

Collateral Damage in Orbit: The Environmental Consequences of Anti-Satellite Weapons Testing and the Case for Reinterpreting Existing Space Law

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Abstract Past anti-satellite weapon tests have generated thousands of trackable debris fragments in low Earth orbit, along with far more untrackable particles. These debris fields pose an acute, lasting threat to the sustainability of outer space, endangering crewed missions and satellite infrastructure. Yet international space law has not squarely addressed the legality of ASAT testing through an environmental lens.

This paper argues that a new binding instrument is neither the most feasible nor most effective path forward. Existing space law, particularly the Outer Space Treaty and Liability Convention, read with the general principles of international environmental law, already provides sufficient foundations to constrain ASAT testing. What is lacking is not law, but interpretation.

The paper advances three claims. First, Article IX's "due regard" obligation includes an environmental component barring debris-producing military tests in shared orbits. Second, the prevention principle can be incorporated into space law through the Vienna Convention, establishing a duty to prevent foreseeable environmental harm. Third, state practice and the UN Guidelines for Long-Term Sustainability, though non-binding, reflect a developing *opinio juris* linking the legality of space activities to orbital sustainability. The paper provides a practical doctrinal contribution to the scholarship on space security and sustainability.

Keywords: anti-satellite weapons; space debris; orbital sustainability; outer space environment; international environmental law

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1. Introduction

The space domain is undergoing a significant set of changes.¹ A growing number of States and commercial actors are engaging in space activities, driving innovation and terrestrial benefits while also increasing congestion and competition in orbit. From a security perspective, an increasing number of States are looking to space to enhance their military capabilities, and the growing reliance on space for national security has led several States to develop their own counterspace capabilities designed to deceive, disrupt, deny, degrade, or destroy others' space systems.² Among these capabilities, kinetic anti-satellite (ASAT) weapons occupy a distinctive and especially severe category: unlike jamming, cyber interference, or non-destructive manoeuvres, a kinetic interception physically fragments its target, converting a single space object into an expanding population of debris that no state can subsequently recall or control.³

The scale of this problem is considerable. Since the beginning of the space age, there have been more than 700 confirmed on-orbit fragmentation events, roughly a third of which have occurred in just the last two decades, reflecting an accelerating pace closely tied to the intensification of space activity, including destructive ASAT testing.⁴ A single test, such as China's 2007 destruction of the Fengyun-1C satellite, can generate more debris than a major accidental collision, and the resulting fragments may persist in orbit for decades or centuries, threatening crewed missions and the satellite infrastructure upon which modern society depends. Despite the severity and apparent irreversibility of this harm, international space law has yet to squarely address the legality of ASAT testing through an environmental lens; legal and policy discussions have instead framed the issue primarily in terms of national security, strategic stability, and arms control.⁵

This article argues that this gap does not reflect an absence of applicable law, but a failure of interpretation. Contrary to prevailing assumptions, the negotiation of a new binding instrument is neither the most feasible nor the most immediately effective response. Existing space law, and in particular Article IX of the Outer Space Treaty (OST) of 1967, already contains the normative resources necessary to constrain destructive, debris-generating ASAT testing, once read in light of general principles of international law and in conjunction with the Liability Convention (LIAB) of 1972.⁶

The argument proceeds in four substantive sections. Section 1 establishes the orbital environment as a legally protected interest, distinct from, but related to, the interests of

¹ Dimitra Atri, Paulina Umansky & Katepalli R Sreenivasan, "Sustainability as a Core Principle of Space and Planetary Exploration" (2024) 70 Space Policy 101636.

² Secure World Foundation, *Global Counterspace Capabilities Report 2026* (Broomfield, CO: Secure World Foundation, 2026).

³ Davide Zannoni, "Out of Sight, out of Mind? The Proliferation of Space Debris and International Law" (2022) 35:2 *Leiden Journal of International Law* 295.

⁴ European Space Agency, *Space Environment Report 2025* (Darmstadt: European Space Operations Centre (ESOC), 2025) at 17.

⁵ David A Koplow, "ASAT-isfaction: Customary International Law and the Regulation of Anti-Satellite Weapons" (2009) 30:6 *Michigan Journal of International Law* 1187.

⁶ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 27 January 1967, 610 UNTS 205 (entered into force 10 October 1967) [OST]; Convention on International Liability for Damage Caused by Space Objects, 29 March 1972, 961 UNTS 187 (entered into force 1 September 1972) [LIAB].

individual satellite operators, and characterises destructive ASAT testing as a form of environmental harm. Section 2 argues that Article IX's requirements of due regard, avoidance of harmful interference, and prior consultation, properly interpreted under the Vienna Convention on the Law of Treaties (VCLT), already constrain debris-generating tests. Section 3 shows how the customary prevention principle, imported through systemic integration under Article 31(3)(c) of the VCLT, supplies content for those open-textured standards. Section 4 examines state practice and soft law, including national ASAT-test moratoria and UN General Assembly (UNGA) Resolution 77/41, as evidence of an evolving legal understanding that reinforces this interpretation. Taken together, these strands support a modest but significant conclusion: existing international space law does not prohibit ASAT weapons as such, but it already renders environmentally destructive testing considerably more difficult to justify than is generally acknowledged.

2. The Orbital Environment as the Protected Interest

2.1 Defining the Orbital Environment

The expression "orbital environment" does not appear as a defined term in the OST, which itself provides neither a scientific definition of "outer space" nor an agreed delimitation of its spatial boundaries.⁷ This absence does not, however, prevent identifying the environment affected by debris-generating ASAT activities. For the purposes of this article, the orbital environment is understood functionally as the Earth-bound orbital regions in which space objects operate, together with the physical and operational conditions that enable their safe, stable, and sustainable use.

The ESA Space Environment Report 2025 defines the "space environment" operationally as all artificial objects, including fragments, that reside or have resided in Earth-bound orbit, while "space debris" encompasses all non-functional artificial objects.⁸ Although useful, this definition remains primarily technical. From a legal perspective, the orbital environment extends beyond the objects themselves to include the conditions they affect, such as orbital density, collision probability, debris persistence, and the continued capacity of orbital regions to support space activities.

This functional conception is consistent with Viikari's analysis of the environmental dimension of space law.⁹ Although outer space is not an ecosystem in the biological sense, human activities can alter its physical conditions in ways that impair its future use, making environmental law concepts applicable. International environmental law protects not only living ecosystems but also non-living environmental media whose degradation produces diffuse or cumulative harm.¹⁰ Accordingly, the orbital environment may be regarded as such a protected medium. This article

⁷ Stephan Hobe, Bernhard Schmidt-Tedd & Kai-Uwe Schrogl, eds, *Cologne Commentary on Space Law*, vol 1 (Cologne: Carl Heymanns Verlag, 2009).

⁸ European Space Agency, *supra* note XX; M P  leg  rin, "Space and Deep Space Environment" (1990) 23:8, Part 3 IFAC Proceedings Volumes 1.

⁹ Lotta Viikari, "Environmental Aspects of Space Activities" in Frans G von der Dunk & Fabio Tronchetti, eds, *Handbook of Space Law* (Cheltenham, UK: Edward Elgar Publishing, 2015) 717.

¹⁰ Patricia Birnie, Alan Boyle & Catherine Redgwell, *International Law and the Environment*, 3rd ed (Oxford: Oxford University Press, 2009).

is concerned exclusively with the Earth-orbital environment, where destructive ASAT testing generates persistent debris.

The orbital environment is dynamic rather than uniform. Debris persistence depends primarily on orbital altitude: lower-orbiting objects re-enter the atmosphere relatively quickly, whereas fragments in higher Low Earth Orbit (LEO) may remain in orbit for decades or even centuries.¹¹ As the ESA Report explains, natural orbital decay is currently insufficient to offset the rate at which fragmentation events generate new debris, resulting in a continuously growing debris population.¹² In 2025, ESA estimated that approximately 40,000 objects were being routinely tracked in Earth orbit (EO), alongside more than 1.2 million fragments larger than one centimetre, illustrating the increasing congestion of the orbital environment.¹³

For the purposes of this article, therefore, the orbital environment refers to the Earth-bound orbital regions, their physical and operational characteristics, the population of functional and non-functional space objects they contain, and their continuing capacity to support the safe and sustainable exploration and use of outer space. Defining the orbital environment in this way identifies the legal interest that may be affected by destructive ASAT testing, without prejudging whether particular activities constitute legally cognisable environmental harm.

2.2 The Protected Legal Interest

Describing the orbital environment does not establish why its preservation is a legal interest rather than merely a policy objective. The OST does not declare a freestanding right to an undamaged orbital environment, but its structure conditions the freedom to explore and use outer space on the interests of other States and the continuing availability of outer space for shared use.¹⁴ Article I requires that exploration and use benefit "all countries" and describes outer space as the "province of all mankind," guaranteeing equal access.¹⁵ Article IX requires due regard for other States' corresponding interests, avoidance of harmful contamination and adverse changes, and consultation where activities may cause potentially harmful interference.¹⁶ Read together, these provisions reject an unlimited liberty to alter orbital regions without regard to consequences for others.

This interest should not be framed as collective property.¹⁷ The OST's non-appropriation principle and "province of all mankind" language do not establish outer space as common property in the technical legal sense and, while useful rhetorically, "global commons" terminology carries contested legal implications. The more defensible proposition is that the accessibility, safety, and usability of orbital regions constitute a shared interest because their

¹¹ European Space Agency, *supra* note XX at 24; European Cooperation for Space Standardisation, *Space Engineering: Space Environment*, ECSS-E-ST-10-04C Rev.1 (Noordwijk, Netherlands: European Cooperation for Space Standardisation, 15 June 2020).

¹² European Space Agency, *supra* note XX at 24.

¹³ European Space Agency, *supra* note XX.

¹⁴ Hobe, Schmidt-Tedd & Schrogl, *supra* note XX at 174.

¹⁵ OST, *supra* note XX, art I.

¹⁶ OST, *supra* note XX, art IX.

¹⁷ Ram S Jakhu, Tommaso Sgobba & Paul Stephen Dempsey, eds, *The Need for an Integrated Regulatory Regime for Aviation and Space: ICAO for Space?* (Vienna: Springer, 2011).

degradation affects the rights of all states. As Von der Dunk's analysis of the 2007 Chinese ASAT test illustrates, the central difficulty was not ownership of the orbital region but the creation of risk in a domain beyond territorial jurisdiction and used by multiple states.¹⁸

The interest is also functional: satellites depend on predictable trajectories, accurate tracking, manageable density, and the absence of uncontrolled fragments. International environmental law provides an analogous framework. Birnie, Boyle, and Redgwell note that environmental obligations increasingly protect shared media and community interests that are irreducible to bilateral injury, reflecting a shift from purely compensatory regulation toward the prevention of activities that pose significant risk, particularly where damage is cumulative or irreversible.¹⁹ Viikari similarly argues that space law's environmental dimension requires attention to the sustainability of the space environment itself, not solely damage to identifiable spacecraft.¹⁹ A debris-generating event may cause no instantaneous, compensable loss under the LIAB, yet it alters an orbital region's risk profile, forces avoidance manoeuvres, and increases future collision probability.

The COPUOS LTS Guidelines provide strong institutional support, defining long-term sustainability as maintaining space activities indefinitely while ensuring equitable access and preserving the environment for future generations, making environmental preservation an express component of sustainability, linked to equality of access, since congestion burdens emerging space actors with limited tracking and manoeuvring capacity.²⁰ Though non-binding, the Guidelines' consensus adoption within COPUOS is evidence that States regard environmental preservation as necessary for the indefinite continuation of space activities.²¹

The interest also has an intergenerational dimension, as debris may outlive the mission and political circumstances that produced it, diminishing opportunities for actors who neither consented to nor benefited from the original activity.²² Official State statements confirm this understanding. The United States' (US) 2022 commitment described long-lived debris as threatening the security, economic, and scientific interests of all nations;²³ Germany stated debris can render LEO unusable;²⁴ France described destructive testing as destabilising given its threat to safety, security, and long-term sustainability;²⁵ and the EU characterised its commitment as an urgent measure against

¹⁸ Michael C. Mineiro, "FY-1C and USA-193 ASAT Intercepts: An Assessment of Legal Obligations under Article IX of the Outer Space Treaty" (2008) 34:2 J Space L 321. ¹⁹ Birnie, Boyle Redgwell, *supra* note XX.

¹⁹ Viikari, *supra* note XX.

²⁰ United Nations Office for Outer Space Affairs, *Promoting Space Sustainability: The International Legal Framework, Space Debris Mitigation Guidelines and Recommendations for Governments and Industry* (Vienna: United Nations, 2021).

²¹ United Nations Committee on the Peaceful Uses of Outer Space, Scientific and Technical Subcommittee, The "Dark and Quiet Skies" Proposal as an Initiative under the Auspices of the Committee on the Peaceful Uses of Outer Space for Protecting the Environmental Observing Conditions for Large Astronomical Observatories and World Citizens, submitted by the International Astronomical Union (IAU), UN Doc A/AC.105/C.1/2017/CRP.17 (30 January 2017).

²² Atri, Umansky & Sreenivasan, *supra* note XX at 6.

²³ United States, Department of Defence, Remarks by Deputy Secretary of Defence Dr Kathleen H Hicks on the New US Commitment Not to Conduct Destructive Direct-Ascent Anti-Satellite Missile Testing (18 April 2022).

²⁴ Germany, Federal Foreign Office, "Germany Commits in Geneva Not to Conduct Anti-Satellite Direct-Ascent Missile Tests" (13 September 2022).

²⁵ France, Permanent Mission of France to the United Nations in Geneva, "France Reaffirms Its Support for International Space Law" (28 May 2025).

widespread and irreversible environmental damage.²⁶ These statements support three conclusions: the interest is collective (harm is indifferent to the affected actor's nationality), environmental (States describe harm as pollution or degradation, not merely asset interference), and preventive (commitments aim to avoid debris creation, not merely compensate afterwards).

The protected interest is therefore the preservation of the integrity, safety, and functional availability of the orbital environment for present and future actors. This formulation does not displace narrower proprietary or security interests but explains why those interests do not exhaust the legal significance of debris creation.

2.3 ASAT Testing as Environmental Harm

Not every counterspace capability generates debris; this analysis concerns destructive ASAT testing that physically fragments an orbiting object. A destructive interception converts a single object into a large population of fragments of varying sizes, velocities, and trajectories, many of which are too small to track continuously yet capable of destroying spacecraft at orbital collision velocities.²⁷ ESA identifies the 2007 destruction of Fengyun-1C and the 2021 destruction of Cosmos-1408 as major fragmentation events in heavily used orbital regions.²⁸

Kessler and Cour-Palais's foundational 1978 model demonstrated that as the density of objects in orbit increases, the probability of collisions rises.²⁹ Each collision produces more fragments, which further elevates the risk of additional collisions. This process is now known as the Kessler syndrome, a positive-feedback loop in which debris accumulation can escalate even without the launch of new satellites. ESA's 2025 assessment confirms this risk and projects that, under a business-as-usual scenario, the long-term environment index would exceed its sustainability threshold by roughly fourfold over 200 years.³⁰

Destructive ASAT testing qualifies as environmental harm for four related reasons. First, it physically alters an environmental medium, converting an orbital region into a denser, more hazardous one, with fragments that cannot be recalled or controlled. Second, the harm is persistent, lasting years to centuries depending on altitude, such that the test's termination does not terminate its consequences. Third, the harm is cumulative and cascading: each event adds to an existing population, and a single test may substantially increase the probability of collisions within an already congested shell.³¹ Fourth, the consequences are diffuse and non-reciprocal; debris does not distinguish between military, civil, or commercial spacecraft, transferring risk to

²⁶ European Union and its Member States, Destructive Direct-Ascent Anti-Satellite Missile Tests, UN Doc A/AC.297/2025/WP.4 (12 May 2025).

²⁷ European Space Agency, *supra* note XX at 24; ECSS, *supra* note XX at 25.

²⁸ European Space Agency, *supra* note XX.

²⁹ Donald J Kessler & Burton G Cour-Palais, "Collision Frequency of Artificial Satellites: The Creation of a Debris Belt" (1978) 83 *Journal of Geophysical Research* 2637.

³⁰ European Space Agency, *supra* note XX.

³¹ Peter Stubbe, *State Accountability for Space Debris: A Legal Study of Responsibility for Polluting the Space Environment and Liability for Damage Caused by Space Debris* (Leiden: Brill Nijhoff, 2018).

operators who received none of the test's strategic benefit, as the US and EU have both acknowledged.³²

The risk is also foreseeable. The fragmentation mechanism has been documented for decades, and States increasingly describe these effects in explicitly environmental terms. Resolution 77/41 expressed concern that destructive ASAT systems may have widespread and irreversible effects on the outer-space environment and called on States to forgo such testing.³³ This scale of support is significant, though it should not be equated with a binding customary prohibition; Jakhu and Freeland caution that political commitments must be examined carefully before being characterised as custom.³⁴ The more defensible conclusion is that these materials establish a strong normative judgment that intentional creation of long-lived debris is incompatible with sustainable use of the orbital environment without requiring proof that a customary prohibition has already crystallised.

The foregoing analysis demonstrates that destructive ASAT testing produces environmental harm. The next section considers whether existing international space law already contains legal obligations capable of addressing that harm.

3. Reinterpreting Article IX of the Outer Space Treaty

3.1 Interpreting Article IX under the Vienna Convention

Article IX must be interpreted as an integrated provision rather than a collection of isolated clauses. It establishes a general obligation to conduct space activities with "due regard" to other States' corresponding interests, requires exploration to avoid harmful contamination, and creates a mechanism for prior consultation when an activity may cause harmful interference.³⁵ Under Article 31 of the VCLT, these elements must be read in good faith according to their ordinary meaning, in context, and in light of the Treaty's object and purpose.³⁶ The interpretative question is therefore not whether the drafters specifically contemplated modern direct-ascent ASAT tests, but whether the language they adopted is capable of regulating a presently foreseeable form of interference with the exploration and use of outer space.

The ordinary meaning supports this application. "All" space activities must be conducted with due regard; the protected interests are the "corresponding interests" of every other State party; and consultation is required for activities causing "potentially" harmful interference. None of these terms confines Article IX to physical contact with an identified spacecraft or harm to a particular State's property. "Potentially" is especially significant: it locates the obligation before damage occurs, making risk, not completed injury, legally relevant. Likewise, "interference with activities" is broader than destruction of property: an activity is impaired when an operator must

³² US Department of Defence, *supra* note XX; A/AC.297/2025/WP.4, *supra* note XX

³³ GA Res 77/41, Destructive Direct-Ascent Anti-Satellite Missile Testing, UNGAOR, 77th Sess, UN Doc A/RES/77/41 (7 December 2022).

³⁴ Ram S Jakhu & Steven R Freeland, "The Relationship Between the Outer Space Treaty and Customary International Law" (Paper delivered at the 59th IISL Colloquium on the Law of Outer Space, International Astronautical Congress, Guadalajara, Mexico, 26–30 September 2016).

³⁵ OST, *supra* note XX, art IX.

³⁶ Vienna Convention on the Law of Treaties, 23 May 1969, 1155 UNTS 331 (entered into force 27 January 1980) art 31; Oliver Dörr & Kirsten Schmalenbach, eds, *Vienna Convention on the Law of Treaties: A Commentary*, 2nd ed (Berlin: Springer, 2018)

alter a trajectory or bear additional operational risk because another State has intentionally created a debris field.³⁷

Context reinforces this reading. Article I's freedom of exploration is exercised "in accordance with international law" alongside the equal freedom of other States; Article III incorporates the wider body of international law; Article VI makes States responsible for national activities, including those of non-governmental entities.³⁸ Article IX regulates the coexistence of these concurrent freedoms, and its due-regard and consultation requirements would lose much of their practical effect if one State could increase long-term deterioration of the orbital environment through persistent debris generation, thereby imposing additional risks on every other space user merely because no satellite happened to be struck at the moment of testing.

Although the contamination clause was framed principally against biological contamination and adverse terrestrial changes from extraterrestrial matter, this narrower drafting history does not require "due regard" and "potentially harmful interference", textually distinct expressions serving different functions within the same article, to share that restricted scope.³⁹ Applying Article IX to contemporary debris hazards is consequently an application of existing language, not an informal amendment.

This interpretation is also consistent with the principle of evolutionary treaty interpretation recognised in international jurisprudence. In its *Namibia Advisory Opinion*, the ICJ emphasised that treaties establishing continuing legal regimes must be interpreted in light of present-day conditions rather than frozen at the moment of adoption.⁴⁰ In the *Aegean Sea Continental Shelf* case and the *Dispute regarding Navigational and Related Rights*, the Court similarly recognised that generic treaty terms may evolve where the treaty's object and purpose indicate an intention for continued application.⁴¹ The ILC's *Conclusions on Subsequent Agreements and Subsequent Practice* confirm that such developments may inform treaty interpretation under Article 31 VCLT.⁴² Applied to Article IX, this interpretative approach supports reading "harmful interference" and "due regard" in light of the contemporary understanding of orbital debris and the emergence of environmental protection as a concern of international law. This approach does not amend the Treaty but instead gives effect to its enduring terms in light of contemporary legal, technological, and environmental realities.

3.2 Due Regard as a Substantive Environmental Obligation

The due regard obligation is the strongest textual basis for treating the environmental consequences of debris-generating ASAT testing as legally relevant. It qualifies every State's freedom of exploration by requiring consideration of other parties' corresponding interests, and

³⁷ Elena Carpanelli, "Unweaving the Tangled Web: The Due Regard Obligation Under Article IX of the Outer Space Treaty" (2024) 49:1 *Air & Space Law* 35.

³⁸ OST, *supra* note XX, art III & VI.

³⁹ Hobe, Schmidt-Tedd & Schrogl, *supra* note XX.

⁴⁰ *Legal Consequences for States of the Continued Presence of South Africa in Namibia (South West Africa) notwithstanding Security Council Resolution 276 (1970)*, Advisory Opinion, [1971] ICJ Rep 16.

⁴¹ *Aegean Sea Continental Shelf (Greece v Turkey)*, Judgment, [1978] ICJ Rep 3.

⁴² International Law Commission, *Draft Conclusions on Subsequent Agreements and Subsequent Practice in Relation to the Interpretation of Treaties*, with Commentaries, UNGAOR, 73rd Sess, Supp No 10, UN Doc A/73/10 (2018).

it is not merely hortatory. Article IX states that States "shall conduct" their activities with due regard, distinguishing this binding standard from the preceding statement that they "shall be guided" by cooperation and mutual assistance.⁴³ Due regard thus requires conduct adjusted to the nature and seriousness of the foreseeable effect on others' interests, not merely awareness that those interests exist.

Comparable treaty practice supports understanding due regard as a relational, balancing obligation. In the Chagos Marine Protected Area Arbitration, the tribunal held that the regard required depends on the importance of the affected rights, the anticipated impairment, the nature of the acting State's own activity, and the availability of alternative approaches, a framework subsequently adopted in the South China Sea Arbitration.⁴⁴ These decisions concerned the law of the sea and cannot mechanically determine the OST's meaning. Still, they illuminate the ordinary legal function of identical terminology coordinating competing freedoms in a domain beyond territorial sovereignty.⁴⁵

Applied to destructive ASAT testing, this balancing exercise is environmentally consequential. The affected interests include not only individual satellites but other States' continuing ability to use orbital regions under conditions of manageable risk; Article IX protects "interests," not merely ownership rights, and Article I guarantees access to all States without discrimination.⁴⁶ Where a test creates persistent fragments that intersect numerous trajectories, its effects fall on civil, commercial, and scientific activities unrelated to the strategic dispute that motivated the test. The weight owed to those interests increases with the scale, persistence, and uncontrollability of the anticipated risk. In contrast, the acting State's own military or technological interest remains part of the balance. Article IX does not render all interference unlawful. A destructive test in a heavily used orbit, expected to create long-lived debris and undertaken despite reasonably available less harmful alternatives, is difficult to reconcile with this requirement, since the burden imposed on other States is extensive while the choice to externalise it is avoidable.⁴⁷

Due regard is therefore capable of imposing substantive constraints without a categorical prohibition on ASAT weapons; it may require modifying the target, altitude, method, or timing of a test, or abandoning it where mitigation cannot reduce foreseeable impairment to a tolerable level. Consultation may assist this determination, but does not exhaust due regard: a

⁴³ J Jarose, "Giving Due Regard to the Obligation of 'Due Regard' under Article IX of the Outer Space Treaty" (2023) 24:2 Melbourne Journal of International Law 235.

⁴⁴ Award in the Arbitration regarding the Chagos Marine Protected Area between Mauritius and the United Kingdom of Great Britain and Northern Ireland, Award, 18 March 2015, (2015) 31 Reports of International Arbitral Awards 359; The South China Sea Arbitration (The Republic of the Philippines v The People's Republic of China), Award, PCA Case No 2013-19, 12 July 2016

⁴⁵ Bernard H Oxman, "The Principle of Due Regard" in Myron H Nordquist, John Norton Moore & Ronán Long, eds, *The Contribution of the International Tribunal for the Law of the Sea to the Rule of Law: 1996–2016* (Leiden: Brill Nijhoff, 2018) 199.

⁴⁶ Carpanelli, *supra* note XX.

⁴⁷ Carpanelli, *supra* note XX.

State cannot satisfy a continuing substantive obligation merely by discussing an activity and then proceeding unchanged despite compelling evidence of serious, lasting interference.⁴⁸

3.3 Environmental Degradation as Harmful Interference

"Potentially harmful interference" should likewise not be confined to deliberate jamming or physical contact between spacecraft. Article IX does not define "interference," qualify it as electromagnetic, or require an instantaneous effect.⁴⁹ The relevant inquiry, with due regard to the above, is functional rather than formal. It asks whether the consequences of one activity impede, endanger, or materially burden the lawful space activities of others.

Environmental degradation satisfies that standard because it changes the conditions under which other activities are conducted. Orbital debris increases collision probability, requires tracking and avoidance manoeuvres, shortens planning horizons, and constrains access to particular trajectories.⁵⁰ The interference lies in creating the hazardous condition itself, not only in a later collision. Requiring an identifiable impact before Article IX becomes relevant would contradict the word "potentially" and reduce the provision to a defective replica of the LIAB, whose principal concern is compensation for legally cognizable damage.

This conclusion is reinforced once the orbital environment is understood not merely as the physical backdrop of space activities, but as the shared operational medium upon which all such activities depend. More acutely than in many terrestrial contexts, the orbital environment is inherently interconnected. Debris generated by a single activity cannot be contained within national jurisdiction and may threaten satellites, crewed missions, and future launches conducted by all States. The distinction between environmental protection and the protection of activities is consequently artificial in the context of space. Because the environment constitutes the common medium through which all space activities are carried out, significant degradation of that environment is legally equivalent to interference with those activities. Read together with the obligation of due regard under Article IX, this supports interpreting the creation of long-lived orbital debris through destructive ASAT testing as a form of harmful interference with the peaceful exploration and use of outer space by other States."

Article IX's drafting history confirms this reading because the consultation mechanism was developed in response to controversies such as Project West Ford, where placing large numbers of artificial objects raised concerns about interference with scientific observation, a concern not limited to bilateral collisions but encompassing environmental alteration of the operational medium itself.⁵¹ Modern debris-generating ASAT testing presents the same legal structure on a far more severe scale.

This interpretation does not make every marginal increase in orbital risk a breach. "Harmful" performs a limiting function, requiring attention to probability, severity, duration, and reversibility. But the threshold for consultation is potential harmful interference, not proven significant damage, and where fragmentation is an intended, technically predictable

⁴⁸ Carpanelli, *supra* note XX.

⁴⁹ Carpanelli, *supra* note XX.

⁵⁰ European Space Agency, *supra* note XX.

⁵¹ Hobe, Schmidt-Tedd & Schrogl, *supra* note XX.

consequence of an interception, characterising the resulting risk as merely speculative would be inconsistent with Article IX's preventive language.⁵²

3.4 The Consultation Obligation and Foreseeable Environmental Harm

The consultation mechanism established by Article IX should be understood within the broader preventive structure of the OST. Unlike the LIAB, which provides for compensation only after damage has occurred, Article IX is designed to avoid foreseeable harm before it materialises.⁵³ Its due regard obligation, coupled with the requirement to undertake international consultations where there is reason to believe that a planned activity would cause potentially harmful interference, reflects a legal preference for risk prevention rather than post hoc remediation. This preventive orientation is particularly significant in the context of destructive ASAT testing, where the creation of orbital debris may produce irreversible and long-lasting consequences that cannot realistically be eliminated once generated. Because the resulting environmental harm is largely permanent, the effectiveness of Article IX depends on interpreting its procedural obligations as mechanisms for preventing environmental degradation before it occurs.

Article IX requires a State to undertake "appropriate international consultations" where it "has reason to believe" that a planned activity would cause potentially harmful interference. This requirement combines an epistemic threshold, a risk threshold, and a temporal element. The State must have reasons grounded in available information; the anticipated consequence need only be potentially harmful; and consultation must take place before the activity occurs.⁵⁴

"Has reason to believe" should not be treated as wholly subjective, since that reading would permit a State to avoid consultation by declining to examine obvious risks. Read in good faith, it requires evaluating information reasonably available to competent decision-makers. Where an act is designed to fragment an object at orbital velocity, decades of technical experience with debris generation provide an objective basis for anticipating interference. Mineiro's analysis of the 2007 Fengyun-1C interception accordingly concluded that the orbit and expected debris field made potentially harmful interference reasonably foreseeable, and that China's failure to consult was inconsistent with Article IX.⁵⁶

General international law's treatment of environmental risk supports this ex ante reading. In *Pulp Mills*, the ICJ characterised due diligence as requiring vigilance and environmental impact assessment where a proposed activity risks significant adverse transboundary effects; in *Certain Activities*, the Court clarified that a State must first ascertain whether such a risk exists and, where it does, consult in good faith on prevention or mitigation.⁵⁵ Article IX establishes its own treaty-specific threshold rather than depending on the precise terrestrial standard of "significant

⁵² Carpanelli, *supra* note XX.

⁵³ LIAB, *supra* note XX, art XX.

⁵⁴ Hobe, Schmidt-Tedd & Schrogl, *supra* note XX. ⁵⁶

Mineiro, *supra* note XX.

⁵⁵ *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, Judgment, [2010] ICJ Rep 14; *Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v Nicaragua)*, Judgment, [2015] ICJ Rep 665 ⁵⁸ Carpanelli, *supra* note XX.

transboundary harm." Still, this jurisprudence remains relevant: a duty triggered by foreseeable risk necessarily entails prior inquiry and good-faith consideration of mitigation.

"Appropriate" consultation must be proportionate to the anticipated hazard, including timely notice, disclosure sufficient to evaluate the expected debris field, and genuine consideration of alternatives. It does not confer a veto, but neither is it satisfied by post-test notification after debris has been irreversibly created.⁵⁸ Critically, compliance with consultation does not automatically legalise the underlying activity: the procedural and substantive obligations are cumulative. A State may breach Article IX by failing to consult despite foreseeable risk, or by proceeding after consultation where the scale of anticipated impairment and the availability of alternatives make the residual harm unreasonable. Properly interpreted, Article IX therefore operates as a preventive environmental obligation rather than a merely procedural provision. Read together, the duties of due regard, avoidance of harmful interference and prior consultation establish a legal framework requiring States to assess and minimise the environmental consequences of space activities before they occur. Although the Treaty does not expressly prohibit ASAT weapons, it already contains principles that can render debris-generating tests legally difficult to justify under contemporary conditions.

4. Systemic Integration: Bringing Environmental Law into Space Law

4.1 Article 31(3)(c) of the Vienna Convention

Article 31(3)(c) VCLT requires an interpreter to take into account, together with the treaty's context, "any relevant rules of international law applicable in the relations between the parties."⁵⁶ Its function is to resist the fragmentation of international law into self-contained regimes. As the ILC explained, treaties are "creations of the international legal system," applied within a normative environment that may include other treaties, customary rules, and general principles.⁵⁷ This principle of systemic integration is especially important where a treaty uses generic concepts or presupposes background law without restating it. In *Oil Platforms*, the ICJ accordingly rejected the proposition that a treaty could be interpreted wholly independently of the relevant rules of international law governing relations between its parties.⁵⁸

The Outer Space Treaty invites this method unusually clearly. Article III requires States Parties to carry on space activities "in accordance with international law." At the same time, Article IX employs evaluative standards, due regard, and harmful interference, as well as appropriate consultation,

whose application depends on the legal significance assigned to foreseeable risk.⁶² Article 31(3)(c) accordingly permits customary environmental rules to inform the content of those standards. At the same time, Article III confirms that generally applicable international law governs space activities in its own right unless displaced by a more specific and incompatible rule.

⁵⁶ Vienna Convention, *supra* note XX, art 31(3)(c).

⁵⁷ International Law Commission, *Fragmentation of International Law: Difficulties Arising from the Diversification and Expansion of International Law*, Report of the Study Group of the International Law Commission, finalised by Martti Koskenniemi, UN Doc A/CN.4/L.702 (18 July 2006)

⁵⁸ *Oil Platforms* (Islamic Republic of Iran v United States of America), Judgment, [2003] ICJ Rep 161. ⁶²

Hobe, Schmidt-Tedd & Schrogl, *supra* note XX.

Environmental law helps specify Article IX; Article III is best understood as preventing the space-law regime from being treated as legally insulated.⁵⁹

This is not an attempt to invoke Article 31(3)(c) as a device to import every environmental treaty into the OST. The phrase "applicable in the relations between the parties" limits the relevant material, and the use of treaties with different memberships remains contested.⁶⁰ That difficulty is substantially reduced here because the prevention principle is invoked as customary international law, not as a provision of a specialised convention. A rule binding the relevant States forms part of their legal relations irrespective of whether all OST parties have joined the same environmental instruments.

Nor does *lex specialis* exclude systemic integration. This approach reflects the ICJ's broader preference for harmonisation rather than fragmentation, whereby apparently distinct regimes are interpreted as forming part of a coherent international legal system. A special regime displaces general law only where a genuine inconsistency exists, or an exhaustive intention to regulate is demonstrated. The OST contains no rule authorising significant environmental harm, no alternative standard excluding prevention, and no comprehensive debris code. As a result, there is no conflict between Article IX and customary prevention, since both are obligations of conduct directed toward foreseeable risk. The ICJ's 2025 Climate Change Advisory Opinion is instructive in emphasising that treaty and customary obligations bearing on the same environmental problem should, where possible, be interpreted as compatible and mutually supportive.⁶¹ Systemic integration thus strengthens Article IX without converting interpretation into amendment.

4.2 The Prevention Principle as Customary International Law

The prevention principle is the customary obligation of a State to exercise due diligence to prevent significant environmental harm caused by activities within its jurisdiction or control. Its lineage runs from the Corfu Channel principle of responsibility for knowingly allowing territory to be used contrary to other States' rights, through Principle 21 of the Stockholm Declaration and Principle 2 of Rio, to the ICJ's formulation that States must ensure activities within their jurisdiction respect the environment of other States and of areas beyond national control.⁶² In *Pulp Mills*, the Court described this obligation as customary and linked it to vigilance, administrative control, and environmental impact assessment.⁶³ The ILC's Draft Articles on

⁵⁹ Carpanelli, *supra* note XX.

⁶⁰ Laurence R Helfer, 'The Burdens and Benefits of Brighton' (2012) 1(1) ESIL Reflections.

⁶¹ Obligations of States in Respect of Climate Change, Advisory Opinion, [2025] ICJ Rep (23 July 2025).

⁶² Corfu Channel (United Kingdom v Albania), Merits, Judgment, [1949] ICJ Rep 4; Declaration of the United Nations Conference on the Human Environment, 16 June 1972, UN Doc A/CONF.48/14/Rev.1 (1973), 11 ILM 1416, Principle 21; Rio Declaration on Environment and Development, 14 June 1992, UN Doc A/CONF.151/26 (Vol I) (1992), 31 ILM 874, Principle 2; Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, [1996] ICJ Rep 226.

⁶³ *Pulp Mills*, *supra* note XX.

Prevention similarly require "all appropriate measures" to prevent significant transboundary harm or, where prevention cannot be guaranteed, to minimise its risk.⁶⁴

Three features matter for outer space. First, prevention is an obligation of conduct, not a guarantee against harm.⁶⁵ Compliance turns on whether the State used all reasonably available means appropriate to the risk, and the standard is variable. The greater the probability, magnitude, and the acting State's capacity to control it, the more demanding the required diligence. Technologically sophisticated States capable of operating kinetic ASAT systems will ordinarily be expected to possess and act upon correspondingly high technical information.

Second, the obligation is triggered by risk rather than completed damage. "Significant" does not mean catastrophic; the assessment combines probability with severity, duration, and reversibility, and a lower probability may still trigger the duty where consequences are grave or persistent. The ICJ's Climate Change Advisory Opinion confirmed that long-term, cumulative, and diffuse effects remain legally cognizable even where harm results from interacting activities or materialises across time.⁶⁶ This matters for orbital degradation, where legal concern is not confined to a single collision but includes the incremental worsening of the common operating environment. A test may cross the significance threshold through aggregate risk even where any single fragment's collision probability is low. This point is developed further below.

Third, prevention's spatial scope extends beyond bilateral transboundary pollution. The Nuclear Weapons Advisory Opinion expressly included areas beyond national control, and the 2025 Climate Change Opinion confirmed the customary duty protects the global environment and areas outside national jurisdiction.⁷¹ Outer space's non-appropriable status therefore creates no regulatory void. The relevant connection is control over the hazardous activity, not sovereignty over where its effects are felt. A State conducting an ASAT test exercises the requisite control even though interception and debris occur in outer space, and Article VI reinforces this by attaching international responsibility to States' national space activities, governmental or private.⁷²

Prevention also has procedural consequences: where a proposed activity may create significant risk, a State must ascertain that risk in advance. Pulp Mills recognised the need for an environmental impact assessment in such circumstances.⁶⁷ Certain Activities clarified the sequence.⁶⁸ The first step is to determine whether a significant risk exists. Then assess, notify, and consult in good faith. These duties operationalise due diligence by forcing risk to be identified. At the same time, alternatives remain available, and complement rather than repeat Article IX: Article IX supplies a treaty-specific consultation mechanism, while customary

⁶⁴ International Law Commission, Draft Articles on Responsibility of States for Internationally Wrongful Acts, with Commentaries, in Report of the International Law Commission on the Work of its Fifty-Third Session, UNGAOR, 56th Sess, Supp No 10, UN Doc A/56/10 (2001) 31

⁶⁵ Pulp Mills, *supra* note XX; Certain Activities, *supra* note XX

⁶⁶ Climate Change Advisory Opinion, *supra* note XX. ⁷¹

Climate Change Advisory Opinion, *supra* note XX ⁷²

Hobe, Schmidt-Tedd & Schrogl, *supra* note XX.

⁶⁷ Pulp Mills, *supra* note XX.

⁶⁸ Certain Activities, *supra* note XX.

prevention explains the antecedent investigation necessary to determine whether that mechanism has been triggered.

Prevention should be distinguished from precaution, which addresses situations of scientific uncertainty where evidence remains incomplete; prevention, by contrast, applies to foreseeable and sufficiently established risks. A central element linking Article IX of the OST to the prevention principle is therefore the foreseeability of environmental harm. Under customary international law, the obligation of due diligence is triggered where there is a foreseeable risk of significant transboundary harm. In the context of debris-generating ASAT tests, such foreseeability can no longer reasonably be disputed. Fragmentation resulting from kinetic interception, the persistence of orbital debris, and the resulting collision risks are well-established consequences that can be modelled *ex ante* using established orbital mechanics and debris propagation models.⁶⁹ Since the Chinese FY-1C ASAT test in 2007 and the Russian Cosmos 1408 interception in 2021, States have had extensive empirical evidence demonstrating both the immediate and long-term environmental consequences of kinetic ASAT testing.⁷⁰ Consequently, the stronger legal claim is that conventional prevention already applies, without the need to rely on the more contested precautionary principle. A State authorising a debris-generating ASAT test can therefore no longer credibly argue that the environmental consequences were unforeseeable, with the result that the corresponding standard of due diligence is correspondingly heightened.

4.3 Applying the Prevention Principle to Destructive ASAT Testing

Applying prevention to ASAT testing begins with characterising the activity. The question is not whether ASAT capabilities are categorically prohibited, but whether a particular test creates a foreseeable risk of significant environmental harm and, if so, whether the responsible State adopted all appropriate preventive measures. Fragmentation is the mechanism by which such a test demonstrates success, and the resulting objects may disperse beyond the tester's continuing control; scientific studies have modelled substantial long-term collision risks from debris-generating ASAT tests, and ESA identifies deliberate anti-satellite tests as a significant source of fragmentation debris.⁷¹ That combination of intention, technical predictability, and loss of control places debris-generating tests near the core of preventive due diligence.

Unlike many environmental risks characterised by significant scientific uncertainty, the consequences of kinetic ASAT interception can be modelled *ex ante* with considerable precision through established orbital debris and collision-probability models. This substantially narrows the margin of appreciation available to States and correspondingly raises the level of due diligence expected under customary international law.

The significance threshold should be assessed environmentally and cumulatively, considering the expected number and size distribution of fragments, orbital lifetimes, the density of the affected region, collision probabilities, risks to crewed spacecraft, and the extent to which the

⁶⁹ European Space Agency, *supra* note XX.

⁷⁰ European Space Agency, *supra* note XX.

⁷¹ European Space Agency, *supra* note XX. ⁷⁸ Climate

Change Advisory Opinion, *supra* note XX ⁷⁹ Pulp

Mills, *supra* note XX at para 197.

test contributes to an already degraded population. No single collision need be more likely than not. A test may be significant because it creates many low-probability hazards over a long period or contributes to future cascading collisions. This is consistent with the ILC's combined probability-magnitude formulation and the requirement that cumulative, long-term effects be included in the assessment.⁷⁸

Due diligence would accordingly require an *ex ante* orbital environmental assessment proportionate to the test: modelling fragmentation, dispersion, persistence, and conjunction risk; evaluating cumulative effects against the existing baseline; identifying foreseeably exposed States and missions; and examining whether the objective can be achieved through a non-destructive demonstration or other less harmful method.⁷⁹ This is not a box-ticking exercise. Its function is to inform the choice among alternatives, since due diligence asks whether the chosen conduct was reasonable, not merely whether the State possessed information about its consequences.

Where the assessment discloses a significant risk, notification and consultation are subject to the same functional requirements discussed in relation to Article IX's consultation mechanism in Section 2.4 above. These requirements call for timely, substantive engagement before the activity becomes irreversible, not mere *post hoc* disclosure.⁷² This customary process complements rather than duplicates Article IX: environmental law explains the diligence required to make the Treaty's consultation mechanism effective, and a State cannot avoid both regimes by declining to investigate a risk that competent technical authorities would readily foresee.

The substantive endpoint is an obligation to prevent, where reasonably possible, and otherwise to minimise residual risk. This can be achieved by changing the target, orbit, intercept geometry, or timing, or by redesigning the demonstration to avoid fragmentation. Mitigation has limits. Once fragments are created at orbital velocity, the acting State cannot reliably retrieve or confine them. Where a test is expected to produce significant, persistent debris and a comparably effective non-debris-generating alternative is reasonably available, proceeding is difficult to reconcile with a duty to employ all appropriate means.

This conclusion remains narrower than a categorical ban. The prevention principle is risk-based and context-sensitive; it does not make every release of debris internationally wrongful. It does, however, shift the inquiry away from whether a fragment has already struck foreign property. A breach may arise from failure to investigate a foreseeable risk, failure to assess alternatives, inadequate consultation, or an unreasonable decision to proceed despite the preventable risk of significant harm.

Systemic integration therefore supplies the doctrinal bridge between space law's open standards and environmental law's developed preventive content. Article 31(3)(c) allows customary prevention to inform Article IX. Article III confirms that the principle remains independently applicable and that no *lex specialis* rule displaces it. Existing international law may not prohibit ASAT weapons as such. Still, it already makes the deliberate creation of persistent debris legally difficult to justify where the risk is foreseeable and less harmful alternatives exist.

⁷² European Space Agency, *supra* note XX at 24.

5. Emerging State Practice and Soft Law: Evidence of an Evolving Legal Understanding

5.1 State Practice

The legal significance of State practice must be assessed cautiously. Official statements, voting records, and unilateral commitments may constitute evidence of practice. In contrast, explanations that conduct is legally required or prohibited may evidence *opinio juris*. However, political undertakings do not automatically become customary law. Identical conduct may be motivated by security or diplomatic rather than legal considerations.⁷³ Nevertheless, consistent public commitments can clarify what States regard as acceptable conduct, particularly where framed as implementing "responsible behaviour" under the existing legal order.

The most important development began with the US' announcement on 18 April 2022 that it would not conduct destructive direct-ascent ASAT missile tests, linking the commitment to the security and sustainability of outer space and describing long-lived debris as a threat to satellites, astronauts, and the ability of all States to explore and use space.⁸² Canada adopted a comparable commitment in May 2022; the United Kingdom followed in October, characterising such testing as "conclusively" irresponsible. By April 2024, thirty-eight UN Member States, including every G7 State, had made equivalent commitments.

Two aspects of this practice are legally important. First, the relevant harm is framed in environmental and collective terms. The objection is not confined to the destruction of a particular satellite, but to the degradation of the orbital environment and the risk to all space users. Second, the conduct is condemned *ex ante*. A destructive test is irresponsible because it intentionally creates an enduring hazardous condition, not merely one that occurs when a fragment subsequently collides with something. This closely corresponds to the preventive, risk-based interpretation of Article IX developed in Section 2. In this interpretation, responsibility attaches to the foreseeable production of environmental danger, not only to completed damage.

Most ASAT commitments are expressly presented as political measures designed to build an international norm, and their wording does not uniformly demonstrate an intention to assume an independently binding obligation under the Nuclear Tests line of authority on unilateral declarations.⁷⁴ Their stronger collective significance lies elsewhere. They constitute executive practice identifying a concrete form of conduct as irresponsible, providing evidence relevant to the interpretation and progressive specification of existing legal standards.

Nor does the practice yet establish a customary prohibition applicable to every destructive test. Of the States known to have demonstrated destructive direct-ascent capability, only the US has adopted the commitment; China and Russia opposed UNGA Resolution 77/41, and India abstained, favouring a legally binding instrument instead.⁷⁵ These objections, however, largely concern the incompleteness or strategic asymmetry of the moratorium rather than a positive

⁷³ International Law Commission, Draft Conclusions on Identification of Customary International Law, with Commentaries, in Report of the International Law Commission on the Work of its Seventieth Session, UNGAOR, 73rd Sess, Supp No 10, UN Doc A/73/10 (2018) ch V, Conclusion 2. ⁸² US Department of Defence, *supra* note XX

⁷⁴ Nuclear Tests (Australia v France), Judgment, [1974] ICJ Rep 253

⁷⁵ A/RES/77/41, *supra* note XX

entitlement to generate persistent debris. For example, Russia's criticism was that the commitment did too little to constrain other counterspace capabilities, not that long-lived debris was environmentally harmless.⁷⁶ The practice therefore supports a more limited but legally consequential proposition: a substantial and geographically diverse group of States regards intentional creation of long-lived debris as inconsistent with responsible space conduct, even without agreement that every ASAT capability should be prohibited, thereby reinforcing, rather than replacing, the duties examined in Sections 2 and 3.

5.2 United Nations Soft Law

State practice does not emerge in isolation. It reflects and reinforces a broader normative framework that has developed through the UN over more than two decades. The COPUOS Space Debris Mitigation Guidelines, adopted by consensus in 2007 and endorsed by the UNGA, state in Guideline

4 that intentional destruction and other harmful activities generating long-lived debris should be avoided, and that any necessary intentional break-up should occur at sufficiently low altitude to limit resulting fragments' orbital lifetime.⁷⁷ Guideline 4's language is technologically neutral; it does not depend on whether destruction serves military testing, disposal, or science, while its low-altitude qualification confirms a risk-based rather than absolute approach, anticipating this article's central distinction between ASAT capabilities as such and tests whose method and expected debris lifetime impose avoidable burdens on other users.

The 2019 Guidelines for the Long-term Sustainability of Outer Space Activities deepen this approach by defining sustainability in terms of preserving the outer-space environment for future generations and encouraging the integration of debris mitigation and risk assessment into national regulatory systems.⁷⁸ Their voluntary status and civil/commercial focus limit their direct force over military testing. Still, their normative architecture treats sustainability as a condition for the continuing, equitable exercise of space freedoms. This approach reinforces the view that the orbital environment is a shared resource whose degradation bears on every State's corresponding interests under the OST.

Resolution 77/41 translated this reasoning directly into the ASAT context, calling on States to commit to opposing destructive direct-ascent testing as an urgent measure to prevent environmental damage.⁷⁹ This process has since received sustained majority support. Resolution 78/20 (2023) and the corresponding 2024 resolution attracted comparable or greater majorities, and a unified open-ended working group was established for 2025–2028 to

⁷⁶ cite Russia's explanation of vote

⁷⁷ United Nations Office for Outer Space Affairs, *Promoting Space Sustainability: The International Legal Framework, Space Debris Mitigation Guidelines and Recommendations for Governments and Industry* (Vienna: United Nations, 2021); AGNU, Résolution 62/217, *Coopération internationale touchant les utilisations pacifiques de l'espace extraatmosphérique*, Doc off AG NU, 62e sess, Doc NU A/RES/62/217 (1er février 2008).

⁷⁸ United Nations Office for Outer Space Affairs, *Promoting Space Sustainability: The International Legal Framework, Space Debris Mitigation Guidelines and Recommendations for Governments and Industry* (Vienna: United Nations, 2021).

⁷⁹ A/RES/77/41, *supra* note XX

consolidate competing processes.⁸⁰ Persistent negative votes and competing treaty proposals show that normative development remains contested; they do not negate the increasingly institutionalised recognition that debris-generating conduct is a legitimate subject of international restraint.

UNGA resolutions cannot, by themselves, create customary law. Still, the ICJ has recognised that their content, adoption conditions, and perceived normative character may evidence emerging *opinio juris*, particularly when considered in a series of resolutions.⁸¹ Resolution 77/41 and the COPUOS Guidelines are accordingly not substitutes for treaty or customary obligations. Their value lies in documenting how the vast majority of States understand the responsible implementation of the existing framework. Deliberate, avoidable, persistent debris generation is conduct to be prevented, not a legally neutral exercise of freedom.

5.3 Towards an Emerging Understanding of Environmental Responsibility

Taken together, recent State practice and United Nations soft law do not redefine the protected legal interest identified in Section 1; rather, they increasingly corroborate it. Whereas earlier discussions of counterspace activities focused primarily on damage to individual satellites or strategic stability, contemporary instruments increasingly frame the relevant concern in terms of preserving the orbital environment, ensuring the long-term sustainability of space activities, and safeguarding the interests of present and future users of outer space. This evolution does not create a new legal obligation. Instead, it supports interpreting existing obligations of due regard, prevention, and responsible conduct as extending to the protection of the orbital environment itself.

The second is sensitivity to avoidability. Neither the COPUOS Guidelines nor most State statements claim that every military space activity is unlawful; instead, they distinguish conduct by its method and consequences. The availability of non-destructive testing, simulation, or lower-risk interception geometries makes deliberate externalisation of long-term debris risk more difficult to defend, so that environmental responsibility functions as a standard of conduct requiring selection of less harmful alternatives where reasonably available.

This evidence should not be characterised as subsequent practice establishing an agreed interpretation of Article IX under Article 31(3)(b) VCLT. The opposition of several major space powers and the voluntary character of these instruments preclude that conclusion. It is better understood as corroborative evidence of the contemporary environment in which Article IX and customary prevention must operate. Open-textured standards such as "due regard" and "potentially harmful interference" acquire practical content through shared expectations concerning acceptable conduct, and soft law can perform that specifying function without itself becoming binding.⁸²

⁸⁰ UNGA, Res 78/20, Reducing Space Threats through Norms, Rules and Principles of Responsible Behaviours, UNGAOR, 78th Sess, UN Doc A/RES/78/20 (7 December 2023); Jessica West, UN Open-Ended Working Group on Reducing Space Threats: First Session Recap (Waterloo, ON: Project Ploughshares, May 2025).

⁸¹ Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, [1996] ICJ Rep 226.

⁸² Vienna Convention, *supra* note XX, art 31(3)(b); ILC Draft Conclusions, *supra* note XX.

The resulting constraint is narrower, but more defensible, than an asserted customary ban on ASAT weapons. The evidence does not establish that all counterspace capabilities or non-destructive tests are prohibited; it does establish a progressively stronger presumption against destructive tests expected to produce significant, persistent, and uncontrollable debris. A State contemplating such a test would now have to explain why conduct widely identified as irresponsible remains compatible with due regard, preventive diligence, and the obligation to consult over foreseeable harmful interference. Moreover, the more persistent the expected debris and the more readily available the alternatives, the less persuasive that justification becomes.

State practice and soft law therefore do not create the environmental constraints identified in this article; they make those constraints harder to deny. Although international law has not yet produced a comprehensive prohibition on ASAT weapons, its existing rules, clarified by converging practice and repeated institutional endorsement, are already sufficient to render environmentally destructive testing legally unjustifiable under contemporary conditions.

6. Conclusion

This article has argued that the environmental consequences of destructive ASAT testing require a different legal perspective from that traditionally adopted in space-security scholarship. Yet legal discussions have traditionally framed the issue primarily through the lens of national security, strategic stability, and arms control, leaving its environmental dimension comparatively underdeveloped. This article has argued that such an approach overlooks an important aspect of the existing legal framework governing activities in outer space.

Rather than requiring the negotiation of an entirely new treaty, this article has demonstrated that a legal basis for constraining debris-generating ASAT testing can be found through a coherent interpretation of existing international space law. Article IX of the OST, read in light of Article III's incorporation of general international law and alongside the LIAB, imposes obligations of due regard, international responsibility, and avoidance of harmful interference that are directly relevant to the creation of long-lived orbital debris. Although these provisions were not drafted specifically with kinetic ASAT testing in mind, their broad, evaluative language enables them to address environmental challenges unforeseen in 1967.

The growing body of State practice further reinforces this interpretation. National commitments to refrain from destructive direct-ascent ASAT testing, together with successive UNGA resolutions recognising the risks posed by space debris and promoting responsible behaviour in outer space, reflect an evolving understanding that the orbital environment constitutes a shared interest deserving legal protection. While this practice has not yet crystallised into a rule of customary international law, it nevertheless provides persuasive evidence of the direction in which international expectations and legal interpretation are developing.

This article does not contend that existing law expressly prohibits destructive ASAT testing, nor that customary international law has already emerged. Rather, it argues that the current legal framework is more adaptable than is often acknowledged. Interpreted in accordance with contemporary principles of treaty interpretation and informed by subsequent State practice and

soft law, the existing corpus of international space law already provides a meaningful legal basis for assessing the environmental legality of debris-generating ASAT tests.

As space activities continue to expand and orbital congestion intensifies, preserving the orbital environment will become increasingly essential to ensuring the continued exploration and use of outer space for present and future generations. Whether or not States ultimately negotiate a dedicated treaty addressing destructive ASAT testing, international space law should not be regarded as legally silent. Instead, it already contains the normative foundations upon which stronger environmental protection of the orbital environment can continue to develop through interpretation, State practice, and the progressive development of international law.

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