying that they claim territory.

The Outer Space Treaty prohibits national appropriation and protects free access. It also requires due regard and consultation to avoid harmful interference. These principles remain strong, but they do not provide detailed rules for commercial extraction or safety zones. The Artemis Accords offer one approach by treating extraction as compatible with the OST and using safety zones for coordination. However, safety zones must not become permanent or excessive zones of exclusion.

India's Space Policy 2023 permits Indian non-government entities to recover, own, transport, use, and sell space resources, subject to law and international obligations. This creates an opportunity for India's private space sector. It also creates a duty for India to build a clear regulatory system before commercial lunar activity begins.

India should adopt a licensing model that requires mission authorisation, public notification, limited safety zones, environmental safeguards, insurance, continuing supervision, and dispute

resolution. Such a framework would let India participate in the lunar economy without compromising the principle that the Moon belongs to no State. The key legal lesson is simple: extracting a resource may be possible, but controlling a lunar territory is not.
