Protecting the Environment of Space for Sustainable Economic and Social Development – Space Law, International Law and the Problem of Space Debris

By

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Outline

- Description of the various environmental problems associated with the exploration and use of outer space
- Analysis of the current international legal regime that regulates the environmental consequences of space activities
  - How well does international space law address the environmental problems associated with outer space?
  - How does general international law treat the environmental concerns associated with outer space?
- The way forward: Analysis of proposed solutions

Environmental concerns in outer space

- Space debris defined: non-functional uncontrolled man-made objects in orbit in outer space (See IADC Guidelines)
- Trends in the evolution of the debris problem
  - 1988: US SSN catalogue contained 7000 objects larger than 10cm, 5% of which were functional objects
  - 2012: Catalogue contains more than 21000 objects larger than 10cm of which fewer than 1000 are functional objects
- Radioactive debris really exacerbates the problem and poses severe challenges for the sustainable exploration and use of outer space.

Environmental Concerns – Radioactive Debris

- As of today, there have been 10 cases of space system failures leading to dispersal of radioactive material. These include:
  - plutonium payload on board the Apollo 13 lunar module which ended up in the Pacific Ocean close to the coast of New Zealand;
  - 68 pounds of uranium-235 on board the Russia's COSMOS 954 spacecraft which was spread over Canada's Northwest Territories in 1978;
  - the irregular reentry of Russia's COSMOS 1402 spacecraft in January/February 1983. The spacecraft, which carried a nuclear reactor on board, broke into 3 pieces and burned up upon reentry.
  - the plutonium payload on board the Russian MARS96 spacecraft which disintegrated over Chile and released the radioactive material but which was never found.
- Currently, there are 32 defunct nuclear reactors, 13 reactor fuel cores and at least eight radio-thermal generators (RTGs) circling the Earth. The total mass of RTG nuclear fuel in orbit is estimated at about 150kg, while there are some 1000kg of radioactive fuel on board the nuclear reactors in orbit.

Environmental Concerns in Outer Space

- Risk of collision between debris and fully functional space objects increases as the quantity of debris in orbit increases
- Given the quantity of debris already in space (in LEO and GEO – the two most used Earth orbits) scientists predict that access to and use of outer space will become unsustainable in the not-too-distant future if we continue on a business-as-usual basis:
  - We are at the point where even with no additional launches, the rate of generation of space debris from collision and fragmentation of space objects will sustain itself.
  - Voluntary and intentional destruction of objects in space by States makes an already bad situation even worse!
- Orbital decay and reentry are the only natural "sinks" for debris reduction. However, they are only practical for objects in LEO and they are most effective when sunspot activity is at its peak. This follows an eleven-year cycle.

Environmental Concerns – Graveyard Orbits

- Graveyard orbits offer a short-term solution to the debris problem in GEO. If objects are moved to such orbits at their end of life, this reduces the probability that they will collide with other objects in the crowded GEO ring and thereby create more debris.
- However, objects placed in graveyard orbits will remain in orbit for a long time thereafter and will become problematic for future generations as and when deep space exploration becomes feasible.

The Legal Regime

- The conduct of space activities is governed by:
  - International space law (a special branch of international law consisting primarily on the provisions of the 5 major space treaties)
  - General international law – conventional law, customary law, general principles, judicial decisions and the teachings of the most highly qualified publicists of the various nations.
- In the absence of new treaties since 1979, a new category of "soft law" guidelines, principles and codes of conduct has also emerged. Although technically non-binding, they cannot be ignored.

International Space Law and Space Debris

- Most relevant provision is Article IX of the Outer Space Treaty which requires that the following principles should be observed by States in the exploration and use of outer space:
  - *cooperation* and *mutual assistance*;
  - *due regard* for the *corresponding interests* of all other states;
  - the avoidance of *harmful interference* with the activities of other states or *harmful contamination* of the environment; and
  - the conduct of *appropriate international consultations* where harmful interference or harmful contamination is foreseen in the conduct of space activities.

International Space Law and Space Debris

- No definition of vague terms such as "due regard", "harmful contamination" and "appropriate international consultations".
- Negotiating history suggests that the drafters of Art. IX intended to prevent adverse changes to the space environment resulting from the introduction of biological, chemical or radioactive material. Notwithstanding the foregoing, it is not farfetched to include space debris within the scope of Art. IX.
- In any event, the OST established general principles which are capable of further elaboration within the context of additional treaties such as Art VI and the Liability Convention.
- If a similar course were to be followed with Art. IX, the resulting *Convention on Protection of the Outer Space Environment* could provide substantive standards and procedural mechanisms to protect the space environment just as the Liability Convention addresses the question of damages.

International Space Law and Space Debris

- To a very limited extent, Art. 7 of the Moon Agreement attempts to elaborate upon the fundamental principles contained in Art. IX of the Outer Space Treaty insofar as they apply to the environment of the Moon and other celestial bodies including the orbits around them.
- In the exploration and use of the Moon, Art. 7 of the Moon Agreement obliges states parties to "*take measures to prevent the disruption of the existing balance of its environment, whether by introducing adverse changes in that environment, by its harmful contamination through the introduction of extra-environmental matter or otherwise*".
- Unfortunately, the Moon Agreement only applies to the Moon and other celestial bodies, including the orbits around, and the trajectories to, them. It does not apply to interstitial space where the bulk of space debris is to be found.

International Space Law and Space Debris

- Although the Liability Convention establishes an elaborate regime of international liability for damage caused as a result of activities carried out in the exploration and use of space, it does not include environmental damage within its scope.
  - "Damage" is defined in the Liability Convention as: "loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations".
- "None of the five major space treaties deals with the protection of either the space environment or the Earth's environment in a satisfactory fashion. Any provision(s) dealing with the protection of the environment appears to be only incidental". International space law is preventive and not redemptive of environmental damage

General International Law and Space Debris

- **Conventional law**: In addition to the 5 dedicated space treaties, there are two other treaties that address environmental concerns in space including the space debris problem:
  - The 1963 Partial Test Ban Treaty
  - The 1977 Environmental Modification Convention
- The Environmental Modification Convention prohibits States Parties from engaging in *military or any other hostile use* of environmental modification techniques having *widespread, long-lasting or severe effects* as the means of causing destruction, damage or injury to any other State Party.
- Article II of the Convention defines "environmental modification techniques" as: "changing – through the deliberate manipulation of natural processes – the dynamics, composition or structure of the earth, including its biota, lithosphere, hydro-sphere, and atmosphere, *or of outer space*".
- Deliberate abandonment of radioactive space objects or debris in outer space may amount to environmental modification of the environment of outer space, and this may be in breach of the provisions of the convention if harm is thereby caused to another State.

General International Law and Space Debris

- **International Custom**: Are there any customary rights and obligations flowing from the declaration in Art I(1) of the OST that the "exploration and use of outer space … shall be the *province of mankind*"?
  - Does the "province of mankind" have a particular meaning in international law supported by state practice and the requisite *opinio juris*? Does it impose an obligation upon states to prevent or refrain from causing harm to the space environment?
  - Given that the OST was concluded and adopted in a geopolitical climate that was entirely different from what pertains today, is the concept amenable to a different interpretation today?
  - What does "mankind" mean? Does it include the concepts of sustainable development and intergenerational equity? Are we obliged to leave outer space in a substantially unimpaired condition for the enjoyment and benefit of future generations?

General International Law and Space Debris

- ***Jus cogens***: Is the "province of mankind" concept indicative of the existence of a peremptory norm of international law that prohibits the pollution of the space environment with space debris and/or radioactive materials or, alternatively, mandates the conservation of the space environment?
  - The notion of *jus cogens* is supported by the view that the satisfaction of the higher interest of the entire community – mankind – should prevail over often contradictory national preferences.
  - If such a peremptory norm does exist, could it form the basis for an *actio popularis* claim by a State against another State for environmental damage caused in outer space (recall that the definition of damage in the Liability Convention excludes environmental damage in space)?

General International Law and Space Debris

Article 48 of the Draft Articles on Responsibility of States for internationally wrongful acts: Invocation of responsibility by a State other than an injured State

1. Any State other than an injured State is entitled to invoke the responsibility of another State in accordance with paragraph 2 if:
   (a) The obligation breached is owed to a group of States including that State, and is established for the protection of a collective interest of the group; or
   (b) The obligation breached is owed to the international community as a whole.

2. Any State entitled to invoke responsibility under paragraph 1 may claim from the responsible State:
   (a) Cessation of the internationally wrongful act, and assurances and guarantees of non-repetition in accordance with article 30; and
   (b) Performance of the obligation of reparation in accordance with the preceding articles, in the interest of the injured State or of the beneficiaries of the obligation breached.

3. The requirements for the invocation of responsibility by an injured State under articles 43, 44 and 45 apply to an invocation of responsibility by a State entitled to do so under paragraph 1.

Soft Law Instruments

- UNCOPUOS has been unable to garner international consensus for the adoption of any new space law treaties since the adoption of the Moon Agreement in 1979.
- Several soft law instruments have emerged to fill the lacuna created by the lack of new treaties (hard law), particularly in connection with space debris mitigation and space environmental preservation.
- Although, strictly speaking, these "soft law" instruments are voluntary and non-binding, they cannot and must not be completely ignored especially given the high levels of State compliance with them.

Soft Law Instruments

- Relevant Soft Law instruments include the following:
  - *Principles Relevant to the Use of Nuclear Power Sources in Outer Space* – UNGA Resolution 47/68 of 14 December 1992 (NPS Principles)
  - *IADC Space Debris Mitigation Guidelines* – Originally adopted in 2002, revised in 2007
  - *UNCOPUOS Space Debris Mitigation Guidelines* – UNGA Resolution 62/217 of 22 December 2007
  - *COSPAR Planetary Protection Policy*
  - *EU Code of Conduct for Outer Space Activities* – published in 2008, revised draft released in September 2010.
- It is significant to note that most of the debris mitigation and planetary protection principles, guidelines and codes of conduct that have been captured within the soft law instruments have all emerged from the voluntary "best practices" of the global space industry.

The Way Forward

- In an ideal world, the best way forward is for the international community to elaborate upon the provisions of Art. IX of the Outer Space Treaty in a new *Convention on Space Environmental Protection*.
- A fundamental principle that must be observed in this connection is that the environmental regulation of space activity must build upon the strengths and avoid the weaknesses of previous Earth environmental regulation.
- A major strength of Earth environmental regulation lies in the use of framework conventions and protocols in the regime building effort. Framework conventions set down the fundamental principles and protocols subsequently prescribe more precise legal norms.

The Way Forward

- To kick-start the process, UNCOPUOS and UNOOSA may consider convening a global conference on the space environment sometime in the near future (drawing parallels from the UN Conference on the Human Environment held in Stockholm in 1972 and the UN Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992).
- Drawing upon principles such as the common interest and the province of all mankind, the object of such a conference would be to mobilize international cooperation towards the adoption of a Space Environmental Framework Convention.
- Subsequent protocols could then address specific space environmental concerns such as space debris as well as radioactive biological/chemical contamination with precise rules based upon the existing soft law instruments.

The Way Forward

- In the meantime, since we do not live in an ideal world, what we can do is to encourage States and private sector space actors to improve upon their compliance with the various treaty provisions and soft law instruments.
- States that are not party to the existing space treaties should be encouraged to become parties. The recent efforts of UNCOPUOS and UNOOSA in this direction are to be commended. However, a more proactive role would be instrumental in re-igniting international cooperation.

Thank you for not asking questions!!

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