

INTERNATIONAL JOURNAL OF LAW MANAGEMENT & HUMANITIES

[ISSN 2581-5369]

Volume 6 | Issue 2

2023

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Legal Enigma Pirouetting Space Tourism

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ABSTRACT

Human interest these days has developed a particular inquisitiveness to unearth innovative objects, discovering the grounds in the wake of fables and superstitions, and now humanity's contemporary concern is the conundrums in outer space.

Owing to technological progress, now ordinary citizens can also visit space as a tourist and not just trained astronauts. Space tourism can be defined as exploring outer space for recreational, leisure and relaxation purposes. India is at close quarters to securing a position for herself in the tillage of space tourism, question is; what are space tourism capabilities, and legal challenges for our nation?

Keywords: *Space law, Outer space, Airspace, Space tourism.*

I. INTRODUCTION

Space tourism sometimes can be mentioned as citizen space exploration, personal spaceflight, or commercial human spaceflight, and it covers spaceflights that are sub-orbital, orbital, and even beyond Earth orbit.[\[2\]](#) For ensuring the harmonious and sustainable development of space tourism, appropriate laws are necessary. Space tourism is still a foreign concept and most of the people are unaware of this. Therefore when space tourism is launched and Indian civilians are ready for this new venture there should be accurate legal disclaimers and releases which the tourists need to sign to ensure that they themselves want to propel in space. Other factors like dispute settlement can also arise in outer space. Since space tourism is such a new venture, there will be multiple legal queries regarding this endeavour. Space tourism was a dream for Indians until today but it will now be possible. Today civilians wish to travel to space as a tourist, it is not foreign that they will not want to stay there for a vacation so legal angle of this should be vivid and be easily attainable.

While on one hand we are aware that facilities, infrastructure and space transportation network are significant elements of space tourism on the other hand governing laws should also be thought upon and discussed on.

India is party to an existing framework of the international law of outer space that,

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governs space tourism activities globally. There are five main multilateral treaties that have been finalised through the auspices of the United Nations Committee on the Peaceful Uses of Outer Space ("UNCOPUOS"), the main international body involved in the development of international space law.[\[3\]](#)

II. INDIA'S PLAN FOR SPACE TOURISM

Previously in 2019, ISRO's chief K Sivan presented the features and proposed India's first space station for the first time. To utilise the best of India's space resources and increased space activities IN-SPACE was set up in June 2020. It is an independent and solo window nodal agency in the Department of Space for the advancement, encouragement and regulation of outer space activities of both government and private entities.[\[4\]](#) It can be said that this organisation hangs Indian Space Research Organisation (ISRO), and everybody who wants to take part in space-related activities, or use India's space resources together.[\[5\]](#) It is a demand driven model and so that it can help common citizens to experience space activities. Lately Union Minister of State, Jitendra Singh has disclosed ISRO has been carrying out a few viable studies for a sub-orbital space tourism mission on-board a liquid propellant stage booster. Gaganyaan is the first human spaceflight programme where three flights will be sent to orbit and will be two unnerved flights and one human spaceflight. Gaganyaan mission is the demonstration of human spaceflight's potential to Low earth orbit. What lies ahead are the missions which will be taken up subsequent to the triumph of Gaganyaan mission. Launching rockets, satellites and sending humans to space are two very different concept therefore the latter needs more expertise and has to be tested and tried before release. It is believed that 3-4 people will be sent to space for this purpose and as of now four Indian Air force officers are being trained for this mission who volunteered themselves to participate for the cause. Additionally, an escape unit have also been set up which aims intents to assist in difficult emergencies. Test of propulsion systems of the launch vehicle has been started and is going forward efficiently. Accomplishment of gaganyaan mission will lead to attainment of space stations. It is said that post the launch of gaganyaan mission within 5-7 years space stations will be brought forward. Santosh George Kulangara , from Kerala who is based in U.S happened to be the first Indian who travelled to space as a tourist.

ISRO has been planning for years for the development of low cost space tourism based on fair and inexpensive space technologies. Competence of ISRO is undoubtable since

Chandrayaan and Mangalyaan missions were comparatively way low-priced than other countries who went down the same lane. Consequently it is believed that an inexpensive method of space tourism will be established.

Space tourism, which involves the travel of civilians to space for recreational, educational, or research purposes, is an emerging field that has gained significant attention in recent years. While several countries and private companies have been actively engaged in space tourism, India has also shown interest in this field and has taken steps towards its development.

ISRO (Indian Space Research Organisation), the national space agency of India, has expressed its plans to explore the potential of space tourism in the country. In 2018, ISRO announced that it was considering opening up its facilities for space tourism, including allowing private citizens to travel to space on board its spacecraft. ISRO has also sought proposals from the Indian industry for the development of space tourism-related technologies.

In June 2019, ISRO's then-Chairman, K. Sivan, stated that ISRO was working on a project to enable "space tourism in India in a big way" and that they were in the process of identifying suitable technologies and partners for the same. However, there has been no specific timeline or details on the progress of ISRO's space tourism plans since then.

In addition to ISRO, there are also some private companies in India that have expressed interest in space tourism. For example, a private aerospace company called TeamIndus, based in Bengaluru, has plans to launch a lunar rover to the moon as part of the Google Lunar XPRIZE competition, and it has also expressed interest in offering lunar surface exploration experiences to tourists.

It's worth noting that space tourism is a complex field that involves significant technological, regulatory, safety, and financial considerations. The development of space tourism in India would require collaboration between various stakeholders, including government agencies, private companies, and international partners. As of now, space tourism in India is still in its early stages, and there are no operational space tourism programs available to the public. However, with the continued advancements in space technology and the evolving landscape of space tourism globally, it is possible that India may play a role in this emerging field in the future.

III. LEGAL OVERVIEW OF SPACE TOURISM IN INDIA

India ranks fifth in global space technology and is an exceptional accomplishment hence it cannot neglect space legislation. India has always had the view that all space associated activities is an international matter and to be a part of international laws and treaties are sufficient and adequate, hence the demand for a separate domestic law was not felt incumbent. Since there are no strong space laws in India, space tourism is a farfetched topic. India has made significant and substantial advancement into space sector over the years but regrettably still does not have a pertinent legislation. In view of these facts Department of Space had released Space Activities Bill in 2017. ISRO claims to launch its first space station by 2030 which is going to weigh 20 tons. Regulation of space activities were previously handled by ISRO and which is now handled by IN-SPACe, since it acts as a link between private organistaions and ISRO all of its decisions will be legally binding. National authorities grant consent for space tourism tuning with applicable legal provisions of air and space law. Also it is questionable that if passengers are to be treated as astronaut hence how their rights and obligations be defined. It is difficult to decide which legal regime will apply for space tourism i.e aviation/air law or space law.[\[7\]](#)

As of the knowledge cut-off date of September 2021, space tourism in India is a nascent and evolving field, and there are no specific laws or regulations that govern space tourism in the country. However, there are existing legal frameworks that are relevant to space activities in India, including space exploration and satellite launches.

The primary regulatory authority for space activities in India is the Indian Space Research Organisation (ISRO), which is the national space agency and responsible for the development and execution of India's space programs. ISRO operates under the Department of Space (DoS), which is part of the Government of India's Ministry of Space.

ISRO has the authority to grant licenses and approvals for satellite launches and other space-related activities in India, and it sets the guidelines and regulations for these activities. ISRO's regulations include requirements for safety, security, and compliance with international space treaties and agreements to which India is a party, such as the Outer Space Treaty, Liability Convention, and Registration Convention.

In addition to ISRO's regulations, space tourism activities in India would also need to comply with other relevant laws and regulations, including those related to aviation, safety, liability, insurance, and environmental protection. For example, the Director General of Civil Aviation

(DGCA) in India regulates civil aviation activities, and any space tourism activities involving manned spacecraft would likely require coordination and compliance with DGCA regulations.

It's worth noting that space tourism is a complex and rapidly evolving field, and the legal landscape related to space tourism in India may evolve as the industry progresses. As space tourism gains traction in India, there may be a need for additional laws, regulations, and guidelines specifically tailored to space tourism activities to ensure safety, security, and compliance with international obligations. It is important for stakeholders involved in space tourism activities in India to closely monitor the legal and regulatory developments in this area and seek legal advice as needed to ensure compliance with applicable laws and regulations.

At the moment, space related ventures and pursuits are legally governed by Constitution of India, 1950 which has provided due consideration for international law.

a) Article 51 provides state obligation to strive for promotion of international peace and security and [\[10\]](#)

b) Article 253 provides implementing the international treaties along with the domestic laws. [\[11\]](#)

DOS fundamentally promotes evolution and implementation of space science and technology for aiding extensive growth of the nation. Prior to its establishment, all of the space related activities were taken care of by Department of Atomic Energy.

What is Space Activities Bill 2017 and how is it a prospective legal backbone for space tourism?

The Space Activities Bill is legislation by ISRO in November 2017 which is meant to cover our nation's space goal meeting national and international obligations. The key propositions of this bill includes that it shall be applicable to all citizens of India, a non-transferable licence will be provided to any person carrying out any space commercial activity by the government, ensure safety requirements and supervise conduct and provide technical and professional support for commercial space activities. [\[8\]](#) As reported by Department of Space at present government has said, there are no laws capable to govern space tourism and there are almost no plans to make a law specific to space tourism in our country. [\[9\]](#) India is one of the members to the Outer Space Treaty, 1967. The Constitution of India administers for implementation of international treaty obligations in Articles 51 and 253. Since there was a lack of domestic participation of India and a vacancy of pertinent legislative framework, Government of India as a welcome step with suggestions from the public has drafted Space Activities Bill 2017 to frame clearer laws

in developing the space sector with an objective to regulate space activities in India. The implementation of this bill will surely be a breakthrough for space companies but sadly it has not yet been approved and therefore is not a legally binding document. There lies a definite question of law on disputes arising in outer space. This Bill being passed will enhance our nation's interests. Also as an inheritor to the Satcom Policy, the Indian Space Research Organisation (ISRO) also have given birth to a new Spacecom Policy 2020 to carry out the commercial use of orbital slots, satellites, and ground stations for communication needs. This policy is also the cause for the formulation of Indian National Space Promotion & Authorization Center (IN-SPACe).

As of the knowledge cut-off date of September 2021, space tourism in India faces several challenges and difficulties, including:

- **Regulatory Framework:** There is no specific legal framework or regulations governing space tourism in India. Existing regulations by the Indian Space Research Organisation (ISRO) primarily focus on satellite launches and other space-related activities, and there are no specific guidelines or regulations that specifically address the unique aspects of space tourism.
- **Licensing and Approval Process:** Obtaining licenses and approvals for space tourism activities in India can be complex and time-consuming. ISRO, as the regulatory authority for space activities in India, may require thorough safety, security, and compliance assessments, which can pose challenges for space tourism operators in terms of compliance, documentation, and coordination.
- **Infrastructure and Technology:** Building the necessary infrastructure and technology for space tourism in India requires significant investments, including launch facilities, spacecraft, and supporting systems. Developing such infrastructure and technology can be expensive and may pose challenges in terms of funding, technological expertise, and capabilities.
- **Safety and Security:** Space tourism involves inherent risks, including those associated with human spaceflight, spacecraft operations, and space environment. Ensuring the safety and security of space tourists is a critical challenge, including measures to mitigate risks, emergency preparedness, and contingency planning.
- **Liability and Insurance:** The issue of liability and insurance for space tourism activities is complex and can pose challenges. Determining liability in case of accidents or

damages during space tourism activities, and obtaining appropriate insurance coverage for potential risks, including third-party liability and property damages, can be challenging.

- **Public Perception and Acceptance:** Space tourism is a novel concept in India, and public perception and acceptance of this industry may pose challenges. Cultural, ethical, and social considerations, as well as concerns related to environmental impacts, could impact the acceptance and growth of space tourism in India.
- **International Obligations:** India is a signatory to several international treaties and agreements related to space, including the Outer Space Treaty, Liability Convention, and Registration Convention. Complying with these international obligations, including issues related to liability, property rights, and registration of space objects, can pose challenges in the context of space tourism.

It's important to note that the challenges and difficulties of space tourism in India are not unique to the country and are similar to those faced by the space tourism industry globally. As space tourism continues to develop and evolve, addressing these challenges will require coordination among stakeholders, regulatory frameworks, investments in infrastructure and technology, safety and security measures, public outreach, and compliance with international obligations.

IV. NASA

In the U.S., the licensing and approval process for space tourism activities, including those involving NASA, is governed by the Federal Aviation Administration (FAA) and the Commercial Space Launch Act (CSLA). The FAA's Office of Commercial Space Transportation (AST) is responsible for regulating and licensing commercial space launches and re-entries, including those for space tourism purposes, in accordance with the CSLA.

The licensing and approval process for space tourism activities in the U.S., including those involving NASA, typically involves the following steps:

- **Licensing and Permitting:** Companies or organizations planning to conduct space tourism activities must obtain licenses or permits from the FAA's Office of Commercial Space Transportation (AST) for space launches, re-entries, or other commercial space activities. These licenses or permits are typically issued after thorough reviews of safety plans, technical specifications, and other relevant documentation.

- **Compliance with Safety Regulations:** Space tourism operators are required to comply with various safety regulations, guidelines, and standards established by the FAA, NASA, and other relevant agencies. These may include requirements related to spacecraft design, systems, operations, crew training, emergency preparedness, and risk mitigation.
- **Environmental Assessments:** Space tourism operators may need to conduct environmental assessments and obtain approvals or permits for potential environmental impacts associated with their activities, such as launch emissions, noise, and other environmental considerations.
- **Coordination with NASA:** Space tourism operators may need to coordinate with NASA for various aspects of their activities, including launch facilities, spacecraft integration, payload accommodations, safety reviews, and other collaborations or partnerships.
- **Insurance and Liability:** Space tourism operators are typically required to obtain appropriate insurance coverage to address potential risks and liabilities associated with their activities, including third-party liability and property damages.

It's important to note that the licensing and approval process for space tourism activities, including those involving NASA, can be complex and may require compliance with multiple regulations, guidelines, and standards. The specific requirements may vary depending on the nature, scope, and location of the space tourism activities, as well as the involvement of NASA or other relevant agencies. It's advisable to consult with legal and regulatory experts familiar with the relevant laws and regulations when considering or engaging in space tourism activities.

RUSSIA

The Russian Federal Space Agency, commonly known as Roscosmos, is the government body responsible for the space science program of the Russian Federation and general aerospace research. Roscosmos plays a significant role in space tourism, as it is responsible for managing and coordinating various space activities, including those related to space tourism.

Roscosmos has been involved in space tourism through its partnership with Space Adventures, a private space tourism company based in the United States. Roscosmos has facilitated several space tourism missions to the International Space Station (ISS) using Russian spacecraft, including Soyuz capsules, which have carried private individuals as space tourists.

V. PRIVATE COMPANIES AND SPACE TOURISM

Private companies and space tourism have been gaining significant attention in recent years as the accessibility of space exploration has expanded beyond just government agencies. Several private companies are now actively involved in developing spacecraft and offering space tourism experiences to the public. Here are some key points about private companies and space tourism:

- **Space Tourism:** Private companies like SpaceX, Blue Origin, and Virgin Galactic are at the forefront of the emerging space tourism industry. They are developing spacecraft that can carry civilians to space for recreational and tourism purposes. These companies have ambitious plans to offer suborbital and orbital space tourism experiences, where civilians can experience weightlessness, see Earth from space, and even visit other celestial bodies like the Moon.
- **Technological Advancements:** Private companies have been driving technological advancements in the space industry, including the development of reusable rockets and spacecraft. SpaceX, for example, has successfully launched and landed reusable rockets, significantly reducing the cost of accessing space. This has paved the way for more affordable space tourism options, making it more accessible to a broader range of people.
- **Market Potential:** Private companies see a huge market potential in space tourism, with projections of a multi-billion dollar industry in the coming years. There is a growing interest among affluent individuals and corporations to experience space travel, which has fueled investments in private space tourism ventures. Companies like Blue Origin and Virgin Galactic have already started taking reservations for space tourism flights, with tickets priced in the hundreds of thousands to millions of dollars.
- **Research and Development:** Private companies involved in space tourism are not just focused on recreational trips to space, but also on conducting research and development activities. These companies are collaborating with scientists, researchers, and institutions to conduct experiments, test technologies, and gather data in microgravity environments, which can have applications in various fields such as medicine, materials science, and agriculture.
- **Regulatory Challenges:** Private companies involved in space tourism are facing regulatory challenges as space is governed by various international treaties, agreements,

and laws. Issues related to safety, liability, insurance, and environmental impact are some of the key regulatory challenges that need to be addressed. Governments and space agencies are working on regulations to ensure the safety of space tourism activities while promoting responsible and sustainable space exploration.

- **Public Interest and Ethical Considerations:** The emergence of private companies in space tourism has also raised ethical considerations and concerns about equity and access. Critics argue that space tourism is currently limited to the ultra-rich and that it exacerbates social and economic inequalities. There are also concerns about the impact of space tourism on the environment and the potential exploitation of celestial bodies. These issues are being debated and discussed by various stakeholders, including governments, space agencies, private companies, and the public.

Private companies are playing a significant role in the development of the space tourism industry, making space exploration more accessible and commercially viable. While there are many opportunities associated with private companies and space tourism, there are also challenges that need to be addressed to ensure responsible and sustainable space exploration in the future.

Private ventures in space tourism face several challenges, including:

- **High Costs:** Developing space tourism infrastructure, including spacecraft and launch systems, is extremely expensive. The costs associated with research and development, manufacturing, testing, and launching spacecraft can be prohibitive for private companies, especially startups or small ventures. The need to invest substantial capital in developing cutting-edge technology and infrastructure poses a significant challenge for private companies in space tourism.
- **Regulatory Hurdles:** Space is governed by various international treaties, agreements, and laws, which can pose regulatory challenges for private space tourism ventures. Obtaining necessary licenses, permits, and approvals from government agencies can be complex and time-consuming. There are also safety regulations, liability issues, and environmental concerns that need to be addressed, which can pose legal and regulatory challenges for private companies.
- **Safety and Liability Concerns:** Space tourism involves inherent risks, including the health and safety of passengers during launch, re-entry, and space travel. Ensuring the safety of passengers and addressing liability issues in case of accidents or mishaps can

be a significant challenge for private companies. Adequate insurance coverage, risk mitigation strategies, and compliance with safety standards are essential, but can be costly and complex.

- **Technical and Operational Complexities:** Developing spacecraft and launch systems for space tourism requires cutting-edge technology, expertise in aerospace engineering, and operational capabilities. Private companies need to invest in research and development, testing, and operational capabilities, which can pose technical and operational challenges. Maintaining and operating spacecraft, managing logistics, and ensuring reliable and safe operations in the harsh environment of space are complex tasks that private companies must navigate.
- **Market Viability and Competition:** The market demand for space tourism is still uncertain, and the competition among private companies in the emerging space tourism industry is increasing. Companies need to develop viable business models, attract customers, and generate sufficient revenue to sustain their operations. Market uncertainties, competitive pressures, and changing customer preferences can pose challenges for private companies to establish a sustainable business in the space tourism market.
- **Ethical and Social Concerns:** The emergence of space tourism has raised ethical and social concerns, including issues related to equity, access, environmental impact, and exploitation of celestial bodies. Private companies need to address these concerns, comply with ethical standards, and demonstrate responsible practices in their operations. Balancing commercial interests with ethical and social considerations can be a challenge for private companies in the space tourism industry.
- **Dependence on Government Support:** Private companies in space tourism often rely on government contracts, partnerships, and support for funding, regulatory approvals, and infrastructure access. Changes in government policies, funding availability, or geopolitical dynamics can pose challenges for private companies, as they may impact their business operations, partnerships, and access to resources.

While private companies are driving innovation and advancement in the space tourism industry, they face significant challenges including high costs, regulatory hurdles, safety and liability concerns, technical complexities, market viability, ethical considerations, and dependence on government support. Overcoming these challenges requires strategic planning, technological

expertise, operational capabilities, compliance with regulations, and responsible business practices.

VI. LIABILITY IN SPACE TOURISM

Liability refers to the legal responsibility or obligation for damages or losses that may arise from space tourism activities. In the context of space tourism, liability can arise from various sources, such as accidents during space launches or landings, in-flight incidents, collisions with space debris or other objects, damage to third-party property, injuries to passengers or crew, and other unforeseen events.

Insurance, on the other hand, involves transferring the risks associated with space tourism activities to an insurance provider through a contractual agreement. Space tourism operators and other stakeholders, such as launch service providers, spacecraft manufacturers, and spaceports, typically obtain various types of insurance coverage to protect themselves financially against potential liabilities and losses.

Liability and insurance clauses in space tourism typically cover a range of aspects, including:

- **Third-party liability:** This involves liability for damages or losses to third parties, such as passengers, crew, other spacecraft, property, or the environment.
- **Property damage:** This involves coverage for damage or loss of spacecraft, launch vehicles, or other property used in space tourism activities.
- **Personal injury:** This involves coverage for injuries or fatalities to passengers, crew, or other individuals involved in space tourism activities.
- **Collision and debris mitigation:** This involves coverage for damages resulting from collisions with space debris or other objects in space and costs associated with debris mitigation measures.
- **Product liability:** This involves coverage for damages resulting from defects or failures of spacecraft, launch vehicles, or other products used in space tourism activities.
- **Business interruption:** This involves coverage for losses resulting from disruptions to space tourism operations due to unexpected events, such as accidents, technical failures, or regulatory issues.
- **Worker's compensation:** This involves coverage for injuries or illnesses to workers involved in space tourism activities.

Liability and insurance requirements for space tourism activities vary depending on the jurisdiction, type of activity, and parties involved. Some countries or international organizations may have specific regulations or guidelines related to liability and insurance for space tourism, and space tourism operators may be required to obtain certain minimum levels of coverage or demonstrate financial responsibility.

Space tourism operators and stakeholders typically work with insurance providers specializing in space or aviation insurance to obtain appropriate coverage for their activities. The terms, conditions, and coverage of liability and insurance clauses in space tourism contracts are typically negotiated and customized based on the specific circumstances and risks associated with the space tourism activity.

It's important for space tourism operators and stakeholders to carefully review and understand the liability and insurance requirements, and work with experienced legal and insurance professionals to ensure that appropriate coverage is in place to protect against potential risks and liabilities associated with space tourism activities.

The liability clause in space tourism is governed by a combination of national and international laws, regulations, and conventions, depending on the jurisdiction and location of the space tourism activity. Here are some specific laws and regulations that may be relevant to the liability clause in space tourism:

International Treaties: There are several international treaties that govern space activities, including space tourism, and may include provisions related to liability. The most important treaty in this regard is the Outer Space Treaty, also known as the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, which sets out the fundamental principles of space law, including liability for damages caused by space objects. Other relevant treaties include the Liability Convention and the Registration Convention, which also address liability issues in space activities.

National Space Laws: Many countries have their own national laws and regulations related to space activities, including space tourism. These laws may include provisions related to liability, insurance, and compensation for damages arising from space tourism activities. For example, in the United States, the Commercial Space Launch Act and its implementing regulations provide for liability and insurance requirements for commercial space launches, including space tourism activities.

Launch Licensing and Permitting Regulations: Space tourism operators may be required to obtain licenses or permits from national or regional space authorities for conducting space tourism activities. These licensing or permitting regulations may include provisions related to liability, insurance, and indemnification requirements for space tourism operators.

Contractual Agreements: Liability clauses in space tourism contracts are typically customized and negotiated between the parties involved in the space tourism activity, including the space tourism operator, passengers, and other stakeholders. These contractual agreements may include provisions related to liability, insurance, indemnification, and dispute resolution mechanisms.

Insurance Requirements: Space tourism operators may be required to obtain liability insurance coverage to mitigate potential risks and liabilities associated with space tourism activities. Insurance requirements may be imposed by national or regional space authorities, or may be included as part of contractual agreements between the parties involved in space tourism activities.

It's important to note that the legal landscape related to space tourism and liability is still evolving and may vary depending on the jurisdiction and location of the space tourism activity. It's recommended for space tourism operators and stakeholders to work with experienced legal professionals and consult applicable laws, regulations, and conventions to ensure compliance with the relevant legal requirements and to properly address liability issues in space tourism activities.

Space tourism and Environment

Space tourism, like any other human activity, has the potential to impact the environment. Some of the potential environmental impacts of space tourism include:

Atmospheric Pollution: Space launches, especially those using traditional rocket propulsion systems, can release various gases and particulate matter into the atmosphere, contributing to air pollution. Emissions from rocket engines can release greenhouse gases, such as carbon dioxide and water vapor, as well as other pollutants, such as nitrogen oxides and soot, which can contribute to the formation of smog and other air quality issues.

Noise Pollution: Space launches generate high levels of noise, which can have impacts on wildlife, ecosystems, and nearby communities. The loud noise from rocket launches can disturb wildlife habitats, disrupt sensitive ecosystems, and affect local communities' quality of life.

Space Debris: Space tourism activities can contribute to the accumulation of space debris or

space junk, which consists of defunct satellites, spent rocket stages, and other debris from space missions. Space debris can pose risks to operational satellites, spacecraft, and the International Space Station (ISS), as well as create potential hazards for future space missions.

Visual and Light Pollution: Space tourism activities, including those involving space tourism vehicles or spaceports, can introduce additional lights and structures into the night sky, potentially affecting natural dark skies, stargazing, and astronomical observations.

Ecological and Cultural Impacts: Space tourism activities, such as construction of spaceports, launch facilities, or infrastructure, can have ecological impacts, such as habitat destruction, disruption of local ecosystems, and impacts on local cultural heritage and traditional practices.

Resource Utilization: Space tourism activities, such as space mining or resource extraction, could potentially impact natural resources in space, such as minerals, water, and other materials, which may have ecological, legal, and ethical implications.

It's important to note that space tourism is still a relatively nascent industry, and the full extent of its potential environmental impacts is not yet fully understood. However, there is increasing recognition and efforts to address and mitigate these impacts through environmental regulations, guidelines, and best practices, as well as technological innovations and sustainable practices in the design and operation of space tourism vehicles and infrastructure.

As space tourism continues to develop, it will be essential to ensure that environmental considerations are carefully addressed to minimize negative impacts and promote sustainable practices in this emerging industry.

VII. CONCLUSION

India has to reach a level where in the legal status of everyone involved in space tourism is successfully defined starting from commanders, crew members to passengers. It is recommended that India should have efficient, robust and appropriate space laws which will facilitate space tourism in India. Relying on International Treaties will not be enough to cover all aspects of space law especially in the field of space tourism which is lucrative but highly competitive as well. At India International Science Festival (IISF) 2023, Dr. S. Somanath, Chairman of the Indian Space Research Organisation (ISRO) did speak about avenues space tourism and the development of reusable rockets which is a ray of sunshine to our hope for space tourism. If India wishes to secure a competitive spot in space market, she will need a comprehensive space law on tourism which will lead to a generous revenue for companies that will provide the facility. Hence, it will also be a pathway for an increase in employment. It is

predicted that India will make space tourism possible by 2030 but whether India will develop a strong legislation regarding space laws remains to be seen.

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