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GROUNDING THE GAP: INDIA'S SPACE ACTIVITIES BILL IN LIGHT OF THE ICJ'S 2025 ADVISORY OPINION ON CLIMATE CHANGE

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I. INTRODUCTION

The space surrounding our planet in orbit is no longer abstract, but scarce. Low Earth Orbit is home to more than tens of thousands of known pieces and millions of unknown pieces that, moving at speeds surpassing seven kilometres per second, could end up destroying a functioning satellite or causing a chain reaction of fragments. Geostationary orbit, a far narrower and non-renewable band, faces the parallel problem of derelict spacecraft crowding the slots on which global communications depend. The physics of the Kessler syndrome, the self-sustaining collisional growth of debris, describes an environmental tipping point of the same structural character as ocean acidification or the loading of greenhouse gases into a shared atmosphere: a diffuse, cumulative, transboundary degradation of a commons that no single operator has any incentive to arrest and that no existing instrument compels any State to prevent.¹

The thesis advanced here is that this regulatory silence is no longer defensible as a matter of general international law, and that its persistence in domestic legislation is a defect an emerging spacefaring State can ill afford. On 23 July 2025 the International Court of Justice, in its Advisory Opinion on the Obligations of States in respect of Climate Change, held unanimously that the specialised climate treaties do not exhaust the international obligations bearing on greenhouse-gas emissions, and that the customary duty to prevent significant

¹See generally Donald J. Kessler & Burton G. Cour-Palais, *Collision Frequency of Artificial Satellites: The Creation of a Debris Belt*, 83 J. Geophysical Rsch. 2637 (1978).

environmental harm operates alongside and independently of them.² Read together with the Advisory Opinion of the International Tribunal for the Law of the Sea of 21 May 2024, which reached the analogous conclusion under the Law of the Sea Convention,³ the two opinions unsettle the assumption that a *lex specialis* regime, once established, seals a field against the general corpus of environmental obligations. That reasoning is not confined to the atmosphere or the oceans. Through the interpretive discipline of systemic integration under Article 31(3)(c) of the Vienna Convention on the Law of Treaties,⁴ it reaches every treaty regime governing a shared environmental medium—including the law of outer space.

India stands where this doctrinal shift becomes a legislative problem. Its draft Space Activities Bill, first circulated for consultation in 2017 and presently under redrafting as the national space economy is liberalised, criminalises the “pollution of outer space” yet leaves the term undefined, fixes no quantitative mitigation threshold, and imposes no pre-launch obligation to plan for debris or end-of-life disposal.⁵ The argument that follows is that the distance between the Bill’s punitive shell and its empty operative core is now measurable against a concrete customary standard, and that closing it is at once a treaty-compliance imperative and an opportunity for India to legislate ahead of, rather than behind, the field.

II. STATEMENT OF THE PROBLEM AND RESEARCH GAP

Poor handling of space debris by the instruments that form the basis of space law is nothing new. The Outer Space Treaty predates the debris problem as an operational concern; its Article IX speaks of harmful contamination and adverse changes in the terrestrial environment in the register of planetary-protection aspiration rather than enforceable duty.⁶ The Liability Convention, engineered for the discrete catastrophe of a falling spacecraft, has no purchase on the diffuse, untraceable micro-fragment that is the characteristic hazard of a congested orbit.⁷ A substantial literature has catalogued these deficiencies and canvassed the difficulty of grounding active debris removal and pre-launch mitigation in binding law.

²Obligations of States in respect of Climate Change, Advisory Opinion, 2025 I.C.J. (July 23) (General List No. 187) [hereinafter *Climate Change AO*].

³Request for an Advisory Opinion submitted by the Commission of Small Island States on Climate Change and International Law, Advisory Opinion, ITLOS Case No. 31 (May 21, 2024) [hereinafter *ITLOS AO*].

⁴Vienna Convention on the Law of Treaties art. 31(3)(c), opened for signature May 23, 1969, 1155 U.N.T.S. 331 [hereinafter *VCLT*].

⁵Draft Space Activities Bill, 2017, Dep’t of Space, Gov’t of India [hereinafter *Draft Bill*].

⁶Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies art. IX, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter *Outer Space Treaty*].

⁷Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 [hereinafter *Liability Convention*].

A distinct scholarly current has emerged in the immediate wake of the 2024–2025 climate opinions. Writing on EJIL:Talk! in late 2025, scholars associated with the International Institute of Space Law argued that the systemic-integration logic the Court applied to the Law of the Sea Convention applies by analogy to the Outer Space Treaty, so that Articles III and IX incorporate the evolving customary environmental obligations the opinions confirm.⁸ A companion contribution reasoned that a hypothetical future advisory opinion on outer space would draw directly on the climate opinion’s environmental reasoning.⁹

The gap this paper addresses lies at the seam between these two literatures. The public-international-law scholarship remains pitched at the level of interpretation: it establishes that the customary duty reaches orbital space but halts at the threshold of the State’s own legal order. However, the statement fails to inquire what legislation a spacefaring State must implement in order to fulfil its obligation and it does not subject its assertion to the statutory provisions of any one jurisdiction. There is not a single publication which converts the rule of customary law of no-harm into a legislative provision in the statute book of a developing spacefaring State. The proposed Indian Space Activities Bill fits this bill perfectly well.

III. RESEARCH QUESTIONS

The structure is based on three questions. First, what are the structural and normative limitations of the existing international space-law framework with respect to the mitigation and remediation of orbital debris? Second, how does the 2025 Advisory Opinion specifically its handling of *lex specialis*, its application of systemic integration under Article 31(3)(c) VCLT, and its articulation of customary due diligence extend to the orbital environment? Third, what concrete statutory amendments are required to reconcile India’s draft Space Activities Bill with the customary standard the opinion crystallises?

IV. RESEARCH METHODOLOGY

The paper proceeds by a qualitative, doctrinal, and normatively comparative method. Its primary materials are legal texts read as legal texts: the operative provisions of the Outer Space Treaty and the Liability Convention, construed according to the customary rules codified in Articles 31 and 32 VCLT; the two advisory opinions, read for their ratio on the relationship between specialised and general law; and the draft Bill, read as a drafting artefact whose

⁸Giulia Bordacchini, Vitali Braun, Elena Ćirković & Adam Mitchell, *Systemic Integration and Space Law After the Climate Advisory Opinions*, EJIL:Talk! (Dec. 30, 2025).

⁹Yu Takeuchi, *From Climate to Cosmos: The ICJ’s Advisory Opinion and Its Implications for Sustainable Space Governance*, EJIL:Talk! (Nov. 17, 2025).

omissions carry legal consequence. Customary international law is identified in the orthodox manner, through State practice and *opinio juris* as reflected in and synthesised by international jurisprudence, *Pulp Mills*, *Certain Activities*, the ITLOS opinion, and now the ICJ opinion. The comparative dimension is functional rather than exhaustive: recent legislative and quasi-legislative responses in the European Union, the United States, and Japan are examined not for their own sake but as evidence of a converging standard of conduct against which Indian inaction can be measured. The paper closes in the register of legislative drafting, proposing statutory language calibrated to the customary standard the doctrinal analysis identifies.

V. REVIEW OF LITERATURE

Three streams of scholarship converge on the problem. The first is the classical critique of the space-law treaties. Bin Cheng's work on the accelerated customary status of the early space principles, Manfred Lachs's treatment of the Outer Space Treaty as a framework of principle rather than regulation, and the systematic exposition of the corpus associated with Stephan Hobe together establish that the treaties were drafted as constitutional aspiration, deliberately leaving operational detail to a later, and largely unrealised, elaboration.¹⁰ This literature explains why Article IX reads as exhortation.

The second stream is the international-environmental jurisprudence on customary due diligence. *Pulp Mills* established environmental impact assessment as a requirement of general international law and confirmed that the obligation to prevent transboundary harm is one of conduct, not result;¹¹ *Certain Activities* refined the threshold and the sequencing of the assessment duty;¹² and the 2024 ITLOS opinion carried the standard into the marine environment, treating anthropogenic greenhouse-gas emissions as marine pollution and the resulting obligations as independent of the climate treaties. This body of law supplies the content of the no-harm duty that the space treaties invoke but do not specify.

The third and newest stream extends the 2025 opinion to outer space. The IISL Working Group on Pluralistic Governance and International Space Law, and the EJIL:Talk! contributions of Baldacchini, Braun, Ćirković and Mitchell, marshal the emerging science of atmospheric contamination from spacecraft re-entry to argue that Article IX, read through systemic integration, already binds States to prevent significant environmental harm from

¹⁰See Bin Cheng, *Studies in International Space Law* (1997); Manfred Lachs, *The Law of Outer Space: An Experience in Contemporary Law-Making* (1972); Stephan Hobe, *Space Law* (2019).

¹¹*Pulp Mills on the River Uruguay* (Arg. v. Uru.), Judgment, 2010 I.C.J. 14, ¶¶ 101, 204 (Apr. 20).

¹²*Certain Activities Carried Out by Nicaragua in the Border Area* (Costa Rica v. Nicar.), Judgment, 2015 I.C.J. 665 (Dec. 16).

space operations. The present paper accepts the interpretive conclusion of this third stream and supplies what it omits—the domestic-law consequence.

VI. THE INTERNATIONAL LEGAL FRAMEWORK GOVERNING SPACE DEBRIS

Article IX of the Outer Space Treaty is the field's environmental provision, and its weakness is instructive. It obliges States to conduct activities with "due regard" to the corresponding interests of others, to avoid harmful contamination of space and adverse changes in the environment of the Earth, and to consult internationally where an activity would cause potentially harmful interference.¹³ Each limb is qualified into near-unenforceability: "due regard" imports no threshold, "harmful" is left undefined, and the consultation duty is procedural and self-judging. The provision was drafted with planetary contamination in view, not the accretion of derelict hardware in orbit, and its open texture has permitted half a century of debris generation without a single finding of breach.

The Liability Convention compounds the problem through the architecture of its liability rules. Article II imposes absolute liability, but only for damage caused on the surface of the Earth or to aircraft in flight; the characteristic harm of orbital congestion—one space object destroying another in orbit—falls under Article III, which requires proof of fault.¹⁴ Fault-based liability is unworkable against the micro-fragment: the object is typically untracked, its origin unattributable, and the causal chain from any launching State's conduct to the collision impossible to establish to the standard the Convention presupposes. The instrument thus supplies absolute liability precisely where the debris problem is least acute, and fault liability precisely where attribution is impossible.

Where there is a lack of treaties on this matter, there is soft law. The guidelines for space debris mitigation under COPUOS in 2007 give sound technological advice about limiting debris in operations, deactivating stored energy, and post-mission disposal, but this is all non-binding advice.¹⁵ The Artemis Accords, for their part, commit signatories only to limit long-lived debris "to the extent practicable," a formula subordinating the environmental commitment to operational and commercial convenience.¹⁶ Soft law of this kind can inform the content of a

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¹⁵Comm. on the Peaceful Uses of Outer Space, *Space Debris Mitigation Guidelines*, U.N. Doc. A/62/20, Annex (2007).

¹⁶The Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids for Peaceful Purposes § 12, Oct. 13, 2020.

customary standard, but it cannot by itself generate an operational duty binding on private operators. That step requires either the crystallisation of custom or its transposition into domestic statute. The next section contends that the former has now occurred, rendering the latter obligatory.

VII. THE CLIMATE ANALOGY: THE 2025 OPINION AND SYSTEMIC INTEGRATION

The 2024–2025 opinions matter to space law for what they hold about the relationship between specialised and general international law. The ITLOS opinion concluded that the Paris Agreement is not *lex specialis* to the Law of the Sea Convention and that compliance with the former does not exhaust obligations under the latter. The ICJ, a year later, generalised the point: the *lex specialis* principle does not effect a wholesale exclusion, by the climate treaties, of other rules of international law bearing on the same conduct.¹⁷ The customary duty to prevent significant environmental harm is an obligation of due diligence that applies to greenhouse-gas emissions in parallel with the treaty regime, and the standard of conduct it demands evolves with scientific and technological knowledge. The Court further affirmed that the precautionary approach is integral to due diligence, so that plausible indications of risk, even absent full certainty, engage the obligation; and that environmental impact assessment has crystallised as a customary procedural duty triggered by any activity posing a risk of significant transboundary harm.¹⁸

The interpretive bridge to outer space is Article 31(3)(c) VCLT, which directs that a treaty be construed in the light of any relevant rules of international law applicable between the parties.¹⁹ The rule requires the Outer Space Treaty to be read not as a self-contained regime frozen at 1967 but within the legal system prevailing at the time of interpretation, the very reasoning both tribunals applied to the Law of the Sea Convention. Article III of the Outer Space Treaty, which subjects space activities to international law including the Charter of the United Nations, is an unqualified *renvoi* that carries general international law into the treaty by reference and forecloses any reading of the instrument as hermetically sealed.²⁰ Through that *renvoi* and the discipline of systemic integration, the customary no-harm duty is with its due-

¹⁷Climate Change AO, *supra* note 2, ¶¶ 162–173; ITLOS AO, *supra* note 3, ¶¶ 223–224.

¹⁸Climate Change AO, *supra* note 2, ¶ 294 (precautionary approach); *id.* ¶¶ 295–298 (environmental impact assessment).

¹⁹

diligence, precautionary and assessment components that enters the interpretation of Article IX, supplying the threshold and content that the provision's own text withholds.

The final step is the characterisation of the orbital environment. Outer space is, in the treaty's own language, the province of all mankind, free for use by all and subject to appropriation by none, the legal signature of *res communis omnium* rather than *res nullius*. A shared commons of this kind is the paradigmatic object of the customary duty to prevent significant environmental harm, a duty that exists precisely to protect media lying beyond any single State's jurisdiction in whose preservation all States hold a legal interest. Orbital debris that is diffuse, cumulative, transboundary, and degrading of a resource on which all spacefaring activity depends is the orbital analogue of marine pollution and atmospheric loading. What the two opinions compel for the oceans and the atmosphere holds with equal force for orbit: the customary environmental due-diligence standard applies to space operations, and neither soft-law disclaimer nor treaty silence displaces it. This is the sense in which *sic utere tuo ut alienum non laedas* has migrated from maxim to operative rule for the conduct of space activity.

VIII. INSTITUTIONAL RESPONSES UNDERWAY: COMPARATIVE STATE PRACTICE

State practice is already converging on this standard, which sharpens the anomaly of Indian inaction. The European Union's proposed Space Act, tabled by the Commission in June 2025, organises regulation around three pillars that is safety, resilience and sustainability and would require operators seeking authorisation to submit debris-mitigation plans and an environmental-footprint declaration assessed against a common life-cycle methodology, with obligations scaled to mission risk.²¹ Whatever its final form, the measure treats debris mitigation and environmental assessment as conditions of market access rather than voluntary aspiration.

The United States, with the help of an executive order of 18 December 2025 (Executive Order 14369), lists orbital debris removal and space traffic management amongst other explicit objectives of national space policy, while also expressing an interest in active debris removal and servicing, yet it is not regulation-oriented, as this executive order is focused on commercial activity and deregulation, whereas the forthcoming ORBITS Act provides for a federal programme of orbital debris removal and mitigation standards.²² Japan has moved furthest toward hard obligation. Its Space Activities Act already conditions launch and satellite-

²¹Proposal for a Regulation on the Safety, Resilience and Sustainability of Space Activities in the Union, COM (2025) 335 final (June 25, 2025).

operation licences on measures to reduce on-orbit debris and to clear spent boosters from protected orbital regions, and the amendment bill approved by the Cabinet in March 2026 extends the licensing framework to next-generation transportation while strengthening post-mission-disposal and design-verification requirements.²³

At the multilateral level, the COPUOS Working Group on the long-term sustainability of outer space activities continues to develop space-traffic-management norms, while a prominent Belfer Center proposal would attach a Conference of the Parties to the Outer Space Treaty, allowing States to harden points of consensus into binding law incrementally rather than through wholesale renegotiation.²⁴ These initiatives differ in form and in force, but they trace a single vector: the migration of debris governance from voluntary guideline toward enforceable obligation. India's draft Bill, by contrast, has not moved.

IX. CLOSING THE GAP: IMPLICATIONS FOR INDIA'S SPACE ACTIVITIES BILL

The draft Space Activities Bill was circulated by the Department of Space in 2017 and, after sustained criticism, is being redrafted as the sector is opened to private participation through IN-SPACe and the wider New Space ecosystem.²⁵ In its published form the Bill lists the pollution of outer space among the acts attracting criminal and civil penalty that is imprisonment and fines exceeding one crore rupees yet nowhere defines "pollution," specifies a mitigation threshold, or requires an operator to plan for debris or end-of-life disposal before launch. Its intellectual-property clause addresses an entirely different subject; the punitive scheme resides in the Bill's penalty provisions. The result is a statute that threatens punishment for a wrong it declines to define.

Two consequences follow. The first is domestic. A criminal prohibition whose operative term is undefined offers Indian operators no *ex ante* standard of compliance and courts no determinate content to apply a defect of legal certainty especially acute for the private start-ups the Bill is meant to enable, since an operator can neither conform its conduct to, nor insure against, a prohibition whose boundaries are unstated. The second consequence is

²²Exec. Order No. 14369, Ensuring American Space Superiority, 90 Fed. Reg. (Dec. 23, 2025); *see also* Orbital Sustainability (ORBITS) Act of 2025, S. 1898, 119th Cong.

²³Act on Launching of Spacecraft, etc. and Control of Spacecraft (Act No. 76 of 2016) (Japan); *see* Cabinet Approval of Amendment Bill (Mar. 27, 2026).

²⁴Ely Sandler, *Governing Outer Space: A Conference of the Parties for the Outer Space Treaty*, Belfer Ctr. for Sci. & Int'l Affs. (Dec. 8, 2025).

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international. Under Article VI of the Outer Space Treaty India bears international responsibility for the space activities of its nationals, governmental and private alike, and must authorise and continuously supervise them.²⁶ If the customary due-diligence standard now requires pre-launch environmental assessment, mitigation planning and disposal assurance as the 2025 opinion, applied through systemic integration, indicates—then a licensing regime that omits these elements does not discharge India’s obligation of conduct. The omission is not a mere drafting infelicity; it is a prospective failure of due diligence which may be caused by the State. The existing practice in India’s constitutional system also requires harmonization of domestic laws with the international commitments of the State according to the provisions of Articles 51(c) and 253 of the Constitution. This method has been used by the Supreme Court to implement internationally acquired unenacted obligations.

The remedy is to make the Bill’s punitive framework an operational one. Three requirements are essential: first, a statutory definition of space pollution in line with the customary definition; second, an obligation of mandatory deorbiting of satellites at the end of their useful life with a financial guarantee to enable disposal and possibly active removal; and third, environmental impact assessment before granting a launch license. Below are some proposals in draft form.

X. SUGGESTIONS

The following proposed amendments are presented as additions to the operative and punitive structure of the draft Bill. Numbers are indicative; the provisions are tailored to the customary standard noted above.

(1) Statutory definition of space pollution. Add to the definitions clause:

“Space pollution” means the creation, emission or disposal in outer space, including in any orbit, of any object, piece or material which has caused, or has the potential to cause, significant alteration of the orbital or terrestrial environment, considering the best scientific knowledge and the cumulative effect of such conduct.

This definition ensures that the offense corresponds to the customary standard of significant harm and to the developing standard of conduct confirmed by the ICJ, thus remedying the uncertainty of the existing prohibition.

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(2) Compulsory end-of-life disposal and financial assurance. Include as a licence requirement:

Every licensee will, as part of the licensing requirements, ensure that the disposal of each space object is achieved through either deorbiting or disposal orbit transfer after the end of its lifetime, and will provide financial security in the amount and manner determined by the regulator, to ensure that the disposal and any other remediation measures resulting from non-performance of the licensee are undertaken.

Disposal after the completion of the mission thus becomes a compulsory action, and financial security will internalise the disposal cost.

(3) Debris and environmental impact assessment as condition precedent. Introduce into the licensing provision:

No launch licence shall be issued until an application has been made for, and a Debris Mitigation and Environmental Impact Assessment concerning the risks of collision, creation of debris through the life-cycle of the mission, atmospheric impacts at re-entry and final disposition of the debris have been approved by the regulator.

In this way, the duty of assessment will be made a firm condition of issuance of authority, bringing Indian law in line with the Pulp Mills approach and an emerging comparative standard.

(4) Supervision and adaptive review. Introduce:

The regulator shall oversee each licensed activity during its period of operation and may modify the terms of a licence in light of advances in scientific understanding or changes in the debris environment.

This is what Article VI requires as well as the opinion's insistence on the evolving standard of care.

(5) Proportionate penalty. Modify the penalty provision such that liability for pollution of outer space results from a defined failure to comply with one of the duties listed above, rather than from an undefined act, thereby preserving deterrence without compromising the legal certainty of a penal provision.

XI. CONCLUSION

The 2024/2025 climate opinions went further than resolving a debate on greenhouse gases. It was established once again as a principle of international law that the specific treaty regime is not a closed regime when it comes to the customary obligation to avoid causing major environmental harm, and that obligation is prudent, precautionary, and assessment-based and is applicable wherever the shared medium is found. Systemic integration by virtue of Article 31(3)(c) VCLT makes this principle applicable to outer space as a medium in light of the renvoi to international law contained in the Outer Space Treaty itself. Thus, space debris is no longer a matter solely for Article IX and some voluntary guidelines, but rather an object of a mandatory customary obligation.

The takeaway for India is obvious. A Space Activities Bill punishing an amorphous pollution of outer space without stipulating mitigation, disposal, or assessment does nothing to protect either its own entities or its reputation within the emerging standard. What follows are recommendations to fill that gap and, in the process, ensure that India does not come across as a follower desperately trying to catch up but as a pioneer from the Global South enacting a principled space legislation. The orbital commons can only be safeguarded, if at all, by States willing to translate principle into actionable domestic responsibility. And there may not be a better opportunity than this Bill.