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Space Debris and its Effect on Environment: A Critical Analysis

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ABSTRACT

Due to man's expanding presence in space over the past 50 years and the fact that modern society heavily depends on the technology orbiting the globe, there is a possibility that human exploitation of space may be jeopardized. Although the activities carried out in outer space has not created any major International disputes till date, the growth in the outer space activities has given rise to pertinent legal lacunas in the field of space law. This paper aims to consider space debris from the perspectives of mitigation and remediation and whether the issue of space debris are adequately addressed by the current regulatory framework. Are the recommendations for debris mitigation considered to be a Rule of Customary International Law and is it possible to apply customary principles of international law to the environment of outer space.

Keywords: *Space Debris, Outer Space Treaty, mitigation, remediation, Convention.*

I. INTRODUCTION

A subset of international law known as "space law" condenses UN declarations, principles, and treaties. Intergovernmental genesis and laws from sovereign states reinforce it. It develops via practice and customs. The United Nations is steadfastly dedicated to the peaceful exploration of space as a means of fostering national and international understanding as well as a crucial component of our efforts to realize the goals established at the major international conferences of the last ten years, notably the Millennium Development Goals. The UN Space Treaty, which is the result of the third United Nations conference on the peaceful exploration and use of outer space, has established a plan for utilizing space science and technology to support these endeavors.

The Oxford Dictionary defines outer space as "*the physical universe beyond earth's atmosphere.*"² For liability purposes, it can be argued that a space object should be considered junk as soon as it ceases to function or have a practical use. Due to this growing issue, new developing nations have to expend increased resources to fit their space objects into the crowded

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² Oxford Dictionary, available at <http://www.oxforddictionaries.com/definition/english/space-debris> (Visited April 14, 2024).

skies³, and all this violates the recommendations of the International Telecommunication Union. The escalating issue makes it quite evident that the Kessler condition will eventually come to pass.

There are two obligations that need to be fulfilled in order to safeguard the space environment. First of all, it forbids states from conducting nuclear or radioactive experimentation, which would eventually render space habitable. Second, nations operating in space have a responsibility to ensure that their operations do not harm other nations' space objects. It is crucial to remember that the major space-faring nations must work together extensively to address the issue before it can be resolved.

II. CRITICAL ANALYSIS

(A) Legal Challenges Caused by Space Debris

The liability system has given rise to relevant legal concerns in the case of Space Debris. These inquiries give rise to a complicated discussion, the main one that has to be resolved is the clause pertaining to the provision of perpetual ownership and jurisdiction retention of satellites deployed into space. The space object launched into outer space is subject to the jurisdiction and control of the launching state. The issue emerges when the space object reaches the end of its useful life and becomes defunct. The satellite eventually turns into a piece of garbage that floats around in orbit after stopping all of its operations. A space object's abandonment does not cause a jurisdictional loss or transfer. States have continuously adhered to the notion that requires a change in register to coincide with a change in jurisdiction. At this point in space exploration and use, damage resulting from a collision between a functioning satellite and a non-functioning satellite as space debris appears to be a common scenario in which Article III will be applied.

The Liability Convention enumerates the definition of 'damage' as a broad and inclusive one "which includes four kinds of recoverable harm such as loss of life, personal injury, other impairment of health and loss of or damage to property."⁴ "The main sticking points in the scope of the definition were whether indirect, moral, or nuclear damages would be covered."⁵ In case

³ "Takuya Yoshida, "Global Access to The orbit and spectrum." Publication on Behalf of Japan Sattelite Systems, Inc. (JSAT)."

⁴ Carl Q. Christol, *International Liability for Damage Caused by Space Objects*, 74 AM J. INT'L L. 346, 359 (1980).

⁵Comm. on the Peaceful Uses of Outer Space, Legal Subcomm., 7th Sess., 100th mtg., U.N. Doc. A/AC.105/C.2/SR.90-101, at 140-142 (June 18, 1968); W.F. Foster, *The Convention on International Liability for Damage Caused by Space Objects*, in 10 CANADIAN YEARBOOK OF INTERNATIONAL LAW, 137, 173 (1972); Comm. on the Peaceful Uses of Outer Space, Legal Subcomm., 8th Sess., 117th-118th mtgs., U.N. Doc. A/AC.105/C.2/SR.116-131, at 140-142 (June 17, 1969).

a conflict arises, the Vienna Convention on the Law of Treaties is referred to understand exact meaning and scope of the Liability Convention's vague clause "damage caused by space objects".⁶ If this interpretation is correct, reimbursement would only cover losses caused directly by space objects, such as property damage or bodily or psychological trauma. Indirect losses and losses to "humanity" would not be covered.

The concept of absolute culpability has one exception. "It occurs when a launching state can demonstrate that one of the following circumstances, either entirely or partially: egregious negligence; or an act or omission committed with the intent to cause harm to a claimant state, its natural resources, or the people it represents. Nonetheless, this absolution needs to be contingent upon the activity adhering to international law, including the 1967 Outer Space Treaty and the UN Charter. The people who have lived in the nations that have seen such drops believe that people in the future will have to constantly worry being struck by spacecraft. Since the Convention on Liability only applies to sovereign states, the private citizens of spacefaring nations have petitioned their government to present their claims before the Convention Claims Commission. The insurance firms have chosen to cover space activities and related contingencies as an emerging field of insurance due to this fear.

Procedures for submitting claims are outlined in the Convention on Liability; however, they do not cover harm done to a citizen of the launching state by a space object of that state. Furthermore, if an activity-based analysis is conducted, the focus will be on the goal of the space activity. If the activity that caused the damage was carried out in the "common interest" of humanity, then the entire world community should share in the liability and the damages, possibly by creating an international insurance pool.

III. SPACE DEBRIS MITIGATION: INTERNATIONAL LAW PERSPECTIVE

Under UNCOPUOS, the Scientific and Technical Subcommittee publishes a study report that documents the formation of debris as a result of particular actions. It has been demonstrated that systemic failure and space object collisions account for the majority of debris. Furthermore, because they still contain fuel and even a small amount of damage to the propellant tanks might cause the solid fuel to explode and send a cascade of debris into space, abandoned satellites remaining in orbit are frequently ticking time bombs.

The main way to address this issue has been to implement debris mitigation standards into the space object's planning and design phases, making it better prepared to handle the issue of debris

⁶ Evan Criddle, *The Vienna Convention on the Law of Treaties in U.S. Treaty Interpretation*, 44 VA. J. INT'L L. 431, 433 (2004).

propagation. Regarding the requirement, there has been a constant worldwide consensus over a number of space launches. Through the use of mitigation principles in joint launching programs, nations governments have collaborated and duly considered their responsibilities to prevent the problem from getting worse. Due to intense debate about the definition of "space object," the Iridium-Cosmos collision proved to be a case study for critics from various national jurisdictions and international space law experts.

The current liability system is predicated on tracking space debris back to its original object. *Lex spatialis* addresses the crucial issue of accountability for space objects, first in the 1967 Outer Space Treaty and subsequently in the 1963 Declaration of Legal Principles. This is a multi-dimensional problem. Liability assignment primarily involves factual aspects such as tracking orbital debris. Furthermore, since space exploration commenced with the 1957 launch of Sputnik and will persist in the years to come, tracking down orbital debris to its source will be an enormous undertaking.

The concepts of justice, equity, and international law must control who is liable for the harm inflicted. One feature of the liability convention that required governments to agree upon and give sufficient weight to the developing states was the amount of damages payable and its limit. The acceptance of the U.S. proposal dated September 25, 1965 is shown by a reference to the travaux. The developing nations would bear the danger of space exploration if liability was kept to a minimum. However, this had an impact on the responsibility regime because it went against the international tort law principle that states the state making the claim must be restored to its initial position by the inheritor of the risk. The Chorzow Factory Opinion established this widely recognized principle of international law.

The fact that all spacefaring nations have consistently implemented the standards in their space exploration missions provides an answer to the author's concern regarding the space debris mitigation guidelines' status as customary international law. NASA Procedural Requirement for Limiting Space Debris and NASA Handbook Limiting Orbital Debris were published in 2008 after the United States adopted NASA Technical Standard: Process for Limiting Orbital Debris in 2007. Since the middle of the 1990s, European Space Agencies have created a "European Code of Conduct" that consists of technically focused standards. The "Requirements on Space Debris Mitigation for Agency Projects," which were created by ESA, went into effect on April 1, 2008. "National Standard of the Russian Federation: General Requirements to Spacecraft and Orbital Stages on Space Debris Mitigation" is the name of the national standards on space debris mitigation that the Russian Federation produced.

The concept of sustainable development is entangled in international customary law. The 1967 treaty's preamble and the 1963 outer space principle both expressly state that outer space operations must adhere to the norms of international law. Furthermore, space is included in the scope of the UN charter. As a result, state accountability encompasses both the earthly and extraterrestrial environments.

In this context, Article IX of the Outer Space Treaty is crucial. The environmental obligation in outer space is a part of instant customary law, as evidenced by the fact that the foundational principle of international space law requires states to refrain from contaminating the environment there and from interfering negatively with the activities of other state parties. As a result, it is suggested that international space law inherently incorporates the *sic utere* concept as a rule. It is also crucial to remember that the adoption of space debris mitigation standards is mostly the result of the precautionary principle. It is obvious that scientific ambiguity shouldn't prevent a problem from being mitigated during the planning phase. No matter how developed or underdeveloped their country may be, all spacefaring states have a fundamental duty to safeguard the space environment. The implementation of the debris mitigation requirement should not be impeded by limitations in science or economic capacity. Unavoidably, preventing a problem from arising in the first place is more financially feasible than correcting it and keeping it from getting worse.

The issue of space debris can be solved by using the cautious principle. It will be more practicable and profitable to stop space debris from ever being created in the first place, if a hypothesis is applied to assess the issue. It is important to remember that relocating the space item is not always a workable approach if a cascade of debris is actually formed and poses a threat to another space object of the same condition. Consequently, in some cases, a nation must make investments in the controlled reentry of space debris. The state will bear the financial burden of such cases with no realistic guarantee of success.

It's also important to remember that rising commercial involvement has led to higher funding for space exploration. As previously mentioned, there will undoubtedly be more space junk in space as a result of increased space operations. Therefore, sufficient regulation of programs undertaken by private organizations is necessary to prevent detrimental interaction with the space environment. The national laws are in charge of continuously monitoring the operations of the private businesses. The requirement to conduct Environmental Impact Assessments (EIAs) is established by international environmental law that applies to both the Earth's atmosphere and the law of the oceans. This allows specific projects to be evaluated based on the extent of the environmental change they generate. National laws governing space activities

can be utilized to carry this out, allowing private projects to be held responsible for any harm or changes they create to the space environment. Given that space resources have been recognized as a common resource, this commitment, if it is carried out, will serve humanity's common interest.

IV. CONCLUSION

To sum up, the international environmental law critique of the space debris problem has not only brought attention to this issue but has also identified a workable solution—namely, the enforcement of environmental law mechanisms to safeguard the space environment. Spacefaring states have an erga omnes obligation to maintain and preserve the outer space environment in order to ensure that future space exploration is conducted with scientific certainty. This obligation stems from environmental law principles that extend to space and prohibit their destructive pollution.
