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"Navigating the Cosmic Frontier: Legal Considerations for Nepal's Entry into Space Exploration"

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Abstract

As space exploration expands beyond traditional spacefaring nations, emerging space players like Nepal face unique legal and regulatory challenges. This article explores the legal considerations crucial for Nepal's entry into space exploration, focusing on national and international frameworks that govern space activities. Through a comprehensive analysis of space law literature, treaties such as the Outer Space Treaty and the Convention on Registration of Objects Launched into Outer Space, and the policies of other nations with emerging space programs, this study identifies key legal issues Nepal must address. These include compliance with international treaties, establishment of national space legislation, and participation in global space governance. The findings suggest that while Nepal's entry into space offers significant opportunities for scientific and technological advancement, it requires careful navigation of legal responsibilities and international collaborations. The article concludes with recommendations for developing a robust legal framework that ensures Nepal's safe and equitable participation in the global space community.

Keywords: *Nano-satellite, Cube satellite, Celestial bodies, Space debris, Public-Private Partnerships (PPP), Outer Space Act, Satellite collisions, Environmental harm, Satellite Spectrum Rights, Space Sustainability and Ethics, UNOOSA, COPUOS, ITU.*

Introduction

The beginning of the 21st century has marked the start of a new age in space exploration, defined by swift technological progress and a growing involvement of nations and private companies in outer space activities.[1] Nepal is also part of this race, having successfully launched its own nanosatellite. The launch of Nepal's first nano-satellite (NepaliSat-1), a cube satellite, on April 18, 2019, at 2:31 AM (Nepal Standard Time) from Virginia[2], was a historic moment for the nation—a dream realized amid economic challenges. This achievement not only showcased Nepal's growing desire for technological capabilities but also marked a significant step toward leveraging satellite technology for national development.

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[1] Amrit Pathak, Space Exploration in the 21st Century https://www.studocu.com/in/document/tribhuvan-university/information-technology/space-exploration-in-the-21st-century/105421642 (accessed Aug.1, 2024)

[2] Nepal's first ever satellite launched into space, *The Kathmandu Post* (Apr.18, 2019) https://kathmandupost.com/science-technology/2019/04/18/nepals-first-ever-satellite-launched-into-space (accessed Aug. 1, 2024)

Leveraging this accomplishment, Nepal is now preparing to launch its next cube satellite, the Munal Satellite, by the end of 2024[3]. This upcoming mission further emphasizes the country's commitment to advancing its space endeavors and utilizing satellite data for crucial sectors such as agriculture, disaster management, and environmental monitoring. As Nepal embarks on this exciting journey, these milestones represent more than just technological advancements; they embody the aspirations of a nation determined to overcome obstacles and forge a path toward sustainable growth and innovation. In the wake of each satellite launch, Nepal not only enhances its standing on the global stage but also inspires future generations to dream big and aim for the stars.

Nepal's foray into space exploration offers a distinctive opportunity for the nation to position itself as a responsible and progressive player on the global stage. However, this opportunity also brings significant legal challenges alongside economic hurdles. As humanity expands into the vastness of space, the urgency for a comprehensive legal framework to regulate exploration and resource utilization intensifies. With Nepal preparing to initiate its space endeavors, it is crucial to explore the legal aspects that will influence its journey into this uncharted realm.

The advent of the Space Age in the late 1950s marked a pivotal moment in human history, necessitating the establishment of a legal framework to govern outer space activities. As nations embarked on ambitious missions beyond Earth, the potential for conflict and competition in this new frontier became apparent. The launch of the Soviet satellite Sputnik-I in 1957[4] marked the beginning of the space age and the subsequent U.S. response with Explorer- 1[5] underscored the urgency for international cooperation and regulation. This led to the creation of foundational treaties, such as the Outer Space Treaty of 1967, which set forth principles for the peaceful exploration and use of outer space, emphasizing that space should be the province of all humankind.[6] The need for space law has only intensified with the rapid advancements in space technology and the increasing involvement of private entities in space exploration. Today, space law addresses critical issues such as the liability for damages caused by space objects, the preservation of the space environment, and the ethical considerations surrounding the use of space resources. As humanity continues to push the boundaries of exploration, a robust legal framework is

[3] MEA, NSIL ink MoU to assist launch of Nepal-made Munal satellite, *Hindustan Times* https://www.hindustantimes.com/india-news/mea-nsil-ink-mou-to-assist-launch-of-nepal-made-munal-satellite-101723362760978.html (accessed Aug. 1, 2024)

[4] John Uri, 60 years ago, the Space Age began, *NASA* https://www.nasa.gov/history/60-years-ago-the-space-age-began/#:~:text=On%20October%204%2C%201957%2C%20the,the%20world's%20first%20artificial%20satellite. (accessed Aug. 1, 2024)

[5] *Sputnik and The Dawn of the Space Age, NASA* https://www.nasa.gov/history/sputnik/index.html (accessed Aug. 1, 2024)

[6] Vladimír Kopal, *Treaty On Principles Governing The Activities Of States In The Exploration And Use Of Outer Space, Including The Moon And Other Celestial Bodies*, https://legal.un.org/avl/pdf/ha/tos/tos_e.pdf (accessed Aug. 1, 2024)

essential to ensure that space remains a domain for peaceful cooperation and sustainable development, safeguarding the interests of all nations and future generations.

As Nepal sets its sights on the burgeoning field of space exploration, a clear framework for its ambitions becomes essential in navigating the complexities that accompany such endeavors. The nation seeks to harness space technology for applications such as telecommunications, agriculture, and disaster management, which could significantly contribute to its socio-economic development. However, this pursuit necessitates a comprehensive understanding of legal frameworks that govern outer space activities, as outlined in the previous paragraph. The establishment of regulatory mechanisms is crucial for ensuring compliance with international treaties and also addressing potential environmental issues associated with space activities, such as space debris and the sustainable use of outer space resources including the peaceful use of outer space, and the responsibility of nations for their space activities.[7]

Nepal has indeed taken steps toward legal reconsideration in outer space activities, notably through the formulation of the Satellite Policy, 2020 (2077 B.S), which aims to regulate and oversee the country's endeavors in this domain. Thus, on 12th March 2019, Nepal Telecommunications Authority (NTA) signed an agreement with the French satellite operator *Thales Alenia Space* to build Nepal's first satellite and to operate and manage Nepal's satellite (C/Ku Band satellite[8]) in the orbital slot allotted to Nepal at 123.3 degrees East[9] by the International Telecommunications Union (ITU).

The Nepalese government intends to use the satellite to provide nationwide internet access to its citizens, improve disaster management efforts, and strengthen economic growth in the country.[10] Unfortunately, NTA, through a notice published on 30th July 2021, canceled the process to procure its own satellite.[11] If this plan had proceeded as initially intended, Nepal would have already launched its own satellite by 2022, marking a significant step forward in the country's space ambitions. The satellite was envisioned to improve telecommunications, enhance connectivity, support disaster management, and boost Nepal's presence in the global space community. However, the project faced several

[7] M. Islam, The Sustainable Use of Outer Space: Complications and Legal Challenges to the Peaceful Uses and Benefit of Humankind. Beijing Law Review, 9, 235-254 (2018). doi: 10.4236/blr.2018.92016.

[8] The Telecommunication Satellite Project For Nepal Has Been Launched, *Thales Group* https://www.thalesgroup.com/en/worldwide/space/press-release/telecommunication-satellite-project-nepal-has-been-launched (accessed Aug. 2, 2024)

[9] Country Report Presentation Nepal, Department of Communication and Broadcasting Nepal, Presented by Bharat Gautam, Director https://www.itu.int/en/ITU-D/Regional-resence/AsiaPacific/Documents/Events/2023/LLDC2023/Final%20Slide_Nepal.pdf https://www.nta.gov.np/uploads/contents/EOI-Satellite-2021.pdf (accessed Aug. 1, 2024)

[10] Nepal Establishes First Satellite Project, *Relief Web* https://reliefweb.int/report/nepal/nepal-establishes-first-satellite-project (accessed Aug. 1, 2024)

[11] Notice for Cancellation of Applications for RFP No. 01-NTA-SATELLITE-2021, NTA https://www.nta.gov.np/content/notice-for-cancellation-of-applications-for-rfp-no-01-nta-satellite-2021 (accessed Aug. 1, 2024)

challenges, including the lack of adequate legal frameworks and regulatory clarity. Critical legal considerations were missing, particularly regarding satellite spectrum rights, international coordination, and the governance of space assets. These legal gaps contributed significantly to the decision to halt the procurement process.[12] As a result, Nepal lost an opportunity to capitalize on its allocated satellite slot, delaying the realization of its long-term space program objectives.[13]

This article, therefore, lays the groundwork for a comprehensive examination of the legal ramifications of Nepal's entry into space exploration, underscoring the necessity of navigating the intricate framework of international space law and domestic regulations that will govern the nation's activities in this field. By exploring the legal factors discussed, Nepal can effectively maneuver through these complexities and establish a robust framework for its space endeavors. This approach will enable the country to capitalize on the benefits of space exploration while minimizing risks and ensuring alignment with global norms and standards.

International Outer Space Law

The framework of international outer space law is built upon a series of treaties and agreements that establish guidelines for the exploration and use of outer space.[14] It happened in response to several critical needs and challenges that emerged with the advent of space exploration. These treaties aim to ensure that space activities are conducted for the benefit of all humanity, promoting peace, cooperation, and sustainability. Therefore, international space laws are pivotal for nations attempting to engage in space exploration, as they delineate the rights and responsibilities of states in outer space.

At the core of this framework are treaties like the Outer Space Treaty of 1967, which states that space exploration should benefit everyone and prevents any nation from claiming ownership of celestial bodies.[15] For a country like Nepal, aspiring to improve its space capabilities, understanding these legal guidelines is crucial. The complex landscape of modern threats and challenges, as noted in several studies, underscores the importance of legal frameworks that can adapt to shifting technological and geopolitical realities.

In addition, the challenges of transitional justice in various governance contexts can provide valuable lessons for emerging spacefaring nations on addressing equity and collaboration in global space activities. Given that transitional justice is a prominent issue

[12] Finally, Nepal To Get Own Satellite, *Nepali Times* https://nepalitimes.com/news/finally-nepal-to-get-own-satellite (accessed Aug. 1, 2024)

[13] NTA Cancels Process For Launching Satellite, *My Republica* (December 08, 2020), https://myrepublica.nagariknetwork.com/news/nta-cancels-process-for-launching-satellite/?categoryId=37 (accessed Aug. 2, 2024)

[14] Zhijie Chen & Yun Zhao, Intellectual Property Protection in Outer Space: Conflict in Theory and Application in Practice, *Sci.Direct*, https://www.sciencedirect.com/science/article/abs/pii/S0265964622000108 (accessed Aug. 1, 2024).

[15] Kate Howells, What is the Outer Space Treaty? *Planetary Society* (May 14, 2024). https://www.planetary.org/articles/what-is-the-outer-space-treaty (accessed Aug. 1, 2024).

in Nepal, the country is well aware of its complexities. Therefore, Nepal's involvement in International Space Law will be key to ensuring its responsible participation in space exploration.

The following outlines the space laws that must be understood when exploring outer space.

a) The Outer Space Treaty (1967)[16] (OST)

The treaty serves as the foundation of international space law for its signatory nations (115 as of March, 2024[17]) and outlines key principles for space exploration and operation:

- Space activities are intended for the benefit of all nations, allowing any country the freedom to explore orbits and beyond[18].
- No nation can claim sovereignty over space; no country can "own" space, the Moon, or any other celestial body.[19]
- The use of weapons of mass destruction is prohibited in orbit and beyond; celestial bodies can only be utilized for peaceful purposes.[20]
- Any astronaut represents all of humanity, and signatory states are required to assist astronauts in need, including facilitating emergency landings in foreign countries or at sea.[21]
- Each signatory state is responsible for its space activities, including those conducted by private companies, and must provide authorization and ongoing oversight.[22]
- Nations are liable for damage caused by their space objects and must take steps to prevent the contamination of space and celestial bodies.[23]

The cornerstone of space law, the Outer Space Treaty, sets fundamental principles for the use of outer space[24]. It emphasizes that space shall be used for peaceful purposes and prohibits the placement of nuclear weapons in orbit. The treaty establishes that celestial bodies cannot be claimed by any nation and underscores the importance of international cooperation.

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[16] "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies"

[17] United Nations Office for Outer Space Affairs, Status of International Agreements relating to Activities in Outer Space https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/status/index.html (accessed Aug. 2, 2024).

[18] Article I, Outer Space Treaty (OST), 1967.

[19] *Ibid*, Article II, 1967.

[20] *Ibid* Article IV, 1967

[21] *Ibid* Article V, 1967

[22] *Ibid* Article VI, 1967

[23] *Ibid* Article VII, 1967

[24] Jinyuan Su, The "Peaceful Purposes" Principle In Outer Space And The Russia–China PPWT Proposal, *Space Policy*, https://www.sciencedirect.com/science/article/abs/pii/S026596461000024X
Doi: https://doi.org/10.1016/j.spacepol.2010.02.008 (accessed Aug. 1, 2024)

b) Rescue Agreement (1968)[25]

This agreement emphasizes the humanitarian aspect of space exploration by requiring states to assist astronauts in distress and ensure their safe return. It also covers the recovery of space objects that land on Earth outside the territory from which they were launched.

c) Liability Convention (1972)[26]

The Liability Convention establishes a framework for managing damages caused by space objects, holding launching states accountable for any harm inflicted on Earth or in space and providing a process for claims and compensation.

d) Registration Convention (1976)[27]

To enhance transparency,

The Registration Convention requires states to register space objects with the United Nations, enhancing transparency. This includes providing details about the object's orbit and function, facilitating the identification and tracking of space activities.

e) Moon Agreement (1984)[28]

The Moon Agreement extends the principles of the Outer Space Treaty to the Moon and other celestial bodies, declaring them the "common heritage of mankind." The Agreement stipulates that celestial bodies must be used exclusively for peaceful purposes and must not be contaminated. It also mandates that the UN be informed of any stations on non-Earth bodies, and it calls for the establishment of an international regime to govern the extraction and use of resources if mining on the Moon becomes viable. It proposes an international regime for resource exploitation, although it has not been widely adopted.

As Nepal continues to develop its space capabilities, adherence to these principles will be vital for ensuring its responsible participation in the global space community. This alignment not only enhances Nepal's standing in international forums but also facilitates collaborative efforts that benefit both national and global interests in space exploration.

National Space Legislation and Policy Framework

Satellite Policy, 2077 (2020)

The history reflects that Nepal has consistently recognized the growing importance of outer space activities and their potential to support national development. Over the years, the country has acknowledged that space-based technologies, such as satellite communications, earth observation, and remote sensing, can play a crucial role in

[25] "The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space"
[26] "The Convention on International Liability for Damage Caused by Space Objects"
[27] "The Convention on Registration of Objects Launched into Outer Space"
[28] "The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies"

addressing key challenges across sectors like telecommunications, disaster management, agriculture, and environmental monitoring. Nepal, strategically located in South Asia (between China and India), understands that access to space not only strengthens national security and technological capabilities but also enables the country to participate in global space initiatives. This growing awareness of the transformative power of space led to the formulation and implementation of Nepal's Satellite Policy in 2077 (2020),[29] which aims to harness space technology for socio-economic growth. By establishing this policy, Nepal sought to formalize its ambitions in space exploration and satellite technology, with a clear focus on developing its own space capabilities.

The Satellite Policy, 2077 reflects the country's commitment to enhancing national infrastructure, improving connectivity, and contributing to sustainable development goals through satellite-based solutions. It marks a significant step in Nepal's journey to integrate space technology into its broader development agenda. It emphasizes the importance of collaboration with international partners to enhance Nepal's capabilities in space science and technology. The policy reflects a commitment to not only participate in the global space community but also to ensure that Nepal can effectively contribute to and benefit from advancements in this field. Overall, the Satellite Policy 2077 marks a significant step forward in Nepal's efforts to engage with outer space in a meaningful and responsible manner.

The Satellite Policy 2077, a significant milestone for satellite usage in Nepal, was approved by the cabinet on 2077/03/02. Its goal is to achieve prosperity through the establishment, operation, and utilization of Nepal's own satellites, contributing to various sectors of development.

The objective and Strategy set by this policy are;

Objectives of the Policy:

- *To launch and establish the satellite controlled and operated from within the territory of Nepal, To prepare the skilled and qualified manpower necessary for space technology,*
- *To provide institutional provision necessary for providing services through the satellite operation.*
- *Coordinate and collaborate with international organizations working in the satellite/space-related field.*

Strategies of the policy

- *To extend/expand access to space by establishing Nepal's own satellite,*
- *To provide necessary arrangements to use Nepal's own satellite after its establishment,*

[29] Nepal Satellite Policy, Ministry of Foreign Affairs https://mofa.gov.np/wp-content/uploads/2020/05/Unofficial-Translation-of-Policy-and-Programme-2077-78.pdf (accessed Aug. 1, 2024)

- *To provide a necessary arrangement for preparing skilled and qualified manpower related to space technology,*
- *To provide a necessary arrangement for program formulation of space research and study.*
- *To use satellites in order to provide effective communication during a disaster and facilitate communication in rural areas,*
- *To collaborate and cooperate with the related international organizations to establish, operate and manage the satellite.*

In the 'Institutional Provision' section of the policy, it is stated that:

- *A separate institutional set-up will be arranged for the operation and management of satellite service,*
- *Nepal Telecommunication Authority (NTA) will work on the necessary functions until the institutional provision is provided,*
- *The functions related to the regulation of satellites shall be done by MoCIT or the body/entity appointed by MoCIT,*

Nepal's **Satellite Policy 2077** sets out clear goals for using satellite technology, but to achieve these goals, Nepal will need to create special laws to manage space activities. The country's current laws are not enough to handle the unique challenges of launching and running satellites, so new and special (Specific) legal structures are needed.

First, with the goal of launching and managing a satellite controlled and operated from within Nepal, the country will need to establish clear legal rights regarding satellite operations, spectrum allocation, and the protection of space assets. This could involve creating laws that align with international space treaties, such as the **Outer Space Treaty (1967)** and the **Registration Convention (1976)**, to ensure compliance with global norms and standards.

The **Satellite Policy** also stresses the need for skilled workers and collaboration with other countries. To support this, Nepal will need laws that not only help develop space technology skills but also guide how Nepal works with international space agencies. These laws should clarify the roles of organizations like the **Ministry of Communications and Information Technology (MoCIT)** and the **Nepal Telecommunications Authority (NTA)**, which will oversee satellite operations.

The policy also focuses on using satellites for disaster communication, rural connectivity, and space research. To ensure these goals are met safely and effectively, legal rules are needed to manage satellite use for these purposes. A special **Outer Space Act** could help manage space debris, control satellite traffic, and protect Nepal's satellite infrastructure.

In short, Nepal's **Satellite Policy 2077** sets ambitious goals, but to make them work, the country will need to create new laws to address gaps in regulation. This is exactly why the French team had to cancel Nepal's satellite launch plan.[30] Without these laws, Nepal could struggle to manage satellite operations, work with international partners, and ensure the long-term success of its space program.

Outer Space Law in Nepal: No Special Legislation Enacted

The landscape of Nepal's legal framework concerning space exploration is currently underdeveloped, mirroring the nascent status of its space endeavors. Existing policy primarily focus on terrestrial issues and are inadequate for addressing the complexities and international obligations that come with space activities. The need for new regulations is pressing as Nepal looks to engage in international partnerships and collaborations in space research and technology. Specifically, risks associated with transnational threats, as highlighted by the challenges of globalization, necessitate a more robust legislative approach. Furthermore, initiatives like the Disaster Information Management System (DIMS) portal underscore the importance of a comprehensive strategy encompassing social factors in risk management[31]. As Nepal prepares to navigate the cosmic frontier, developing a regulatory framework tailored to space exploration will be essential for fostering innovation, ensuring safety, and promoting international cooperation in this critical area.

Further, to build a comprehensive legal framework for space activities, Nepal can draw inspiration from the legal frameworks of other nations, particularly those with successful space programs and similar geopolitical contexts. For instance, India's Space Activities Bill,[32] which is currently being discussed, could serve as a model for Nepal. This bill proposes a dedicated space regulatory authority, which oversees both government and private sector space activities and ensures compliance with international treaties. Likewise, the United States' Commercial Space Launch Competitiveness Act (2015) outlines the roles of private companies in space exploration and addresses liability and insurance concerns related to satellite launches.[33] Nepal should also look to global space law conventions, such as the Outer Space Treaty and Liability Convention, to ensure its national legislation is in alignment with international norms, particularly concerning the

[30] NTA Calls Off Proposal To Procure Own Satellite, *My Republica*, https://myrepublica.nagariknetwork.com/news/nta-calls-off-proposal-to-procure-own-satellite/ (accessed Aug.2, 2024).

[31] Gaurab Sagar Dawadi. "Strengthening the Government of Nepal's portal for data on disaster and disaster risks: Ensuring That Bipad Portal is Used to Make Informed Decisions by Federal, Provincial, and Local Governments to Enhance Disaster Resilience". Oxford Policy Management Limited, (2020), https://www.opml.co.uk/files/Publications/a1594-strengthening-the-disaster-risk-response-in-nepal/strengthening-the-bipad-portal-for-data-on-disaster.pdf (accessed Aug.2, 2024).

[32] Draft Space Activities Bill, 2017, https://prsindia.org/billtrack/draft-space-activities-bill-2017 (accessed Aug.2, 2024).

[33] United States' Commercial Space Launch Competitiveness Act (2015) https://www.congress.gov/114/plaws/publ90/PLAW-114publ90.pdf (accessed Aug.2, 2024).

peaceful use of outer space and the prevention of space debris. By aligning its legal structures with established frameworks, Nepal will be able to attract international investment and ensure that its space activities are recognized as credible and compliant with global standards.

Nepal's Legal Gaps and Challenges in Space Exploration

As Nepal continues to develop its space program, it faces significant gaps in its current legal framework regarding space activities. While the country has made notable strides in space exploration—such as the successful launch of the NepaliSat-1 nano-satellite—there are several legal complexities that must be addressed to ensure responsible and sustainable participation in outer space activities.

Regulation of Private Actors

As space exploration increasingly involves the private sector, Nepal must proactively establish legal frameworks to regulate private space companies, especially as they play a critical role in satellite development, launch services, and space technology innovation. One effective approach could be to encourage Public-Private Partnerships (PPP), which would allow Nepal to leverage private expertise and funding in space activities while maintaining government oversight. Through PPPs, Nepal can establish mutually beneficial agreements where private firms invest in the space infrastructure while the government ensures compliance with national regulations, security standards, and international treaties. For example, private companies could be invited to build satellite manufacturing plants or participate in satellite launch programs under the supervision of a national space agency. This would also provide a pathway for Nepal to develop advanced space technologies without relying solely on state funding, thus accelerating its space ambitions and fostering innovation in the space sector.

In particular, Nepal must consider**:**

a. **Licensing and Oversight**: Clear legal mechanisms must be put in place for the authorization and ongoing oversight of private companies operating in Nepal's space sector. This includes regulating satellite launches, space data collection, and ensuring compliance with both national and international law**.**
b. **Public-Private Partnerships (PPP)**: Nepal could benefit from creating legal provisions for Public-Private Partnerships (PPP) in space exploration. By incentivizing private investment while maintaining regulatory oversight, Nepal could boost its technological capacity without relying solely on government funding.

Liability and Insurance:

Space activities inherently involve risks, such as satellite collisions, space debris, and potential environmental harm. Nepal's legal framework must address these risks by adopting liability and insurance frameworks**:**

a. **Liability for Space Objects:** Under the Convention on International Liability for Damage Caused by Space Objects (1972), Nepal would be held responsible for any

damage caused by its space objects, whether in outer space or on Earth. As Nepal looks to launch additional satellites, including the Munal Satellite in 2024, it must establish clear procedures for liability and ensure that it is covered by adequate insurance to protect against potential damages.

b. **Insurance Requirements:** A comprehensive insurance framework would help mitigate the financial risks associated with satellite launches and space activities. Nepal could mandate that space operators procure insurance that covers third-party liability, damage to other space objects, and environmental contamination.

Space Debris Management

As space exploration accelerates globally, space debris is becoming a pressing issue. Nepal must be proactive in addressing this concern by incorporating legal provisions that**:**

a. Regulate Satellite End-of-Life Procedures: Nepal should adopt regulations for the deorbiting and disposal of its satellites to minimize space debris. These regulations could align with international guidelines on debris mitigation set forth by entities like the United Nations Office for Outer Space Affairs (UNOOSA)**.**

b. Promote Sustainable Practices: Nepal can establish a "sustainability clause" within its space law that mandates the adoption of best practices for space debris management. This can include requirements for satellite design to ensure the satellite's removal from orbit at the end of its operational life.

Nepal's Role in Global Space Governance

As Nepal looks to expand its space activities, one of the most critical considerations will be the issue of space debris and the long-term sustainability of its space program. Space debris—comprising defunct satellites, fragments from satellite collisions, and other waste—presents a growing challenge to both national and global space operations. Nepal must incorporate space debris management into its space policy and legal framework. This can include adopting end-of-life protocols for satellites, ensuring that they are deorbited in a controlled manner, and mandating that all new satellite designs incorporate features to minimize the generation of space debris. Nepal could also align its regulations with international guidelines set by the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), which promotes space sustainability through debris mitigation measures. By doing so, Nepal can demonstrate its commitment to responsible space exploration and ensure that its growing space program does not contribute to the problem of space congestion and debris.

Joining and Contributing to International Space Organizations

Nepal's participation in international organizations will be critical for enhancing its credibility and fostering collaborations that benefit national and global interests. Some avenues for Nepal to explore include**:**

a. **United Nations Committee on the Peaceful Uses of Outer Space (COPUOS):** By increasing its involvement in COPUOS, Nepal can help shape global policies related to the peaceful use of outer space and space sustainability. This engagement will also ensure that Nepal is aligned with international space norms and treaties, such as the Outer Space Treaty (1967).

b. **International Telecommunication Union (ITU):** As Nepal continues to develop its satellite program, it must work closely with the ITU to ensure proper coordination on satellite spectrum allocation. Nepal should actively participate in ITU's work on satellite communication and contribute to the development of global telecommunication policies.

South-South Cooperation in Space

Nepal's geopolitical positioning, bordered by China and India, places it at the crossroads of major spacefaring nations in Asia. Given the increasing importance of space cooperation among developing nations, Nepal can act as a regional bridge for South-South collaboration in space. Areas where Nepal can focus its efforts include:

a. **Space Technology Transfer:** Nepal could play a key role in facilitating the transfer of space technologies from more advanced nations to other developing countries in the region. By partnering with countries such as India, Brazil, and other emerging space nations, Nepal could help build capacity for space science and technology in the Global South.
b. **Regional Space Networks:** Nepal can advocate for regional space collaboration programs in South Asia, focusing on shared challenges like disaster management, climate monitoring, and agricultural advancements through satellite data.

Recommendations for Nepal's Legal Framework for Space Exploration

Space technology has the potential to significantly transform Nepal's economy and society, particularly in areas critical to national development. For instance, satellite-based technologies can be harnessed to improve agricultural productivity, monitor climate change, and assist in disaster management. Remote sensing satellites could provide critical data for weather forecasting, crop monitoring, and natural resource management, which are vital to Nepal's largely rural and agriculture-dependent economy. Furthermore, satellite communications can bridge the digital divide by enhancing connectivity in remote and mountainous regions, where traditional infrastructure is limited. As Nepal invests in building its space capabilities, it should ensure that the benefits of space technology are aligned with its sustainable development goals (SDGs), particularly in areas such as education, healthcare, and climate resilience. By framing space exploration within the context of national development, Nepal can not only boost its global presence in space but also make significant strides in improving the lives of its citizens.

To ensure its successful and responsible entry into space exploration, Nepal must build a comprehensive legal and regulatory framework. Below are several specific recommendations to address the current gaps and guide Nepal's future space activities.

1. Drafting a National Space Law

The development of a dedicated National Space Act should be Nepal's top priority. This law would:

a) Establish the legal and regulatory framework for all space activities, including satellite launches, space research, and collaboration with private companies.
b) Ensure compliance with international space treaties such as the Outer Space Treaty (1967), the Registration Convention (1976), and the Liability Convention (1972), while also addressing national interests and security concerns.
c) Create a regulatory body or National Space Authority that would oversee space-related activities, provide licensing, and enforce compliance with the law.

2. Strengthening Institutional Capacity

Nepal should establish dedicated space institutions to support the implementation of the National Space Act:

a) **Space Research and Development Institute:** This institution could be tasked with advancing space technologies and research, building a skilled workforce in space sciences, and developing local satellite systems.
b) Nepal Space Agency: This could act as the central authority for coordinating space-related policies, projects, and international partnerships. It would also serve as the focal point for Nepal's space diplomacy.

3. International Collaboration and Capacity Building

As Nepal's space program evolves, establishing bilateral agreements with more advanced space nations will be critical for gaining the technical expertise and infrastructure necessary for its space activities. For instance, partnering with India could provide access to its space launch facilities, satellite communication systems, and expertise in space technology. Similarly, collaborations with Japan and European Union (EU) space agencies could offer advanced capabilities in satellite development, remote sensing, and space research. Additionally, Nepal should engage in capacity-building initiatives through joint training programs with international space agencies, which would help develop a skilled workforce capable of operating and managing satellite systems. By establishing these partnerships and pursuing technological transfers, Nepal can accelerate its space program and enhance its global competitiveness in the space sector.

Nepal must pursue partnerships with international space agencies and organizations. This will provide the necessary technical expertise and financial support needed for Nepal's space program to thrive. The following steps can be considered**:**

a) Bilateral agreements: Nepal should negotiate space cooperation agreements with countries such as India, Japan, and the European Union to access advanced space technologies and infrastructure.
b) Training and education: Establishing space training programs in collaboration with international space agencies can help build a skilled workforce capable of operating and managing Nepal's space activities.

4. Focus on Space Sustainability and Ethics

Given the global emphasis on space sustainability, Nepal should develop national policies that:

a) Promote space debris management, ensuring that all satellite projects include a plan for end-of-life disposal and debris mitigation.
b) Encourage ethical use of space resources, aligning with the principles of the Moon Agreement (1984) and ensuring that Nepal's space activities contribute to the common good, particularly in environmental monitoring and disaster management.

Conclusion:

A Robust Legal Framework for Nepal's Space Future

Nepal stands at a pivotal moment in its journey into space exploration. As the country seeks to leverage space technology for socio-economic development, it is essential to develop a comprehensive legal framework that ensures safe, responsible, and sustainable participation in space activities. This legal infrastructure must address both the technical and ethical challenges of space exploration while positioning Nepal as a responsible player in the global space community.

Through the establishment of a National Space (Outer Space) Act, active engagement with international space organizations, and a focus on sustainable space practices, Nepal can build a space program that not only advances its national development goals but also contributes to global efforts in space exploration and cooperation. By navigating the legal complexities of space with foresight and strategic planning, Nepal will be able to harness the full potential of the final frontier.

Further, to ensure that Nepal's space program remains on track and achieves its ambitious goals, Nepal must act swiftly to implement the recommendations outlined in this article. Developing a National Space (Outer Space) Act and fostering an ecosystem that supports both governmental and private sector initiatives will be pivotal to bridging gaps in regulation and infrastructure. Moreover, Nepal must continue to prioritize capacity building and international cooperation, acknowledging that no country can advance its space ambitions in isolation. By aligning its legal framework with international treaties and committing to sustainable practices, Nepal can contribute to the broader global dialogue on the responsible use of outer space.

Ultimately, by ensuring that its space activities are well-regulated, collaborative, and forward-thinking, Nepal will be able to harness the full potential of space—not only for its own development but also as a force for global progress and cooperation.