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The Earth's Need for a Space Ombudsman

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I. INTRODUCTION

Mankind has always been fascinated with the space. Space flight began with superpower prestige and the race to put a man on the moon. U.S.S.R became the first nation to send man into space and thus provoked the concept of Space Law. Consequently, the race for space exploration kicked-off. There have been a number of advancements in space exploration since then. From multi-fold categories of satellites, to International Space Station and from establishing foot on the moon, to anticipating the approaching threats from the outer space, humans have achieved a tremendous success all the way.

With many countries proficient enough to carry out the space exploration, the need for enactment of universal Space Law was felt. In the absence of prominent case laws, the current Space Law is endorsed by various treaties and conventions only. First key treaty was Outer Space Treaty, which is the Magna Carta of Space Law came into force in 1967. As we go from bi polar world to multi polar world, many treaties came in way but the main purpose was the 'peaceful utilization of space and space resources' for the welfare of mankind.

This legacy of over 50 years of space flight has brought us impressive technical and scientific developments and achievements — but it has also led to the growing population of space junk. There is an internationally recognised need to deal with the issue; a need which strengthens after each incident. As Donald Kessler, retired head of NASA's orbital debris programme, stated:

"The longer you wait to do this the more expensive it's going to be. Given the economy, we'll probably end up putting it off, but that's really not very wise. This scenario of increasing space debris will play out even if we don't put anything else in orbit."[2]

Even if we do not launch anything else into orbit, the 'Kessler Effect' remains a risk that may render space activities unfeasible for several decades.

II. THE PROBLEM OF SPACE DEBRIS

"Space Debris" is one of the biggest problems that we are facing today and that can affect both

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[2]Tim Robinson, "Space Debris: The Legal Issues", Aero society ,(2014), available at: https://www.aerosociety.com/news/space-debris-the-legal-issues/.

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extra-terrestrial and terrestrial environment. The major treaties which are dealing with space law along with the provisions of environment safety are: Outer Space treaty, 1967 and Moon Treaty, 1979. Further there are more treaties which more or less deals with such issue: The Environment Modification Convention 1977, Space Liability Convention 1972, The Rescue Agreement 1968 and The Space Registration Convention 1975.

Many problems were solved since man-made objects were launched in space but a hazardous threat is also increasing to the environment due to principles of some countries, which are responsible for the Space Debris in outer space, which is posing threat to entire future space exploration and launching programs. With the increasing number of space activities, the claims for the damage control have also grown. The size of Space Debris and the amount of threat pose by them are contrary. Even at present it is unfortunately, impossible to track and to keep record of all the data of Space Debris due to its size.

III. DEFINITION

No treaty deals with the universal definition of Space Debris. The word 'Debris' is derived from French word 'Debriser' which means to break down[3].

Carl Q. Christol suggests that, "Debris is something that possesses tangible, physical characteristics, of the kind that can be seen, touched, weighed and processed in the factories or analysed in the laboratories. He suggests further that as a physical substance, 'debris' may consist of a space objects, including its component parts, or it may be composed of those fragments that are located in space or which endure the tests of the atmosphere and ultimately come to rest on the surface of the earth.[4]"

According to the Report of Second U.N. Conference on Exploration and Peaceful Uses of Outer Space 1982, space debris consists of dead satellites, spent rocket motors, nuts and bolts etc.

"Space debris" is:[5]

- A space object as defined by Article I(d) of the Liability Convention and Article I(b) of the Registration Convention;
- That no longer performs its original function or has no tangible function;

[3]Definition of Debris, available at: https://www.dictionary.com/browse/debris.
[4] Carl Q. Christol, "Protection of Space from Environmental Harms", Annals of Air and Space Law, vol IV (1979), p. 434
[5]Michael Listner, "Legal Issues Surrounding Space Debris Remediation", The Space review (2012), available at: http://www.thespacereview.com/article/2130/1

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- That either re-enters the atmosphere, remains in Earth orbit, in outer space or on the Moon or another celestial body,
- Is either created intentionally or through the actions or inactions of a launching state;
- May have economic value to a launching state;
- May have historical value to a launching state;
- And/or may have continued national security value to a launching state.

IV. THE SCENARIO

Currently there are millions of fragments orbiting around the earth. Greater part of these is result from the activities of very few countries, majorly China, U.S, Russia etc. Currently, the U.S Space Surveillance Network is tracking over 13,000 human-made objects larger than 10 cm in diameter orbiting the Earth.[6] In addition, there are over 100,000 objects measuring between one and ten cm in diameter and millions smaller than one cm.[7] It is estimated that 40 % of the tracked debris is the result of breakups of rockets and space craft bodies.[8]

V. TYPES OF DEBRIS

Mainly there are two kinds of Debris:

- Natural Debris consists of natural bodies revolving around the sun, like, meteors and asteroids.
- Artificial Debris consists of man-made objects (usually non-functional) which revolves around the Earth. (Therefore, it is most commonly referred as Orbital Debris)

VI. LEGAL FRAMEWORK ON SPACE DEBRIS

(A) Outer Space Treaty, 1967

The 1967 Outer Space Treaty concerns principles governing the activities of the state in the exploration and the use of Outer Space, including the moon and other celestial objects. The Outer Space Treaty is the most widely accepted treaty which regulates and supervises the national activities to confine to scientific development,[9] peaceful utilization of the space[10]and

[6] Stefan Lovgren, "Space Junk Cleanup Needed, NASA Experts Warn", National Geographic News, January 19, 2006, available at: http://news.nationalgeographic.com/news/2006/01/0119_060119_space_junk.htm.
[7] Brad Thomas, "STS 121," "Space Center Roundup, Lyndon B. Johnson Space Center," (April 2006), available at: http://www.jsc.nasa.gov/roundup/online/2006/0406_p8_11.pdf .
[8] Supra Note 4.
[9]Article I of the Outer Space Treaty, 1967.
[10]Article IV of the Outer Space Treaty, 1967.

liability in case of damage.[11]The Treaty mandates the state parties to be guided by principles of cooperation and mutual assistance so as to avoid harmful contamination and reduce the adverse impact on the environment by undertaking such appropriate measures.[12]

(B) The 1968 Rescue Agreement, 1968

The Treaty calls for rendering all possible assistance to astronauts in the event of exigencies as well as the return of objects launched in Outer Space. The Agreement gives a detailed resolution under Article 5, to the contracting parties with regard to discovery, retrieval and disposal of material which is either hazardous or deleterious in nature in order to eliminate all potential threat or danger to the Human environment.

(C) Convention on International Liability for Damage caused by Space objects, 1972

The Liability for Damage Convention, 1972 provides succour and strength to the Outer Space Treaty, 1972 by imposing liability on the 'launching state'[13] for damage caused by space objects and provide for fair and equitable compensation to victims of such damage. The Convention imposes liability both jointly as well as severally, in case of joint operation and details the methodology involved in claiming such compensation.

(D) Convention on Registration of Objects launched into Outer Space, 1974

The United Nations designed the Convention with the purpose of bringing in accountability and international responsibility into the activities of the launching states. The Convention lays down procedures for damages caused by launching states by making provision for national registration of the objects launched into space.[14]The Convention imposes a liability on the countries that have been alleged to have caused third party damage and also provides for seeking compensation from the violating party.

(E) Agreement Governing the Activities of the States on Moon and other Celestial Bodies, 1979

Recent trends in the scientific community have witnessed a sudden surge of activities in the lower orbit of the earth which led to the enactment of the Moon Treaty. The Moon Treaty casts an impending duty on the state parties to take measures to prevent the disruption of the existing balance in the environment through contamination.

[11]Article VII of the Outer Space Treaty, 1967.
[12]Article IX of the Outer Space Treaty, 1967.
[13]Article V of the Liability Convention, 1972.
[14] Article II-V of Registration Convention,1974.

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(F) Inter- Agency Space Debris Coordination Committee (IADC)

The Inter- Agency Space debris coordination committee is an international governmental forum for worldwide coordination of activities related to issues of man-made and natural debris in space. IADC exchanges information on research activities undertaken by various nations and also to provide for opportunities to conduct research on space debris and undertake mitigation measures through mutual cooperation. The steering Committee comprises of four specific groups.

VII. NATIONAL AND REGIONAL POLICIES ON ORBITAL DEBRIS

National laws or policies on orbital debris may potentially affect not only domestic space activities but also any international rule-making on the debris issue:

- In the United States, the policy issued in 1988 by President Reagan states that "all space sectors will seek to minimize the creation of space debris…consistent with mission requirements and cost effectiveness." Another U.S. initiative is NASA's "Space Debris Handbook," which may become an important technical reference for space debris reduction measures.

- The Russian Federation also has a policy on debris, alluded to in Section I, Article 4, Paragraph 2 of its Law on Space: "For the purpose of ensuring strategic and ecological safety in the Russian Federation, the following are forbidden: …harmful pollution of space, leading to unfavourable environmental changes, including intentional destruction of space objects in space."

- ESA has had specific requirements to prevent the creation of new debris since 1988. In 1989 ESA's Council passed a resolution defining the agency's objectives in the field of space debris. ESA's policy is "…to reduce to the maximum possible extent the production of space debris and to promote exchange of information and cooperation with other space operators…"

- India adheres to the 1967 Outer Space Treaty (OST), 1968 Rescue Agreement, 1972 Liability Convention and 1974 Registration Convention. Also, India is a signatory to the 1979 Moon Agreement. India is a member of the Inter-Agency Space Debris Coordination Committee (IADC) and adheres to the Debris Mitigation Guidelines of 2008. Also, India is constructively debating the European Union (EU)-sponsored proposal for creating an International Code of Conduct (ICoC) as an interim measure until a legally binding space treaty mechanism is formulated.

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VIII. LIABILITY FOR DAMAGE CAUSED BY SPACE DEBRIS

Article VI[15] describes, the "International Responsibility" for the activities conducted by the countries (govt. agencies or private) in outer space and for ensuring that such activities are obedient with Outer Space Treaty.

Further Article VII[16] elaborates : Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the Moon and other celestial bodies, and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space, including the Moon and other celestial bodies

Article VIII[17] states:

"A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object […] or on a celestial body. Ownership of objects launched into outer space, [….] and of their component parts, is not affected by their presence in outer space or on a celestial body or by their return to the Earth…"

Article VII of 'Convention on International Liability for Damage Caused by Space Objects' states: The provisions of this Convention shall not apply to damage caused by a space object of a launching State to:

(a) Nationals of that launching State;

(b) Foreign nationals during such time as they are participating in the operation of that space object from the time of its launching or at any stage thereafter until its descent or during such time as they are in the immediate vicinity of a planned launching or recovery area as the result of an invitation by that launching State.

IX. SPACE DEBRIS MITIGATION AND REMOVAL

There are basically two main ways to remove the space debris:

- Mitigation
- Active Removal

Mitigation means reducing the further creation of space debris while Removal may be by a

[15] Article VI of Outer Space Treaty, 1967.
[16] Article VII of Outer Space Treaty, 1967.
[17] Article VIII of Outer Space Treaty, 1967.

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human made scheme. For this it is important to understand the Tracking of Space Debris and Sources of Space Debris.

Tracking

Tracking of Space Debris is very important to have a rough overview of the situation of the problem. Tracking includes extreme calculations by sophisticated machines. It can further help us in avoiding major collisions in future. In the present time, there are some sensors put up for tracking space objects. The United States Space Surveillance Network, track, identify, and catalogue all manmade objects orbiting the earth. It has a Radar Sensor system, Optical Sensor system, Air Force Space Surveillance system and works with Joint Space Operation Center (JSpOC).

Mitigation

In Resolution 62/217, "International cooperation in the peaceful uses of outer space",the General Assembly endorses the Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space and agrees that the voluntary guidelines for the mitigation of space debris reflect the existing practices as developed by a number of national and international organizations, and invites Member States to implement those guidelines through relevant national mechanisms.[18]

UN-Space Debris Mitigation Guidelines:[19]

- Limit debris release during nominal operations
- Minimize break-up potential during operations
- Limit accidental in-orbit collision probability
- Avoid intentional destruction & harmful activities
- Limit the probability of post-mission break-up
- Limit the long-term presence of spacecraft and launcher orbital stages in the LEO protected region re-entry objects resulting from this recommendation must not pose an undue risk to the ground population
- Limit the long-term interference of spacecraft and launcher orbital stages with the GEO protected region.

[18]COPUS Space Debris Mitigation Guidelines, available at: http://www.unoosa.org/pdf/bst/COPUOS_SPACE_DEBRIS_MITIGATION_GUIDELINES.pdf.
[19]UNGA Res. 62/217 of 21 December, 2007.

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Active Removal of Space Debris

Under this method the space debris is planned to be removed by the human made machines (spacecrafts).Many private companies even have entered into the contract with various space agencies to help in removing Space Debris. Only Mitigation Guidelines are not enough as there is urgent need to protect the outer space environment form space debris for further research and to ensure sustainability of these activities in future also.

The following are some of the essential prerequisites for the conduct of active debris removal and on-orbit satellite servicing: [20]

- A "cost effective" technique;
- A proper legal and policy framework to protect the parties involved;
- Available and willing target for removal or customer for servicing;
- Someone to pay;
- Capability to locate, approach, connect deorbit/servicing device, control orientation and to move thetarget object to desired destination; and
- Safety of the public on ground, at sea and traveling by air.

There are some other ways to get rid of Space Junk like:[21]

- Auto Detector Debris Satellites, which can auto-detect the space junk and either destroys it or take it back on Earth.
- Supersonic Laser, which can be use by placing it on Earth only, but it, will burn the space trash. These lasers have been put up in Australia.
- Artificial Robots, which can go to space and there only work will be to destroy orbital debris.
- Space Magnet, which can attract small pieces of debris and throw it out from Earth's orbit.
- Space Bombs, which can burn the space junk, without harming any other satellites.
- Self De-Orbiting Mechanism, which can allow satellite to automatically go out of Earth's orbit, after it is of no use.

[20]Dr. Ram Jakhu, Active Debris Removal - An Essential Mechanism for Ensuring the Safety and Sustainability of Outer Space,available at: http://ploughshares.ca/wp-content/uploads/2013/02/Jakhu.pdf, p. 8.
[21]Tyler Falk, 7 Ideas for solving the space junk problem, available at: http://www.zdnet.com/article/ideas-for-solving-the-space-junk-issue.

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X. LEGAL PROBLEM

The *Outer Space Treaty,* provisions are too generic to deal with the complex problems of space debris with any certainty. Despite efforts over decades to define the concept of 'space debris', no internationally agreed definition exists.

It offers minimal guidance as to the mitigation of space debris at State level, with much interpretation left to lawyers. For example, Article IX provides that State Parties to the Outer Space Treaty:

"shall conduct all their activities in outer space… with due regard to the corresponding interests of all other State Parties to the Treaty."[22]

With some stretching and interpretation, this can be used to oblige State Parties to avoid the creation of, reduce, and even remove, space debris to allow all States to participate in the exploration and use of outer space with minimal risk from debris.

Interpretative difficulties are also illustrated in the next sentence of Article IX[23] which explains that the study and exploration of outer space shall be conducted, "so as to avoid their harmful contamination," and that States Parties, "shall adopt appropriate measures for this purpose." The Article does not enlighten us as to what constitutes "harmful contamination'" or what such "appropriate measures" consist of. Space debris is not normally classed as "harmful contamination;" the phrase being usually construed as biological or radioactive contamination.

An international consultation process is also provided for by Article IX[24]. If a State believes that an activity planned by it or its nationals would "cause potentially harmful interference" to the activities of another State, it shall undertake consultations before proceeding. A State Party may also request consultations if it believes that an activity planned by another State would cause it potentially harmful interference. But it is difficult to describe the existence or creation of space debris as a future "planned" activity. The provisions also do not address the issue of current or completed activities or the problem of current space debris.

Article VIII[25], states that non-functional satellites still belongs to its launching States, which further means without the consent of that State, no other country can interfere with it.

And it is equally possibility of accidents during the clean-up of space debris, Article VI[26] states

[22] Article IX of Outer Space Treaty, 1967.
[23] Ibid.
[24] Ibid.
[25] Supra Note 16.
[26] Supra Note 14.

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that the country under whose jurisdiction the satellite falls retains the responsibility of the activity and any accidents during their activities.

XI. CONCLUSION

Law is very precise, but when we come to the concept of Space Law, we lack some precise definitions like Space Objects, Outer Space and Space Debris etc. The U.N Treaties, Agreements, Conventions etc, have given birth to legal aspects of space, termed as 'Space Law'. But in spite of having a defined legal framework, space is not free from problems. One such problem is 'Space Debris'. The traffic in outer space is increasing every year. It is well established fact that anything that goes in space today will turn Space Debris one day. There is urgent need to improve the technology, so that it may reduce the amount of debris formation and also to clean the present orbital debris. The law and legal conventions should be in favour of 'Future Generations' also and shouldn't be only for the present generation. Although, Liability Convention and other Space Treaties, no doubt were made for the best of mankind but analysing the amount of risk, the Space Debris is posing to the future of mankind, it is necessary to solve the existing problems and finding more rational solutions. This problem requires all nations to agree on some universal measures, with international cooperation. All countries must focus on Planning, Drafting and then Developing method.

The sustainable future of human activities in outer space, whether in exploration, communications, observation, broadcasting or navigation, and the growing applications of such activities on Earth, demands it — we all need to avoid the Kessler Effect.

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