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The Future of Space Tourism: Legal Uncertainty, Environmental Concerns, and Regulatory Pathways

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ABSTRACT

The rapid advancement of commercial space exploration, exemplified by industry leaders like Elon Musk, has thrust space tourism into the global spotlight, necessitating urgent regulatory considerations. This paper critically examines the regulatory challenges in space tourism, particularly the inadequacy of existing international legal frameworks, the reluctance of national governments to introduce specific legislation, and the pressing need for regulatory harmonization. A key issue in space tourism regulation is the outdated nature of international space treaties, such as the Outer Space Treaty of 1967, which were formulated in an era when space tourism was not a consideration. These legal instruments fail to address contemporary concerns such as liability, passenger safety, and jurisdictional conflicts. The study assesses whether current laws and safety protocols sufficiently address these issues or if a specialized legal framework is required. In conducting a comparative analysis, this research examines regulatory approaches adopted by major spacefaring nations, including Japan, Russia, and the United States. Japan's regulatory strategy highlights how a technologically advanced nation balances innovation with legal oversight, while Russia and the U.S. provide insights into how established space powers navigate commercial spaceflight governance. By evaluating these diverse models, the paper identifies best practices and potential areas for legal reform. Additionally, the paper explores environmental concerns, specifically the issue of space debris, which poses a significant threat to space tourism operations and long-term space sustainability. It evaluates international efforts to mitigate space debris and proposes new regulatory measures to ensure environmental protection. In conclusion, the study advocates for a comprehensive legal framework that balances economic growth, safety, and environmental

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sustainability in space tourism. By integrating comparative legal insights and environmental considerations, the research contributes to the ongoing discourse on developing effective space tourism regulations.

Keywords *- Space tourism, regulation, space law, debris, comparative analysis*

I. Introduction

The dream of exploring outer space, once reserved for astronauts and science fiction, has rapidly transformed into a commercial reality. With technological strides and entrepreneurial ambition, space tourism has emerged as a tangible frontier, no longer confined to speculative imagination. The 21st century has witnessed private space enterprises, led by pioneers like Elon Musk, Jeff Bezos, and Richard Branson, translate their visions into real-world endeavors, ushering in an era where civilians can access suborbital and potentially orbital travel for recreational purposes. The evolution of space tourism can be traced through both historical milestones and contemporary achievements. The first seeds of commercial interest were sown when Dennis Tito became the world's first space tourist in 2001, funding his own voyage aboard a Russian Soyuz spacecraft to the International Space Station (ISS).[3] Since then, the field has progressed with remarkable momentum. In recent years, Virgin Galactic, Blue Origin, and SpaceX have all conducted manned missions involving private citizens. Blue Origin's New Shepard carried its first civilian crew in 2021, while SpaceX's *Inspiration4* mission took civilians on a multi-day orbital flight, marking a significant leap from suborbital tourism.[4]

Despite this progress, the legal regime governing space travel remains entrenched in Cold War-era frameworks that primarily contemplated state actor. The Outer Space Treaty of 1967, for instance, was negotiated in a geopolitical context where private space tourism was not a conceivable reality. Consequently, it provides no clarity on private liability, passenger rights, or jurisdiction over spaceborne commercial operations.[5] Compounding this issue is the long-standing ambiguity between the concepts of airspace and outer space. While airspace falls under national sovereignty, outer space is designated as the "province of all mankind"—free from national appropriation.[6] Yet, no clear legal boundary demarcates the two, creating regulatory uncertainty for space tourism vehicles that operate across both realms. This legal gray area has implications for applicable law, liability for accidents, and the licensing of commercial launches. Moreover, the shift from government-dominated missions to private enterprise introduces new challenges in

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[3] Tariq Malik, *First Space Tourist Dennis Tito Looks Back on His Trip to Space*, SPACE.COM (Apr. 28, 2011), https://www.space.com/11597-space-tourist-dennis-tito-10-year-anniversary.html.
[4] Jeff Foust, *Blue Origin Launches First Human Flight with Jeff Bezos and Crew*, SPACE NEWS (July 20, 2021), https://spacenews.com/blue-origin-launches-first-human-flight-with-jeff-bezos-and-crew/.
[5] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies art. VI, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205.
[6] Id. art. I–II.

regulatory oversight, risk management, and international coordination. As space becomes increasingly commercialized, the absence of unified global standards for licensing, insurance, and safety compliance raises the stakes for both state and private actors. These concerns highlight the urgent need to reassess and modernize the legal infrastructure governing space activities, ensuring that the frameworks evolve in step with technological capabilities and commercial interests. This paper explores these gaps through a critical lens, focusing particularly on the implications of regulatory inadequacies, environmental threats posed by space debris, and comparative legal frameworks of leading spacefaring nations. In doing so, it aims to contribute to a discourse that not only acknowledges the excitement of space tourism but also anticipates its legal and ethical dimensions.

II. Bridging the Regulatory Void: Rethinking International Space Law for Commercial Realities

The legal landscape governing outer space was born out of a time when the cosmos was the exclusive domain of nation-states. Drafted in the thick of the Cold War, international treaties like the *Outer Space Treaty* of 1967 served to promote peace and prevent the militarization of space but were not designed to anticipate the modern reality of space as a commercial frontier. As a result, the legal instruments currently in place struggle to keep pace with the rapid advancement of private space enterprises and the new phenomenon of space tourism. In recent years, space tourism has shifted from a speculative concept to a viable industry, propelled by billion-dollar investments and private players like SpaceX, Blue Origin, and Virgin Galactic. These ventures have pushed the boundaries of space exploration from state-sponsored missions to market-driven experiences, offering civilians the opportunity to travel beyond Earth's atmosphere—albeit at a premium price.[7] The increasing presence of private actors in space has disrupted the state-centric assumptions embedded in early space law, exposing regulatory gaps that, if left unresolved, could undermine safety, accountability, and equitable access.

Legacy Frameworks in a New Space Era

The *Outer Space Treaty* (OST), often described as the "Magna Carta of space," laid the foundational principles for outer space governance.[8] It declares outer space as the

[7] Christian Davenport, *The Space Barons: Elon Musk, Jeff Bezos, and the Quest to Colonize the Cosmos* (2018).
[8] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies art. I, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205.

"province of all mankind," prohibits national appropriation, and places responsibility on states for national activities in space, whether carried out by governmental or non-governmental entities.[9] While noble in its ideals, the OST lacks specificity in areas critical to commercial space operations. For instance, it does not define the legal status of space tourists, nor does it provide clear rules on passenger safety, liability allocation, or property rights on celestial bodies.

Subsequent treaties—the *Rescue Agreement* (1968), *Liability Convention* (1972), *Registration Convention* (1975), and *Moon Agreement* (1979)—sought to elaborate on aspects of state responsibility and cooperation.[10] Yet, these too fall short of addressing private sector dynamics. The Liability Convention, for example, holds launching states absolutely liable for damage caused by their space objects on Earth and liable under fault-based standards in outer space.[11] However, it offers limited clarity on who bears liability in multi-stakeholder, cross-border commercial space ventures—a common scenario in today's globalized market.

The *Moon Agreement* attempted to establish a framework for resource utilization on celestial bodies but failed to gain widespread ratification, particularly by major spacefaring nations, due to its collectivist and restrictive tone.[12] This left a vacuum in legal clarity for activities like lunar tourism or commercial habitation in outer space, which are no longer distant ambitions.

Private Space Tourism: Regulatory Gaps and Legal Ambiguity

As private companies begin transporting civilians into space, legal uncertainties arise regarding the classification of space tourists. Are they passengers akin to airline travelers, astronauts entitled to protection under the Rescue Agreement, or a new category altogether?[13] This classification is not merely semantic—it determines the extent of legal protection, rescue obligations, and liability coverage.

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[9] Id. arts. I–VI.
[10] See Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119; Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187; Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15.
[11] Convention on International Liability for Damage Caused by Space Objects, supra note 4, art. III.
[12] Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, 1363 U.N.T.S. 3.
[13] Frans G. von der Dunk, *Space Tourism and Space Law: A Primer*, 27 Space Pol'y 146 (2011).

Another gray area is tort liability. In the aviation industry, carriers are bound by established international conventions like the *Montreal Convention (1999)* that define carrier responsibilities and passenger rights.[14] No such regime exists for space travel. The reliance on national licensing (such as the U.S. Federal Aviation Administration's commercial spaceflight regulations) offers some assurance, but without a globally harmonized standard, jurisdictional conflicts and litigation uncertainty loom large, particularly in cases involving foreign passengers, multinational operators, and operations that traverse multiple legal domains.

A further challenge lies in the application of contractual waivers and informed consent in this high-risk industry. The U.S. Commercial Space Launch Amendments Act of 2004, for instance, allows operators to have passengers sign "informed consent" waivers, thereby limiting liability in case of injury or death.[15] While this facilitates commercial operations, it also raises ethical and legal questions about the enforceability and fairness of such waivers, especially when space travel remains inherently dangerous and unregulated in many aspects.

Toward a Hybrid Regulatory Framework: Public-Private Synergy

To address these regulatory voids, there is a compelling need to move toward a hybrid model that blends state oversight with private sector compliance and innovation. Such a model would not only enhance legal certainty but also promote international cooperation and equitable access.

1. Establishing a Global Space Tourism Convention: Drawing inspiration from the International Civil Aviation Organization (ICAO), the global community could establish a space tourism convention under the auspices of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS). This instrument would articulate minimum safety standards, define the status of space tourists, prescribe cross-border liability rules, and promote transparency in licensing and insurance protocols.

2. Updating the Outer Space Treaty through Interpretative Declarations: Given the political resistance to renegotiating the OST, an alternative approach is to issue official

[14] Convention for the Unification of Certain Rules for International Carriage by Air, May 28, 1999, 2242 U.N.T.S. 350.

[15] Commercial Space Launch Amendments Act of 2004, Pub. L. No. 108-492, 118 Stat. 3974 (2004) (codified at 49 U.S.C. § 70105(b)(5)).

interpretative declarations that expand upon its principles to cover commercial activities. For example, clarifying that Article VI's reference to "national activities" includes all private commercial operations would ensure that states remain accountable for regulating their domestic space industries, while still permitting private enterprise.

3. Creating a Multilateral Licensing Registry: A shared international registry of spaceflight licenses and operational standards would reduce redundancy, prevent regulatory arbitrage, and promote harmonization. Much like the International Telecommunication Union coordinates satellite frequencies, a multilateral licensing body could track launch approvals, spacecraft status, and operator compliance across jurisdictions.

4. Crafting Uniform Passenger Protection Norms: Similar to airline passengers' rights frameworks, there is a need for a code of conduct or charter outlining the rights and protections of space tourists. This would cover disclosure requirements, safety briefings, refund protocols in case of launch failure, and compensation in the event of injury or death—particularly critical as space tourism becomes more accessible to the general public.

Challenges to Reform and the Way Forward

Reforming international space law is no easy task. Legal pluralism, geopolitical competition, and the fast-evolving nature of space technology make consensus-building difficult. States may be reluctant to surrender regulatory autonomy, and private actors may resist constraints perceived to hinder innovation. However, inaction poses greater risks—both to passenger safety and the sustainability of space ecosystems. Importantly, the future legal regime must also consider equity. As space tourism develops, there is growing concern about its accessibility and implications for global justice. If space becomes an elite playground governed by the laws of a few powerful nations, it would exacerbate existing global inequalities. Embedding inclusivity, sustainability, and transparency into future space law is not just a legal imperative but a moral one. Furthermore, any hybrid model must preserve the foundational ethos of space as a shared domain. Private commercial interests, though legitimate, must be balanced against long-term stewardship and international peace. The vision of outer space as the "province of all mankind" cannot be compromised by short-term profits or monopolistic tendencies.

As humanity ventures further into commercial space activities, the disconnect between legal reality and technological capability widens. The current international space law regime, though historically significant, is no longer sufficient to regulate the complexities of space tourism. Bridging this regulatory void requires more than piecemeal amendments—it calls for a strategic shift toward a hybrid governance model that integrates state responsibility, international coordination, and private innovation. Such a framework must prioritize legal clarity, protect passenger rights, and ensure the sustainability of space environments. Only then can space tourism thrive as a legitimate, inclusive, and well-regulated frontier of human experience.

III. Harmonization Over Fragmentation: Towards A Global Space Tourism Regulatory Framework

As space tourism emerges as a credible component of the commercial space industry, the lack of uniformity in legal and regulatory frameworks among spacefaring nations is becoming increasingly evident—and problematic. While innovation continues to soar, law remains earthbound, shackled by fragmented national approaches that threaten to create inconsistencies in safety standards, jurisdictional confusion, and legal grey zones. The regulatory strategies of leading space powers—the United States, Japan, and Russia—underscore this divergence. Without harmonized legal instruments, the commercial expansion of space tourism risks not only legal uncertainty but also potential geopolitical tension.

Divergent National Approaches: A Snapshot

The United States has arguably been the most active in enabling a private spaceflight ecosystem. Through the Federal Aviation Administration (FAA), the U.S. has adopted a "learning period" approach that emphasizes minimal intervention, requiring passengers to sign informed consent waivers acknowledging the risks of spaceflight.[16] While this approach encourages innovation, critics argue that it under-prioritizes safety in the absence of stringent regulatory mandates for passenger protection and third-party liability.

Japan, on the other hand, maintains a cautious but constructive regulatory stance. Its policies emphasize safety and liability, aiming to balance the promotion of commercial

[16] Id.

ventures with public accountability.[17] The Japanese Aerospace Exploration Agency (JAXA), while not directly involved in tourism, supports a framework in which public and private actors collaborate closely, ensuring that safety protocols and licensing procedures reflect high standards of diligence.

Russia presents yet another model, grounded in its long-standing expertise in human spaceflight. Through Roscosmos, it has enabled private individuals to travel to the International Space Station via Soyuz spacecraft since the early 2000s.[18] However, Russia's regulatory apparatus is still largely government-controlled, lacking the kind of liberalized private-sector participation seen in the U.S. This limits commercial expansion, while offering stronger state oversight.

These case studies illustrate that national interests, legal traditions, and strategic priorities shape diverse regulatory responses. Yet, as space tourism becomes increasingly global in character—featuring international passenger lists, multinational corporate actors, and transboundary operations—fragmentation is no longer sustainable.

Legal Consequences of Fragmentation

The current patchwork of domestic regulations poses several legal risks. First, there is the issue of jurisdictional uncertainty. In the absence of a common framework, disputes involving liability for accidents, property damage, or environmental harm could become entangled in complex and conflicting legal doctrines. A space tourist from France injured on a U.S.-licensed spacecraft launched from Japan into orbit may find themselves caught in a web of inconsistent rules and unclear remedies.

Second, inconsistent safety standards threaten to undermine public trust in the sector. As operators shop for the most permissive jurisdictions—a phenomenon known as "regulatory arbitrage"—there's a risk that safety will be compromised for commercial advantage. In the long run, this could invite catastrophic accidents that damage not only lives but also the credibility of the industry itself.

Third, cross-border tort liability becomes nearly impossible to adjudicate fairly without a shared understanding of rights and responsibilities. The current Liability Convention

[17] Japan Aerospace Exploration Agency (JAXA), *Policy and Governance*, https://global.jaxa.jp/about/policies.html (last visited Apr. 10, 2025).
[18] Supra 1.

(1972) is state-centered, offering little guidance on private-to-private claims that arise in commercial tourism contexts.[19] This absence of clarity makes it difficult for courts to determine fault and award damages, especially in multijurisdictional scenarios.

The Case for Harmonization: Legal and Practical Justifications

A harmonized global framework would offer several advantages. It would create predictability, which is essential for insurance underwriting, investment security, and legal accountability. It would also promote equitable access, ensuring that no single country monopolizes legal control over an inherently global domain. Most importantly, it would reinforce the principle that space, though commercially accessible, remains a domain of collective human interest.

From a legal standpoint, harmonization could proceed through several avenues. A multilateral treaty focused specifically on commercial space tourism could be negotiated under the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS)**.** Such a treaty would not need to reinvent the legal wheel but could build upon existing instruments—like the *Outer Space Treaty* and *Liability Convention*—to include provisions tailored to commercial realities.

Key elements of this harmonized framework might include:

Licensing and Launch Authorization Standards: Uniform licensing procedures could reduce regulatory uncertainty and ensure that only qualified operators enter the space tourism market. A centralized registry—perhaps overseen by a neutral international body—could verify operator credentials and maintain transparency across jurisdictions.[20]

Passenger Rights and Protections: Similar to international aviation laws under the Montreal Convention, space tourists should be entitled to certain baseline rights—such as informed consent, insurance coverage, and post-incident remedies.[21] This would protect not only passengers but also bolster consumer confidence in the industry.

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[19] Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187.

[20] Frans G. von der Dunk, *International Space Law: Harmonization and Commercial Realities*, 22 Space Pol'y 38 (2006).

[21] Convention for the Unification of Certain Rules for International Carriage by Air, May 28, 1999, 2242 U.N.T.S. 350.

Tort Liability and Dispute Resolution: A harmonized legal standard for fault and damages in space-related injuries or accidents could be articulated, accompanied by a multilateral dispute resolution body or arbitration mechanism. This would prevent forum shopping and jurisdictional paralysis in transnational claims.

Cross-Border Legal Cooperation: States could agree to share data, recognize each other's regulatory findings, and cooperate in investigations of spaceflight incidents. This would promote efficiency and credibility, particularly in high-stakes emergencies or legal claims involving multiple actors.

Sovereignty Preservation Clause: To reassure states wary of ceding control, any harmonized treaty could include a clause that affirms national sovereignty in domestic implementation, allowing flexibility in enforcement while adhering to shared norms.

Existing Models and Potential Blueprints

International aviation and maritime law offer useful analogies. The International Civil Aviation Organization (ICAO) governs a network of technical standards, safety protocols, and operational procedures that facilitate cross-border air travel.[22] Its legal framework blends national sovereignty with global uniformity—an approach that space law could emulate. Similarly, the United Nations Convention on the Law of the Sea (UNCLOS) demonstrates how states can manage shared domains through a mix of codified rights, enforcement mechanisms, and dispute resolution structures.[23]

A potential model for space tourism could be an "International Space Tourism Code," endorsed through a multilateral agreement, outlining baseline safety, licensing, and liability norms. It could also include provisions for coordination between national space agencies and private operators, regular compliance audits, and public disclosure of incident data.

Challenges to Harmonization

Despite its merits, global harmonization faces obstacles. States with robust space industries may be reluctant to accept constraints that limit regulatory freedom or confer

[22] See generally International Civil Aviation Organization (ICAO), https://www.icao.int (last visited Apr. 10, 2025).
[23] United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 3.

competitive advantages to others. Similarly, private actors may fear that overly rigid rules will dampen innovation or impose costly compliance burdens. Moreover, geopolitical tensions—such as U.S.-China rivalries or Russian-Western frictions—may hinder consensus-building in multilateral forums like UNCOPUOS. Even within the private sector, differing corporate cultures and risk tolerances could impede agreement on uniform safety thresholds or liability standards. However, incrementalism may offer a path forward. Rather than seeking immediate universal ratification, countries with aligned interests—such as members of the Artemis Accords or regional coalitions—could pioneer bilateral or plurilateral agreements that serve as templates for broader adoption. Over time, this "coalition of the willing" approach could create momentum for more inclusive global treaties.

The legal fragmentation currently characterizing space tourism regulation is unsustainable in a sector that inherently transcends national boundaries. Without harmonized legal norms, the commercial promise of space tourism may be eclipsed by jurisdictional confusion, inconsistent safety practices, and public mistrust. A globally coordinated framework—rooted in shared legal standards and mutual cooperation—is essential to ensure that the next frontier of human exploration is not only economically viable but also legally sound and ethically grounded. Such harmonization would reflect the dual nature of outer space: a domain of boundless opportunity and profound responsibility.

IV. From Orbit To Obligation: Embedding Environmental Stewardship In Space Tourism Law

As the commercial use of space accelerates, a parallel and perhaps more sobering phenomenon is unfolding above Earth's atmosphere: the quiet but mounting threat of space debris. Often invisible to the eye yet capable of immense destruction, even the tiniest fragments of space junk can compromise the viability of orbital activities, particularly those associated with emerging industries like space tourism. For a field that markets itself as futuristic and visionary, the absence of robust environmental safeguards reveals a critical blind spot. Space tourism, with its reliance on reusable spacecraft, multiple launches, and near-Earth orbits, is particularly vulnerable to orbital congestion and debris collisions. It also risks becoming a significant contributor to the problem. Unless environmental stewardship is integrated into the core legal framework governing

commercial space activities, the dream of sustainable and safe space tourism may be irreparably undermined.

Understanding the Environmental Risks of Space Tourism

The threat posed by space debris is not hypothetical. As of 2024, the U.S. Space Surveillance Network (SSN) tracks over 27,000 pieces of orbital debris larger than a softball, while hundreds of thousands of smaller but still dangerous fragments remain unmonitored.[24] This debris pieces travel at velocities exceeding 25,000 km/h, meaning even a millimeter-sized object can damage spacecraft windows, navigation systems, or even rupture a hull. The growing number of launches—many of them by private entities seeking to serve the space tourism market—has worsened the problem. Blue Origin, Virgin Galactic, and SpaceX all conduct frequent suborbital or orbital flights, often using vehicles that leave behind expended stages or components with limited plans for deorbiting or retrieval.[25] Additionally, commercial space stations envisioned for tourism purposes may remain in orbit for extended periods, increasing the likelihood of collision and fragmentation events. Yet, despite the scale of the risk, there exists no binding international legal obligation to prevent or clean up space debris. Most existing guidance consists of voluntary, non-binding principles such as the *United Nations Guidelines for the Long-term Sustainability of Outer Space Activities*, which promote responsible behavior but lack enforceability.[26]

Soft Law and the Limits of Voluntarism

The current global approach to orbital debris mitigation is primarily soft law-based. Bodies like the Inter-Agency Space Debris Coordination Committee (IADC) have produced mitigation guidelines, encouraging satellite operators and launch providers to minimize long-lived debris and to deorbit satellites at the end of their operational lives.[27] While widely accepted, these guidelines are not binding and carry no penalties for non-compliance. The UN's Office for Outer Space Affairs (UNOOSA) has similarly

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[24] National Aeronautics and Space Administration (NASA), *Orbital Debris Quarterly News*, Vol. 28, Issue 1 (2024), https://orbitaldebris.jsc.nasa.gov.
[25] Jeff Foust, *Blue Origin Launches First Human Flight with Jeff Bezos and Crew*, SPACE NEWS (July 20, 2021), https://spacenews.com/blue-origin-launches-first-human-flight-with-jeff-bezos-and-crew/.
[26] United Nations Office for Outer Space Affairs (UNOOSA), *Guidelines for the Long-Term Sustainability of Outer Space Activities* (2019), https://www.unoosa.org/oosa/en/ourwork/topics/long-term-sustainability-of-outer-space-activities.html.
[27] Inter-Agency Space Debris Coordination Committee (IADC), *IADC Space Debris Mitigation Guidelines*, IADC-02-01 Rev. 2 (2020).

promoted best practices but lacks the legal mandate or enforcement capability to compel adherence. This reliance on voluntarism, while politically convenient, leaves a significant regulatory vacuum—particularly in light of the growing commercialization of space. For space tourism, this absence is especially troubling. The industry's business model depends on repeat access to clean, safe, and predictable orbital environments. Accumulated debris, or worse, cascading collisions like those predicted by the Kessler Syndrome, could render certain orbits unusable for decades or even centuries.[28] Without legal mechanisms that compel actors to behave responsibly, the incentives to externalize environmental costs remain unchecked.

Toward a Binding Environmental Framework: The Case for Hard Law

To ensure long-term sustainability, international law must shift from soft law encouragement to binding obligations. This transition could occur through amendments to existing treaties or the development of a new instrument focused specifically on orbital environment protection. One potential avenue lies within the *Liability Convention* of 1972. Article III of the Convention provides for fault-based liability for damage caused by space objects in outer space.[29] This article could be interpreted—either judicially or through supplementary protocols—to extend liability to environmental harm caused by avoidable debris generation. Much like environmental torts under terrestrial law, operators could be held liable if it can be demonstrated that debris-generating behavior was reckless or inconsistent with best practices.

Moreover, a treaty or multilateral code focused on active debris removal (ADR) and eco-responsible spacecraft design could serve as a global benchmark. Technologies such as robotic arms, tether systems, and drag sails already exist and can be incentivized through regulatory frameworks that offer tax reliefs, reduced licensing fees, or preferential orbital slots to compliant operators.[30] Embedding such incentives into national licensing laws—aligned with international standards—would help harmonize the patchwork of domestic policies currently in place.

[28] Donald J. Kessler & Burton G. Cour-Palais, *Collision Frequency of Artificial Satellites: The Creation of a Debris Belt*, 83 J. Geophys. Res. 2637 (1978).
[29] Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187, art. III.
[30] NASA Office of Technology Transfer, *Emerging ADR Technologies*, https://technology.nasa.gov (last visited Apr. 10, 2025).

A legally binding international protocol might include:

- Mandatory end-of-life disposal plans for all spacecraft.
- Re-entry protocols ensuring minimal residual debris.
- Financial guarantees or environmental insurance for tourism operators.
- Data-sharing mandates for tracking and notification of potential collisions.
- Penalties or compensatory mechanisms for debris-related damages.

Integrating Environmental Principles into Space Law

In designing a legal architecture for sustainable space tourism, terrestrial environmental law offers useful analogies. The "polluter pays" principle, embedded in numerous national and international environmental regimes, could guide liability frameworks for space pollution. Similarly, environmental impact assessments (EIAs) – a routine requirement for major projects on Earth—could be mandated for commercial space ventures, especially those involving prolonged stays or large orbital platforms.[31] Furthermore, doctrines such as intergenerational equity – the idea that future generations deserve an undamaged environment—are particularly resonant in the context of space, a domain humanity is only beginning to explore but has already begun to contaminate. Integrating these principles into treaties or national legislation could serve both a normative and operational purpose.

The Role of UNCOPUOS and International Cooperation

The United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) remains the most viable forum for advancing an environmental protocol for space tourism. While historically slow-moving, UNCOPUOS has succeeded in generating consensus around foundational space law. The next phase could involve the development of a Space Environmental Protection Agreement (SEPA), which—analogous to the Paris Agreement in climate law—could set global emission caps for debris, reporting obligations, and a multilateral review process.[32] Additionally, collaboration with existing space surveillance entities such as the U.S. Space Command, ESA's Space Situational Awareness Program, and the IADC could enhance global monitoring and enforcement. A transparent reporting mechanism for orbital incidents, backed by international data verification, would provide the factual basis needed for legal accountability.

[31] Principle 17, Rio Declaration on Environment and Development, U.N. Doc. A/CONF.151/26 (1992).
[32] United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS), *Report of the Legal Subcommittee on its 61st Session*, U.N. Doc. A/AC.105/1272 (2022).

Commercial Responsibility and Innovation Incentives

While governments hold treaty obligations, private actors now form the backbone of space activity. Therefore, the success of environmental regulation will depend on aligning commercial incentives with sustainability objectives. Voluntary industry standards—such as the "Space Sustainability Rating" being developed by the World Economic Forum and ESA—can complement hard law by encouraging best practices through reputational reward.[33] Insurance companies, too, can act as gatekeepers. By refusing coverage for missions that fail to comply with environmental protocols or by offering premium discounts for ADR-equipped spacecraft, insurers can influence operator behavior in ways regulation alone may not achieve.

The commercialization of space should not be allowed to proceed at the expense of the orbital environment. Space tourism, though promising in its potential, carries a duty of care not only to its participants but also to humanity at large. The Earth's orbital zones are not infinite, and their degradation threatens the very viability of the ventures now being celebrated as revolutionary. Transitioning from soft guidelines to binding legal commitments is not merely a legal reform; it is a moral and ecological imperative. Embedding environmental stewardship into space tourism law will require a coordinated effort—combining international diplomacy, national legislation, private sector accountability, and technological innovation. Only by treating orbital space as an environmental commons—worthy of protection and governed by law—can the future of space tourism be secured for generations to come.

V. India's Strategic Opportunity: Crafting a Futuristic National Space Tourism Policy

India's journey in space has been marked by a spirit of self-reliance, scientific excellence, and the pursuit of national development goals. From launching Aryabhata in 1975 to executing the low-cost, high-impact Chandrayaan and Mangalyaan missions, the Indian Space Research Organisation (ISRO) has proven that innovation need not be bound by budget.[34] Today, as the global space economy pivots toward commercialization, India finds itself at the cusp of a new frontier—space tourism. With its maturing technological base,

[33] European Space Agency (ESA), *Space Sustainability Rating Initiative*, https://www.esa.int/space-sustainability-rating (last visited Apr. 10, 2025).
[34] Indian Space Research Organisation (ISRO), *About ISRO*, https://www.isro.gov.in/about-isro.html (last visited Apr. 10, 2025).

increasing private sector participation, and a rapidly growing space startup ecosystem, India has both the opportunity and the responsibility to develop a national space tourism policy that is future-ready. Doing so requires more than policy ambition; it demands a robust legal framework that integrates safety, sustainability, innovation, and international best practices.

The Indian Context: Rising Potential, Evolving Landscape

India's interest in space commercialization has been formalized through recent legislative and institutional shifts. The creation of IN-SPACe (Indian National Space Promotion and Authorization Center) in 2020 signaled the government's intent to liberalize the space sector and facilitate private enterprise in satellite launches, R&D, and downstream applications.[35] The Draft Space Activities Bill, first introduced in 2017 and currently under review, aims to regulate space-related commercial activities and define liabilities and licensing procedures.[36] However, it remains silent on space tourism—a gap that must be addressed as India enters the next phase of space commercialization. India is also witnessing a surge in space-tech startups. Companies like Skyroot Aerospace, AgniKul Cosmos, and Bellatrix Aerospace are developing indigenous launch vehicles, propulsion systems, and orbital infrastructure.[37] These enterprises represent not only technical innovation but also the embryonic stages of a broader commercial space ecosystem that could support tourism ventures in the near future. As the global market for space tourism is projected to reach $3 billion by 2030,[38] India must not remain a passive observer. Rather, it should leverage its cost advantage, engineering talent, and policy momentum to craft a regulatory framework that enables safe, inclusive, and sustainable space tourism.

Learning from Global Practices: Comparative Insights

Insights from spacefaring nations offer India valuable guidance. The United States, through the Commercial Space Launch Amendments Act of 2004, created a legal environment that encourages private participation while managing risk through informed

[35] Press Information Bureau, Govt. of India, *Cabinet Approves Creation of IN-SPACe to Boost Private Participation in Space*, (June 24, 2020), https://pib.gov.in/PressReleasePage.aspx?PRID=1633914.
[36] Draft Space Activities Bill, Ministry of Law and Justice (2017), available at https://www.prsindia.org/billtrack/space-activities-bill-2017.
[37] Anirban Ghoshal, *Indian Space Startups Launch Bold New Ideas*, LIVEMINT (Oct. 27, 2022), https://www.livemint.com.
[38] Morgan Stanley, *The Space Economy: Investment Implications and the Next Space Age* (2020), https://www.morganstanley.com/ideas/investing-in-space.

consent frameworks and FAA oversight.[39] Japan, balancing innovation with caution, has focused on liability frameworks and technical standards for safe operations.[40] Russia, with its early history of sending private individuals to the International Space Station (ISS), integrates state-operated missions with commercial arrangements via Roscosmos.[41] India can selectively adopt elements from these models—like the FAA's tiered licensing, Japan's emphasis on safety and liability, and Russia's state-supported infrastructure—to shape its own regulatory ecosystem. However, it must also contextualize these within its unique socio-economic, geopolitical, and constitutional environment.

Key Pillars for India's Space Tourism Policy

1. Safety and Passenger Protection: India must establish rigorous safety standards for space tourism vehicles, training requirements for spaceflight participants, and medical screening protocols. Drawing from international aviation and space law precedents, the policy should clearly define the legal status of space tourists—whether as passengers, trainees, or participants—and articulate their rights in case of accidents or loss. An independent regulatory authority under IN-SPACe or the Department of Space could be empowered to grant licenses, oversee operations, and conduct audits to ensure compliance. Provisions for passenger insurance, third-party liability, and post-incident investigation protocols should be codified to build public confidence.

2. Environmental Safeguards and Sustainability: Space tourism activities—especially frequent suborbital launches—have the potential to contribute to space debris and atmospheric pollution. India's framework must therefore include mandatory debris mitigation measures, deorbiting plans for spacecraft, and emission reporting standards for reusable launch vehicles. Environmental clearance processes similar to terrestrial environmental impact assessments (EIAs) could be introduced for space tourism projects, particularly those involving permanent space habitats or lunar missions. These should align with international sustainability guidelines issued by the UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS).[42]

[39] Commercial Space Launch Amendments Act of 2004, Pub. L. No. 108-492, 118 Stat. 3974 (codified at 49 U.S.C. § 70105(b)(5)).
[40] Japan Aerospace Exploration Agency (JAXA), *Policy and Governance*, https://global.jaxa.jp/about/policies.html (last visited Apr. 10, 2025).
[41] Russian Federal Space Agency (Roscosmos), *Space Tourists*, http://en.roscosmos.ru/space-tourists/ (last visited Apr. 10, 2025).
[42] United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS), *Long-Term Sustainability Guidelines*, U.N. Doc. A/AC.105/C.1/L.366 (2019).

3. Intellectual Property Rights and Innovation Incentives: As private players develop proprietary launch and life-support systems for tourism, intellectual property (IP) law must evolve to accommodate inventions made or used in outer space. India's IP regime should be extended to cover space-specific inventions, providing clarity on ownership, jurisdiction, and enforcement. Incentives such as R&D tax credits, patent fast-tracking, and technology transfer support can be integrated into the policy to encourage innovation among startups and MSMEs (micro, small, and medium enterprises). Collaboration between ISRO and private entities should also include clear IP-sharing agreements to avoid future disputes.

4. International Alignment and Treaty Compliance: Any national framework must align with India's international obligations under the *Outer Space Treaty (1967)*, *Liability Convention (1972)*, and *Rescue Agreement (1968)*.[43] India should articulate its commitment to peaceful space activities, non-appropriation of celestial bodies, and cooperation in rescue and return missions. Moreover, as India's role in global space governance grows, it should actively participate in multilateral efforts to develop space tourism norms, potentially advocating for a regional framework through BRICS or SAARC, or joining initiatives like the Artemis Accords with reservations that reflect national interests.

5. Public Awareness and Inclusivity: Space tourism must not remain the domain of the elite. India's policy should promote public awareness, educational outreach, and opportunities for citizen-scientists, students, and researchers to engage with space missions. Contests, simulations, and microgravity training programs can democratize participation and fuel a science-literate society.

Over time, public-private missions could include payloads from educational institutions or offer affordable suborbital experiences to participants from underrepresented regions. Such inclusivity would echo India's constitutional commitment to equality and inspire a new generation of space enthusiasts.

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[43] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205; Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187; Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119.

Opportunities and Challenges Ahead

Crafting a national space tourism policy is not without its challenges. The absence of precedents, dual-use technology concerns, limited infrastructure, and geopolitical sensitivities all pose hurdles. Additionally, public skepticism over the ethics and utility of commercial space travel in a developing country context must be addressed through transparency and public engagement. Yet, the opportunities far outweigh the challenges. A comprehensive policy could attract foreign direct investment (FDI), generate high-skilled jobs, catalyze aerospace manufacturing, and elevate India's soft power in the global arena. More importantly, it would mark India's entry into a new era—where its ambitions are no longer limited to reaching space, but to hosting it.

India stands at a defining moment. The groundwork laid by ISRO and the private sector, coupled with global shifts toward space commercialization, presents a strategic opportunity to develop a futuristic space tourism policy. By embedding safety, sustainability, innovation, and international alignment into its legal framework, India can position itself not just as a participant, but as a leader in the global space tourism narrative. As the final frontier opens to civilians, India must ensure that its policies reflect both the aspirations of a modern technological power and the values of a constitutional democracy. Doing so will not only advance India's space economy but also cement its reputation as a visionary, responsible, and inclusive spacefaring nation.

VI. Legal Preparedness for the Next Frontier: Recognizing Space Hospitality and Human Rights in Orbit

Space tourism, once imagined as a brief suborbital thrill ride, is now rapidly transforming into something far more enduring – an immersive human experience beyond Earth's bounds. Prototypes for space hotels, private orbital habitats, and even lunar resorts are in development, with companies like Axiom Space, Orbital Assembly Corporation, and SpaceX envisioning space stations not just as research outposts, but as destinations for leisure, adventure, and commercial habitation.[44] This transition from transportation to hospitality and human settlement introduces a host of unprecedented legal questions that the current space law regime is ill-equipped to answer. With the emergence of permanent or semi-permanent human presence in outer space, there is a critical need for anticipatory

[44] Axiom Space, *World's First Commercial Space Station*, https://www.axiomspace.com (last visited Apr. 10, 2025).

legal frameworks that address not only technical and operational aspects but also human dignity, rights, and justice in extra-terrestrial environments. Space hospitality, as a legal concept, must evolve alongside space tourism, and so must our understanding of how constitutional and human rights norms extend beyond Earth.

The Emerging Reality of Space Hospitality

From inflatable modules designed to house tourists on the International Space Station (ISS) to blueprints for lunar habitats envisioned as part of NASA's Artemis program, the future of commercial space tourism clearly involves accommodating humans for extended stays in orbit and on celestial bodies.[45] These habitats will not only need infrastructure for basic survival—oxygen, food, water—but also protocols for health emergencies, service standards, privacy, and dispute resolution. In this regard, space hospitality merges space law with concepts from terrestrial hospitality law, international human rights law, health law, and criminal jurisprudence. Just as hotels on Earth must comply with consumer protection laws, health and safety regulations, and non-discrimination statutes, space hotels must also uphold legal standards for guest welfare—adapted to the unique circumstances of zero gravity, confined spaces, and extraterrestrial risk. The foundational international instruments—such as the *Outer Space Treaty (OST)*, *Rescue Agreement*, and *Liability Convention*—offer some basic guardrails, particularly concerning state responsibility and liability for damage. However, these frameworks were designed for state-led exploration and offer no direct regulation over private space hospitality ventures, nor do they guarantee basic rights for space tourists as "individuals" or "consumers."[46]

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[45] NASA Artemis Program, *Gateway Habitation and Lunar Exploration*, https://www.nasa.gov/artemis (last visited Apr. 10, 2025).
[46] Outer Space Treaty, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205.

Key Legal and Ethical Issues in Space Hospitality

1. Property Rights and Access: One of the most contested questions in space law is the issue of property rights. Article II of the OST states that outer space, including the Moon and other celestial bodies, is not subject to national appropriation by any means.[47] While this prohibits sovereign claims, it leaves a gray area regarding private property rights. Can private companies lease land on the Moon? Can space hotels claim operational zones around orbital habitats? This legal vacuum makes it difficult for companies to make long-term investments and for states to regulate or tax space-based businesses. There is a pressing need to clarify and codify usufructuary rights, licenses, or lease models that allow private use without violating the non-appropriation principle.

2. Service Standards and Medical Safety: Space tourism will increasingly involve complex service arrangements—accommodation, catering, recreational activities, and medical care. What standards will apply to these services? Who will regulate their quality, and under whose law? Given the unique dangers of space, medical safety takes on amplified significance. Issues like pre-flight screening, mental health support, in-orbit emergency procedures, and life insurance coverage must be addressed. Should orbital hotels be required to have on-board medical personnel? Must they provide facilities for emergency evacuation? A uniform set of space hospitality safety and service standards, overseen by an international regulatory authority, would ensure that space tourists are not exposed to undue risk and that providers are held accountable for negligence.

3. Criminal Jurisdiction and Dispute Resolution: When a legal dispute or crime occurs on a space station—be it theft, assault, or contractual breach—which legal system applies? The ISS Intergovernmental Agreement (IGA) currently governs such matters by allowing each nation to retain jurisdiction over its nationals and registered modules. However, this model is unlikely to scale well in the context of multinational commercial ventures involving citizens from different states and privately-owned infrastructure. India, for instance, may host its tourists aboard a U.S.-launched orbital hotel operated by a European firm. If a dispute arises between an Indian tourist and an American company, whose courts have jurisdiction? Will space tourism contracts require arbitration clauses? These jurisdictional dilemmas demand pre-emptive legal instruments.

[47] Id. art. II.

4. Extension of Human Rights and Constitutional Protections: Perhaps the most profound issue in space hospitality is whether human rights protections extend beyond Earth. Do space tourists enjoy the right to privacy in their sleeping pods? Can they practice their religion in orbit? Do workers at space hotels have labor rights? The OST emphasizes that space should be used for the benefit of all humankind, but it does not elaborate on individual rights.[48] As humanity enters an age of settlement and habitation beyond Earth, there must be legal recognition that human dignity and fundamental freedoms do not stop at the edge of Earth's atmosphere. International human rights treaties, such as the *International Covenant on Civil and Political Rights* (ICCPR), must be interpreted to apply to individuals in space, particularly when the hosting state has regulatory control over the operators.[49] National constitutions, like that of India, which guarantees fundamental rights to citizens "in any place," should be read expansively to cover extra-terrestrial contexts.[50]

Astro-Legal Jurisprudence: A New Legal Frontier

To address these emerging complexities, scholars and policymakers must develop what could be termed "astro-legal jurisprudence" – a cross-disciplinary legal doctrine that integrates constitutional, criminal, hospitality, health, and human rights law with international space law.

This field would explore questions such as:

- How to draft space tourism contracts with enforceable dispute clauses.
- How to regulate employer-employee relations in space hotels.
- How to extend environmental and bioethics principles to lunar habitats.
- How to ensure accessibility and inclusion in space travel.
- How to harmonize jurisdiction between terrestrial and orbital legal systems.

Astro-legal jurisprudence must also explore moral and philosophical dimensions of law in space: What constitutes justice in an environment with no national borders? What ethical obligations do we owe to future generations inhabiting space?

[48] Outer Space Treaty, supra note 3, art. I.
[49] International Covenant on Civil and Political Rights art. 2(1), Dec. 16, 1966, 999 U.N.T.S. 171.
[50] Constitution of India. Art. 14–21.

Recommendations to Government of India

1. Amend the Draft Space Activities Bill to Include Provisions on Space Hospitality and Human Rights: The current draft focuses primarily on launch authorizations and liability. It must include a dedicated chapter addressing space hospitality services, passenger rights, dispute resolution mechanisms, and health safety protocols.

2. Constitute a National Astro-Legal Advisory Council (NALAC): Comprised of legal scholars, ISRO representatives, policymakers, and human rights experts, this council can advise the government on developing space law reforms and prepare model frameworks for India's participation in international dialogues.

3. Ensure Constitutional Protections Extend to Indian Citizens in Space: Clarify through legislative or judicial means that fundamental rights under Part III of the Indian Constitution apply to Indian citizens engaged in extra-terrestrial travel or employment.

4. Negotiate Bilateral Agreements with Spacefaring Nations on Criminal Jurisdiction and Rights Enforcement: India must proactively sign MOUs and bilateral pacts with countries hosting space operators to ensure its citizens' rights and protections are honored during their stay in foreign space hotels or stations.

5. Promote Indigenous Space Hospitality Projects with Legal and Ethical Oversight: As India moves toward private orbital stations, such ventures must include legal audits, ethical reviews, and compliance with global human rights norms.

Recommendations to International Institutions (UNCOPUOS, UNHRC, ICAO)

1. Adopt a Declaration on Human Rights in Outer Space: Under the United Nations Human Rights Council (UNHRC) and UNCOPUOS, a declaration should affirm the universality of human rights protections in all human space activities.

2. Develop a Global Charter for Space Hospitality Standards: International Civil Aviation Organization (ICAO) and UNOOSA, in collaboration with ILO and WHO, can formulate standards for hospitality safety, worker rights, and health protocols in orbital and lunar environments.

3. Establish an International Space Ombudsman Office: An independent, international mechanism should be created to receive and mediate complaints from space tourists and workers who face rights violations or service failures while in space.

4. Initiate an International Treaty on Jurisdiction in Commercial Space Habitats: This treaty should clarify jurisdictional authority, establish uniform legal definitions of crimes in space, and set up procedures for extradition, enforcement, and arbitration.

As humanity inches closer to permanent habitation in space, the law must ascend alongside the technology. The expansion of space tourism into hospitality demands a bold reimagining of legal structures to address not only technical risks but also human dignity, fairness, and justice in extra-terrestrial environments. India, with its progressive constitutional ethos and rising space ambitions, has a unique opportunity to lead this discourse. By embedding human rights, safety, and ethical governance into its space tourism policy, India can ensure that the final frontier remains not only accessible but also humane.

‘*Yatha pinde tatha brahmande’ Yajurveda* (and echoed in several *Upanishads*)
(As is the individual, so is the universe)

This ancient Vedantic aphorism suggests a deep connection between the microcosm (individual human) and the macrocosm (universe). It implies that our actions in space whether hospitality, behavior, or technology should reflect the ethics and responsibilities we uphold on Earth. It supports the idea of human dignity and conduct being universal, not confined to terrestrial boundaries.