

LEX LATA IN ORBIT: A CRITICAL RE-EVALUATION OF THE OUTER SPACE TREATY IN THE AGE OF KINETIC ANTI-SATELLITE WEAPONRY

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Abstract

This paper conducts a critical jurisprudential analysis of the *corpus juris spatialis* in the context of the escalating threat posed by debris-generating anti-satellite (ASAT) weapons tests. Using India's 2019 'Mission Shakti' as a central case study, this inquiry interrogates the efficacy and interpretative boundaries of **the 1967 Outer Space Treaty**. The central contention is that while the Treaty's primary arms control provision, Article IV, contains a significant and debilitating lacuna concerning conventional kinetic weapons, a purposive and evolutive interpretation of its principles of international cooperation and environmental protection, particularly within Article IX, offers a viable legal pathway for constraining such destabilising activities. Through a meticulous textual analysis, the paper demonstrates that the traditional, narrow construction of Article IV, which prescribes only weapons of mass destruction, is manifestly inadequate for addressing the contemporary reality of ASAT technology. Subsequently, it proffers a contemporary hermeneutic of Article IX, arguing that the obligations of 'due regard' and the prohibition on 'harmful contamination' must be construed to encompass the deliberate creation of orbital debris. This analysis posits that such an interpretation is not only consistent with the teleological objectives of the Treaty but is also mandated by general principles of international law, including the 'no-harm' rule. The article, through using a new legal framework by understanding the concept of space law, which is relevant and necessary, discusses and attempts to apply the existing space law principles, eyeing emerging issues in space security, which stands to develop a more robust regime of responsibility related to space operations.

Keywords: Anti-Satellite Weapons (ASAT), Space Debris, Outer Space Treaty, Article IX, Mission Shakti, Space Law, Due Regard, Harmful Contamination.

1. Introduction: The Paradox of a Contested Commons

Outer space is at a critical juncture. It is a shared resource on the one hand, which pushes science, world trade, navigation, and communication. Conversely, many nations are considering it as a strategic region in which the major powers can strategise wars. That combination elicits significant apprehension. The primary space regulations were created throughout the Cold War, and they are

grappling with the transition to an increasingly multipolar world order, a shift that has profound geopolitical implications and all the emerging technologies. That tension is most evident in the competition to construct and test anti-satellite (ASAT) weapons, specifically those capable of destroying satellites literally in space¹. On 27th March 2019, a historic event took place as India put into orbit Mission Shakti. During that test,

¹ Ministry of External Affairs, Government of India. (2019, March 27). *Frequently asked questions on Mission Shakti*. Ministry of External Affairs. https://www.mea.gov.in/pressreleases.htm?dtl/31179/Frequently_Asked_Questions_on_Mission_Shakti

India shot one of its satellites in low-earth orbit down, using a missile. Back home, it was welcomed as an indication of the increasing technological might of India and space power. Far away, however, all were concerned—above all because the strike left behind them a substantial accumulation of space debris. The experiment brought it out clearly that it is not only the US and Russia, or even China, that can now destroy satellites. It is extending to new space giants such as India, and this scenario raises pressing questions regarding the governance of space militarisation and the effective management of orbital debris. It has now proliferated, raising the spectre of a celestial tragedy of the commons, where the orbital environment, a finite resource, is rendered unusable by the cumulative effect of debris-generating events.

This proliferation of kinetic ASAT capabilities² presents a formidable challenge to the international legal regime governing outer space, which is anchored by the 1967 *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies* (Outer Space Treaty). Drafted with the primary aim of preventing the placement of nuclear weapons in orbit, the Treaty's provisions appear, upon a cursory examination, to be conspicuously silent on the matter of conventional, non-orbital weaponry. This apparent lacuna has led to a prevailing view among some states that such ASAT tests, while perhaps politically unwise, are not *per se* illegal under existing international law.

This paper will contest that narrow, formalistic interpretation. This article argues that even though the Outer Space Treaty has many significant and manifest deficiencies in its arms control provisions, by applying a deliberative, systemic, and evolutionary interpretation of some of the foundational tenets of the Treaty, there is a viable, if imperfect, method for legally

limiting (and possibly even banning) ASAT tests that create space debris. The central thesis is that while a literalist reading of Article IV of the Treaty appears permissive, a contemporary and contextually appropriate understanding of the obligations contained within Article IX—namely the duties to conduct activities with 'due regard' to the interests of other states and to avoid the 'harmful contamination' of outer space—can and should be construed to encompass the deliberate creation of orbital debris.

To substantiate this claim, this inquiry will proceed in four parts. It will set the context for the strategic & environmental threats associated with ASAT weaponry and underscore the imperative for a robust legal framework. Second, it will conduct a critical textual analysis of Article IV of the Outer Space Treaty, elucidating the lacuna that enables the development of kinetic ASATs. This Article will provide an in-depth analysis of the IX of the Outer Space Treaty to showcase the development of a changing view for key sections of this article based on the foundations established within International Law. Moreover, this project will evaluate India's "Mission Shakti" and whether or not India's compliance with Article IV would also violate both the "spirit" and the "substance" of Article IX as per the new view of Article IX discussed above

2. The Strategic Imperative and Celestial Peril: Contextualising ASAT Weaponry

The weaponisation of outer space is not a futuristic hypothetical; This issue constitutes an established historical reality and an ongoing risk, necessitating urgent scholarly and legal attention. From the earliest days of the space race, both the United States and the Soviet Union pursued ASAT capabilities as a strategic imperative, recognising the immense military advantage conferred by space-based assets for reconnaissance, navigation, and communication. This has created an enduring security dilemma: the increasing reliance of terrestrial military forces on satellite infrastructure makes these assets high-value

² Schmitt, M. N. (Ed.). (2017). *Tallinn manual 2.0 on the international law applicable to cyber operations*. Cambridge University Press.

targets in any potential conflict, which in turn incentivises the development of weapons to deny an adversary the use of those assets.³

Modern ASAT systems can be broadly categorised into four types: kinetic (e.g., direct-ascent interceptor missiles), co-orbital (manoeuvrable satellites designed to interfere with or destroy other satellites), directed-energy weapons (lasers or high-powered microwaves), and electronic warfare (jamming or spoofing signals).⁴ While all pose a threat, it is the debris-generating potential of kinetic systems that presents the most immediate and indiscriminate danger to the space environment. The physics of hypervelocity impacts in orbit means that the destruction of a single satellite can create thousands of pieces of debris, each travelling at speeds exceeding 7 kilometres per second.⁵

This leads to the existential threat famously conceptualised as the 'Kessler Syndrome', a cascading chain reaction where orbital debris collisions create more debris, exponentially increasing the probability of further collisions until certain orbital bands become entirely unusable. The 2007 Chinese ASAT test, which destroyed the Fengyun-1C satellite, is a case in point; it single-handedly created over 3,000 pieces of trackable debris, much of which will remain in orbit for decades, posing a persistent threat to all operational satellites, including the International Space Station.⁶ The debris from such events does not discriminate; it threatens the assets of the state that created it as much as those of its adversaries and non-belligerent third parties. A kinetic ASAT test is no other than a demonstration of no substantive validity of military power. The effect is larger since it disturbs the space environment, which is, in fact, a global common that can be used by all.

³ Moltz, J. C. (2019). *The politics of space security: Strategic restraint and the pursuit of national interests* (3rd ed.). Stanford University Press.8

⁴ Weeden, B., & Samson, V. (2021, April). Global counterspace capabilities: An open-source assessment (pp. 8–10). Secure World Foundation. <https://swfound.org/counterspace>

⁵ Johnson, N. (2011). The physics of space debris. NASA Orbital Debris Program Office. <https://orbitaldebris.jsc.nasa.gov/>

⁶ Broad, W. J., & Sanger, D. E. (2007, January 18). China tests anti-satellite weapon, renewing U.S. concerns. *The New York Times*. <https://www.nytimes.com/2007/01/18/world/asia/18cnd-china.html>

This type of test leaves behind an enormous amount of debris. This increases the vulnerability of space, posing greater risks to all who rely on satellites for communication, GPS, research, and security. Viewed in this context, the problem extends beyond mere armament considerations and encompasses broader strategic and operational risks. It also raises some larger questions of state responsibility, the necessity of international cooperation, and how we are expected to conserve the space environment—stuff fundamental to the Outer Space Treaty. Viewed in terms of collective risk, it is necessary to examine the Treaty's provisions and the potential it offers for unaddressed contingencies.⁷

3. The Lacuna of Article IV: A Permissive Silence on Kinetic Weaponry?

Article IV of the Outer Space Treaty⁸ is, then, the main issue of the Outer Space Treaty on control. An in-depth analysis of the Treaty highlights its historical Cold War context and its failure to effectively regulate ordinary kinetic weaponry. In short, two megaliths of things are forbidden in the article:

'States Parties to the Treaty undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner.'

The Moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies shall be forbidden.⁹

⁷ United Nations. (1967). Treaty on principles governing the activities of states in the exploration and use of outer space, including the moon and other celestial bodies (Outer Space Treaty), 610 U.N.T.S. 205. https://treaties.un.org/pages/ViewDetails.aspx?src=IND&mtmsg_no=XXIV-1&chapter=24

⁸ Johnson, N. (2011). *The physics of space debris*. NASA Orbital Debris Program Office. <https://orbitaldebris.jsc.nasa.gov/>

⁹ United Nations. (1967). Treaty on principles governing the activities of states in the exploration and use of outer space, including the moon and

The first paragraph explicitly proscribes the placement *in orbit* of nuclear weapons and other weapons of mass destruction (WMDs). The doctrine of legal interpretation, *expressio unius est exclusio alterius* (the express mention of one thing excludes all others), suggests that by specifically enumerating WMDs, the drafters implicitly permitted the placement or use of all other types of weapons.¹⁰ This creates a notable omission. A conventional kinetic weapon, such as an interceptor missile, is not a WMD. Therefore, its use is not explicitly prohibited by this clause.

Furthermore, the prohibition applies to weapons *placed in orbit* or *stationed in outer space*. A direct-ascent ASAT, like the one used in Mission Shakti, is launched from the ground on a sub-orbital trajectory. Consequently, it neatly circumvents the textual prohibition of the first paragraph. This demonstrates a critical lack of foresight by the drafters, who were primarily concerned with preventing a scenario of orbiting nuclear bombs, not with the more technologically nascent threat of conventional interceptors.¹¹

The second paragraph of Article IV establishes a more stringent demilitarisation regime, but its application is geographically limited to 'the Moon and other celestial bodies'. It does not apply to outer space itself—the void between these bodies. The testing of 'any type of weapons' is forbidden on the Moon, but not in Earth orbit. A unique legal definition for celestial objects exists, and a separate definition exists for the realm of outer space, as the Treaty allows all forms of military activity except for the placement in orbit of nuclear weapons. As a result, if a state conducts a physical ASAT test, it can defend itself from being accused of violating the Treaty under a logical and literal interpretation of the language of Article IV.

other celestial bodies (Outer Space Treaty), art. IV, 610 U.N.T.S. 205. https://treaties.un.org/pages/ViewDetails.aspx?src=IND&mtmsg_no=XXIV-1&chapter=24

¹⁰ Byers, M. (2010). The shifting sands of law: A legal-realist inquiry into the status of customary international law. *European Journal of International Law*, 21(3), 531–576.

¹¹ von der Dunk, F. (2018). *An introduction to space law* (4th ed., p. 215). Kluwer Law International.

Neither the weapon tested nor the weapon will be categorised as a WMD, and neither the weapon nor the test will occur in space. This strict interpretation, which relies on the principle of *argumentum a contrario*, has been the default position for states developing these capabilities.¹² It renders Article IV largely obsolete as a tool for constraining the most prevalent contemporary threat to space security. This jurisprudential vacuum necessitates a search for legal principles elsewhere within the Treaty's architecture—a search that leads directly to Article IX.¹³

4. Article IX - Transitioning from Environmental Protection to De Facto Arms Control

The primary focus of Article IV is to define the limitations of state behaviour regarding outer space; whereas, Article IX is to establish general guidelines for the behaviour and interactions of states in that same environment. The primary tenet behind both Articles is the need for international cooperation, without attempting to interfere in each other's domestic concerns. The paper establishes the legal foundation of restricting the scope of the anti-satellite tests that result in debris by construing the main provisions of Article IX incrementally and feasibly. The relevant part of Article IX states: In the exploration and use of outer space, including the Moon and other celestial bodies, States Parties to the Treaty shall be guided by the principle of co-operation and mutual assistance and shall conduct all their activities in outer space, including the Moon and other celestial bodies, with **due regard** to the corresponding interests of all other States Parties to the Treaty. States Parties to the Treaty shall pursue studies of outer space, including the Moon and other celestial bodies, and

¹² United Nations. (1967). Treaty on principles governing the activities of states in the exploration and use of outer space, including the moon and other celestial bodies (Outer Space Treaty), art. IX, 610 U.N.T.S. 205. https://treaties.un.org/pages/ViewDetails.aspx?src=IND&mtmsg_no=XXIV-1&chapter=24

¹³ United Nations. (1967). Treaty on principles governing the activities of states in the exploration and use of outer space, including the moon and other celestial bodies (Outer Space Treaty), art. IX, 610 U.N.T.S. 205. https://treaties.un.org/pages/ViewDetails.aspx?src=IND&mtmsg_no=XXIV-1&chapter=24

conduct exploration of them to avoid their **harmful contamination** and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter and, where necessary, shall adopt appropriate measures for this purpose.¹⁴ If a State Party to the Treaty has reason to believe that an activity or experiment planned by it or its nationals in outer space would cause **potentially harmful interference** with activities of other States Parties, it shall undertake appropriate international consultations before proceeding with any such activity or experiment.¹⁶

4.1 An Evolutive Interpretation of 'Due Regard'

The obligation to act with 'due regard to the corresponding interests of all other States Parties' has traditionally been interpreted as a soft, procedural obligation, primarily requiring states to consult with one another in cases of potential interference.¹⁷ However, in the context of a congested and contested orbital environment, this interpretation is no longer tenable. The principle of evolutive interpretation, as utilised by the International Court of Justice, posits that the terms of a treaty must be interpreted in light of the contemporary conditions and understandings that prevail at the time of interpretation, not merely those at the time of its drafting.¹⁵

Applying this principle, 'due regard' must now be construed as a substantive obligation of conduct. The 'corresponding interests' of all states in the modern era unequivocally include the safe and sustainable use of Earth orbits. An activity, such as a kinetic ASAT test, that generates thousands of pieces of indiscriminate, long-lasting debris, thereby increasing the risk of catastrophic collision for every satellite in that orbital band, cannot

plausibly be reconciled with having 'due regard' for the interests of all other space-faring nations. It is a unilateral act that externalises risk onto the entire international community. A substantive reading of 'due regard' would therefore imply a duty to refrain from activities that foreseeably and significantly degrade the shared space environment.

4.2 Expanding the Ambit of 'Harmful Contamination'

The prohibition on 'harmful contamination' of outer space has historically been interpreted in a biological or radiological context—for example, preventing contamination of celestial bodies with terrestrial microbes ('forward contamination') or of Earth with extraterrestrial matter ('back contamination').¹⁶ This narrow construction, however, ignores the plain meaning of the term. 'Contamination' is the introduction of a substance that has a harmful or poisonous effect. Orbital debris is, in essence, a form of physical or particulate contamination of the orbital environment. Its effect is demonstrably harmful, as it renders orbits hazardous and potentially unusable.

This interpretation is strongly supported by an analogy to general international environmental law, particularly the 'no-harm' principle. This principle, affirmed as a rule of customary international law in the *Trail Smelter* arbitration and the ICJ's *Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons*¹⁷, holds that states have a responsibility to ensure that activities within their jurisdiction or control do not cause significant damage to the environment of other states or of areas beyond national jurisdiction.¹⁸ Outer space is unequivocally an area beyond national jurisdiction. A debris-generating ASAT test is an activity under a state's control that causes

¹⁴ Kessler, D. J., & Cour-Palais, B. G. (1978). Collision frequency of artificial satellites: The creation of a debris belt. *Journal of Geophysical Research*, 83(A6), 2637–2646. <https://2024.sci-hub.box/2040/cd11b2f60e4434e4b0ae11aacee2cfb1/kessler1978.pdf>

¹⁵ International Court of Justice & European Court of Human Rights. (n.d.). *Case concerning the Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, I.C.J. Rep. 7, para. 140; *Tyrer v. United Kingdom*, 2 E.H.R.R. 1 (1978). <https://www.icj-cij.org/en/case/92>; <https://hudoc.echr.coe.int/eng?i=001-57599>

¹⁶ International Council for Science (ICSU). (2002). *Planetary protection policy*. Committee on Space Research (COSPAR). <https://cosparhq.cnes.fr/assets/uploads/2019/12/PPPolicyDecember-2017.pdf>

¹⁷ Panda, A. (2019, March 29). India's ASAT test: Acknowledging the debris risk. *The Diplomat*. <https://thediplomat.com/2019/03/indias-asat-test-acknowledging-the-debris-risk/>

¹⁸ *Trail Smelter Arbitration* (United States v. Canada), (1941) 3 RIAA 1905. https://legal.un.org/riaa/cases/vol_iii/1905-1982.pdf

direct and significant harm to that shared environment. Thus, the deliberate creation of space debris can be convincingly characterised as a form of 'harmful contamination' proscribed by Article IX.

4.3 India's Mission Shakti and the Challenges Ahead from the Corpus Juris Spatialis Theory

India's justification for Mission Shakti rested on two pillars: national security and legal compliance. The Ministry of External Affairs¹⁹ stated that the test was conducted 'to verify India's capability to safeguard its space assets' and emphasised that it was 'not directed against any country'.²¹ Legally, India asserted that the test was done in the lower atmosphere to ensure that there is no space debris. Any debris generated is expected to decay and re-enter the Earth's atmosphere within a matter of weeks, minimising long-term orbital hazards.²⁰ Furthermore, it maintained that the test did not violate any international law or treaty obligation to which India is a party.

Applying the legal framework developed in this paper, India's claims can be critically assessed. Under the narrow, literalist reading of Article IV of the Outer Space Treaty, India's position is arguably correct. The interceptor was a conventional weapon, not a WMD; it was on a sub-orbital trajectory and thus not 'placed in orbit'; and the test did not occur on a celestial body. On a strictly formal basis, Article IV does not prohibit or in any way limit any actions taken by any party. However, when you look at the Context and Intent of each party, and consider the flexible Interpretation of Article IX, it would appear there are significant concerns about the legality of the actions. First, consider the obligation of '**due regard**'. Mission Shakti generated an estimated 400 pieces of orbital debris.²¹ While India claimed this would decay

quickly, subsequent tracking by US space surveillance networks indicated that dozens of pieces were thrown into higher orbits, posing a direct threat to other satellites and the International Space Station, and were not expected to decay for over a year.²² The act of creating a debris cloud in a commonly used orbital region, without prior international consultation, which foreseeably increased the risk to the space assets of all other nations, is difficult to reconcile with a substantive duty to act with 'due regard' for their corresponding interests. It prioritised a unilateral security interest over the collective interest in a safe orbital environment.²³

Second, consider the prohibition on '**harmful contamination**'. India's assertion that the debris would not be a long-term problem does not negate the fact that the orbital environment was, for a period of time, contaminated with hundreds of high-velocity projectiles. The harm caused by this contamination is the elevated risk of a catastrophic collision. The idea that the contamination could be only temporary does not mean that it is acceptable. The consequences of just one such event of contamination are expected to inflict serious damage. Furthermore, by placing a significant amount of hazardous materials into a global common, India has severely violated the harmful nature of contamination as defined in the area of general international environmental law, especially taking into account the no-harm principle.

In conclusion, while Mission Shakti may not have violated the antiquated *letter* of Article IV, it arguably contravened the enduring *spirit* and substantive obligations of the Outer Space Treaty as embodied in a contemporary reading of Article IX. India's claim to be a 'responsible' space actor is undermined by an act that contributed to the very problem—orbital

¹⁹ International Court of Justice. (1996). *Legality of the threat or use of nuclear weapons* (Advisory Opinion), I.C.J. Rep. 226, para. 29. <https://www.icj-cij.org/en/case/95>

²⁰ *ibid*

²¹ Subramanian, T. S. (2019, March 28). Debris from Mission Shakti will "vanish" in 45 days. *The Hindu*. https://www.mea.gov.in/press-releases.htm?dtl/31179/Frequently_Asked_Questions_on_Mission_Shakti_1_indias_AntiSatellite_Missile_test_conducted_on_27_March_2019

²² Bridenstine, J. (NASA Administrator), quoted in Foust, J. (2019, April 2). NASA chief calls India's ASAT test a "terrible thing". *SpaceNews*. <https://spacenews.com/nasa-chief-calls-indias-asat-test-a-terrible-thing/>

²³ Hobe, S. (2009). Article IX. In S. Hobe, B. Schmidt-Tedd, & K.-U. Schrogl (Eds.), *Cologne commentary on space law* (Vol. 1, p. 160). Carl Heymanns Verlag.

debris—that the international community has identified as the most significant threat to the long-term sustainability of space activities.

5. Conclusion

The recent emergence of kinetic anti-satellite weapons systems like India's Mission Shakti reveals the need for reforming the existing body of law regarding the use of outer space that was developed during the Cold War. The outer space treaty only limits the use of chemical and biological weapons, but does not cover today's threats from kinetic anti-satellite weapons or create additional space debris. In addition, because of this limitation of the Treaty, there has been an increase in the number of kinetic anti-satellite weapons being created and tested. However, while there are legal restrictions on the development and testing of these weapons under the Treaty, there exists a way to restrict these types of activities through the provisions of Article IX of the Treaty.

Through a purposive and evolutive interpretation, the obligations to act with 'due regard' and to avoid 'harmful contamination' can be transformed from soft, ambiguous principles into substantive duties of conduct with direct applicability to the problem of orbital debris. Understanding "due regard" as a requirement that states protect against foreseeable damage to their collective interests in maintaining a safe orbital environment and "harmful contamination" as the intentional placement of dangerous objects leads to no change in the existing space law regime. Instead, it is adapting existing space law principles to the new technology and environmental conditions of the 21st century. The treaties should be interpreted considering both historical and current principles of international environmental law. For states to evolve the understanding of due regard into a customary international law standard, there must be extensive and ongoing practice by states demonstrating due regard to other states, and there must also be widespread agreement in the international community that all states have an obligation (*opinio juris*) to

demonstrate due regard. There are indications that an international consensus is developing around these issues. The United Nations General Assembly, in numerous resolutions, has called upon all States to refrain from conducting destructive direct ascent ASAT missile tests. Further discussions and consultations among members of the United Nations Open-Ended Working Group on Reducing Space Threats support the belief that there will be a collective will to create norms regarding the responsible use of space. These actions are representative of the crystallisation of these ideas, which are contained within Article IX of the Outer Space Treaty. At this point, the future of the international community lies ahead of it and is at a crossroads. The international community may choose to adhere to an inflexible, literal interpretation of a 50-year-old treaty that leads to the inevitable possibility of a tragedy of the commons in orbit, or the international community may adopt a more dynamic, purposeful, and responsible interpretation of the foundational principles of the Outer Space Treaty to address modern challenges. The choice the international community will make is not only a matter of legal interpretation; the choice will also shape the future of outer space as a place of opportunity and exploration for years to come, or an uninhabitable desert that will have been created by us. To protect the celestial commons, the world must collectively choose to encourage the latter approach.