

INTERRELATION OF THE REALM OF MARITIME AND THE OUTER SPACE: ADDRESSING DEBRIS AND POLLUTION THROUGH INTERDEPENDENCY OF THE LAWS

ABSTRACT

The two regimes of the outer space, and the international maritime region, have been the most interesting to analyse. They are two extremes, yet the similarities are numerous. The main focus here in this paper is the interesting commonalities that can be identified in the common issues facing these regimes, as well as the application of specialized laws that can be utilized to address and resolve these issues.

These commonalities have been streamlined to focus on the issue of 'pollution'. The orbital or the space debris, as well as the maritime pollution, are grave causes of concern. Upon analysis, taking their intersection further is the effect of one on the other – the space debris in the ocean, increasing the gravity of concern in the maritime region and its increasing pollution.

This paper highlights the interdependence and subsequently the scope they have of resolving the issues with their specialized laws in each other's domains.

The paper also aims to analyse the feasibility and the practicality of an upcoming and a potentially sound solution mechanism that can have far reaching benefits for these domains.

Keywords: Maritime, Pollution, Space, Debris, Salvage

INTRODUCTION

The maritime domain and the outer space have since long been compared to each other, and have built themselves on a set of similarities that exists between them.

The curiosity and the exploration of the unknown has always intrigued the mankind, which over the years has led to the exploration and attempts to define the vast extensions beyond territorial existence. These expeditions inevitably developed to the stage of a need for definite rules and regulations, and laws, to control the regimes in a fair and equal manner.

However the pace of development of human interpretation of the exploration was not the same. Maritime trade and practices are rooted way before in the mankind history than when compared to the outer space expeditions and the involvement of humans in that realm. This had directly affected both, the depth and the speed of evolution of the laws in each of these domains.¹ The availability and the possibility of exploring the high seas and the oceans has been present since long and therefore the pace it could pick for defining rules and laws around it was slow and careful. The outer space was not the same — it developed way too quickly, too fast.² Therefore the need to develop detailed and covering-it-all laws was urgent, so much as that many aspects of this domain are still not concretized enough to be able to ensure applicability of rules and the governance of the same.

This is where the intersecting intersection, and the *commonalities* or the *similarities* between the maritime and the outer space domain can be utilized!

The focus of this paper is addressing the huge concern of the marine pollution caused by the space debris, as well as the remote yet urgent concern of the space debris.

These two sides of consideration will be dealt with in two different chapters. First, the extent of marine pollution and the intrusiveness of the space industry in the maritime domain, lack of liability, all mounting up the need to address the grave concern of the subsequent pollution.

¹ Robin Elizabeth Lewis, *An analysis of the law of the sea and outer space law: claims over the natural resources of the "commons"*, Master's Thesis Paper 539, University of Richmond UR Scholarship Repository (1987).
<https://core.ac.uk/download/pdf/232756197.pdf>.

² Id, at 8.

Second, the interesting counter side of the intersection will be looked into. The issue of space pollution – space debris, orbital debris – needs immediate attention and steps to curb them and resolve the issue. This is where understanding of the maritime law, its principles, and their applicability will come into the picture. The paper analyses the relevant maritime laws and their applicability, post the analysis of the situation and the issue at hand. Adoption of doctrines and principles derived from maritime law have a great potential of establishing a solution mechanism for dealing with the issue of space and orbital debris related pollution. The same is aimed to be analyzed in the paper.

The intersection of the outer space and the related activities, and the impact they have on the marine environment along with the effect of the well-established over-the-years capability of the maritime laws and its potential of resolving issues in the outer space domain are the main objectives aimed to be covered through this paper.

Analyzing the two sides of an intersecting plane of two opposite domains.

OUTER SPACE WASTE AND THE IMPACT ON MARITIME ENVIRONMENT

In the process of satisfying the curiosity regarding the outer space, the adverse effect or the cost of it all is majorly evident on the *environment*. Leading the orbit of the Earth to become a *landfill* is but obvious a point of concern. The main problem is that the orbital and the space debris is not restricted to the outer space domain, it has infiltrated the Earth's atmosphere and has indicated the long term effect of this in the form of extensive marine pollution.

Most of the satellites, subsequent space debris are present in the Low Earth Orbit ("LEO").³ Some of these fall back into the Earth causing marine pollution. It is a fact that these "*fallouts*" are perfectly scientifically planned – and being aware of this issue, these fallouts are *planned* to be accumulated or be crashed at one point/place. This is all done to minimize the extent of damage and pollution as much as possible. The "*Nemo Point*" is the *point of inaccessibility* and the chosen point of space debris accumulation.⁴ Interestingly enough it is also referred to as the "*Spacecraft Cemetery*"!⁵

Since the space activities and such resultant problems are comparatively very recent, ignorance or negligence with respect to the waste disposal would not have been appreciated. The planning of Nemo point is thus based on a lot of strategized planning. First and foremost, it is the point furthest away from human reach or activity. The point is so deep and far in the ocean, it is also known for scarcity of life at this region. *Why?* Well the ocean currents don't pass in this region, making it extremely difficult to survival of any fauna here due to lack of nutrients. The specialists thereby claim that space objects can collide and crash at this place with near to none risk.⁶

The space cemetery has thereby had hundreds of spacecraft and related space debris have been buried here.⁷ This is alarming, as the process is still in continuance and one knows not until when.

³ Louis De Gouyon Matignon, *Marine Pollution Caused By Space Debris*, SPACE LEGAL ISSUES, (Nov 24, 2020, 11:43 pm) <https://www.spacelegalissues.com/marine-pollution-caused-by-space-debris/#:~:text=After%20sixty%20years%20of%20outer,countless%20presence%20of%20space%20debris.&text=Although%20many%20of%20them%20remain,And%20especially%20in%20the%20oceans.>

⁴ Ella Davies, *The place furthest from land is known as Point Nemo*, BBC Earth (Dec 6, 2020, 6:50 pm) <http://www.bbc.com/earth/story/20161004-the-place-furthest-from-land-is-known-as-point-nemo> .

⁵ Louis, *supra* note 3.

⁶ *Id.*

⁷ *Id.*

Therefore addressing this ongoing practice of causing marine pollution is weighed as a responsibility upon the maritime law.

Let us understand a bit more of context. It will be naïve to assume that the specialists are not aware of the long term marine pollution dangers of this activity, yet this practice is continued. Well this practice is still running with a green signal due to two main reasons:⁸

(i) Sustainability of space activities

The space debris or the junk, if allowed to accumulate at the orbit, then the space activities and expedition to be conducted in the future will be dangerously jeopardized.⁹

(ii) Addressing causality and risk of space debris

There is always the concern of junk falling over people's head, property, or casually anywhere on the terrestrial part of the Earth.¹⁰ If the collision and the disposition is pre-planned to be crashed/buried at a remote location while keeping in regard of the fauna and the direct danger to the human population, can provide a healthy alternative to the unpredictable looming danger over everyone's head, literally! So then why not opt for that!

The liability thus arising from any mishaps is again a series of nightmares to be considered.¹¹

Understanding the background, the reasoning, the space cemetery seems like a viable option. However just surface level understanding of the Point Nemo, especially only relating it to the direct impact to humans is unfair. Lack of ocean currents and nutrients may be proof of lack of fauna impacted in the region, however other deep oceanic life and various vulnerable ecosystems have not been cleared of harm beyond doubt.¹²

⁸ Vito De Lucia, Viviana Iavicoli, *From Outer Space to Ocean Depths: The 'Spacecraft Cemetery' and the Protection of the Marine Environment in Areas beyond National Jurisdiction*, Vol. 49, No. 2, California Western International Law Journal 345, 346-389 (2019).

<https://scholarlycommons.law.cwsl.edu/cgi/viewcontent.cgi?article=1551&context=cwilj>

⁹ Id, at 347.

¹⁰ Id.

¹¹ The 1972 Liability Convention envisioned strict liability in cases where falling space objects cause damage on the surface of the Earth or to aircrafts in flight. See G.A. Res. 2777(XXVI), Convention on International Liability for Damage Caused by Space Objects, Art. 2 (1971)

¹² Vito, supra note 8, at 347.

In addition to space crafts and the related space debris, the toxic concerns of chemical and radioactive waste associated with these junk are also to be considered!¹³

Forming the foundation for the need to extend research in the maritime environment aspect of the space debris, relevant legal framework and provisions will be analyzed to check for their utilization in addressing the issue at hand.

Relevant Legal Provisions

European Code of Conduct for the Mitigation of Space Debris - Established in 2004, this code has been signed by the various prominent space agencies across the world.¹⁴ This code deals with methods, designs, and controls of spacecraft to reduce generation of waste. It is mandated to have a space waste manager for each project with the main duty of reducing the damage to the environment during return to the Earth's surface.¹⁵

Outer Space Treaty - Art. III of the OST lays down the provision that activities carried must be in accordance with international law, most definitely including the United Nations Charter. Legal framework regulating space activities must be applied in consistency with the general international laws, and not in isolation.

The Liability Convention also recognizes the interrelation of space laws with general international laws.

The Law of the Sea Convention ("LOSC") provides for a vast range of provisions ensuring protection and preservation of the marine environment. Art. 192 is the groundwork for the general duty established for the states to follow the principle, even beyond their respective national jurisdictions. Interestingly Art. 237 of LOSC also emphasizes on the interdependency, to any extent, of LOSC and other conventions aimed at protecting and preserving the marine environment!¹⁶

¹³ Robert Kelley & Nicholas Johnson, *Evaluating and Addressing Potential Hazards of Fuel Tanks Surviving Atmospheric Reentry*, NAT'L AERONAUTICS AND SPACE ADMIN., 1, (Dec 6, 2020, 8:06 pm).<https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20110008637.pdf> .

¹⁴ Louis, supra note 3.

¹⁵ Id.

¹⁶ Vito, supra note 8.

Most recently, and giving this stance a major authoritative stand is the reaffirmation of this principle in the South China Sea Case by the Arbitral Tribunal.¹⁷

LOSC's Part XII addresses rules and provisions for pollution in the marine environment. It includes "duties to prevent, reduce, or control pollution by dumping and pollution from or through the atmosphere".¹⁸ This is a good indication of interpreting the laws to incorporate and address space debris issues in the ocean.¹⁹

¹⁷ The South China Sea Arbitration (Phil. v. China), Case No. 2013-19, ¶ 941 (Perm. Ct. Arb. 2016), <https://pcacases.com/web/sendAttach/2086>.

¹⁸ Vito, *supra* note 8, at 375.

¹⁹ *Id.*

RESOLVING THE SPACE DEBRIS ISSUE: BANKING ON SALVAGE

Space debris, space junk, extensive orbital pollution; all of these are the aftermath or the cost paid by the environment for the human adventure or curious expeditions and explorations in the realm of the outer space.

As discussed previously, the rapid improvement and development in the field of outer space led to some quick formation of laws, not given enough time to ripen at their own pace. It may be fair to say that certain aspects were not given complete attention, and some more details, enhancing the rules and laws around it can be focused upon now to be able to address the concerning issues.

In developing these additional rules and laws to deal with the reasons of concerns, a well appreciated method could be to adopt principles and doctrines from already existing rules and laws that are well established and are somewhat in coherence with the field in consideration.

In developing the same, in the field of space, the interesting observation of similarity between the orbital environment and the maritime environment should be looked into. Space expeditions are often compared to ship voyages – artificially structured destinations, either a space station or ports. The futuristic vision of space tourism will again bear all resemblance to ship cruises – a ship (or a spaceship), passengers, commercial transactions, cruising through a vast medium, etc. Basically the similarities are very much in alignment and so deriving principles of governance, or way of addressing concerning issues from the ancient practice of maritime and the well-established base of laws can be a win-win for addressing the space debris issue!

With a huge predicament of the rise of space tourism in the near future,²⁰ the scope of harm to the spatial environment is also immense! Art. VIII of the OST allows the State Party, the launched object's registration place, to maintain their own jurisdiction and retain the control of the launched objects. Further, the Articles VI and VII of the OST, and Article IV of the Liability Convention make multiple launching States involved in a space debris intervention jointly and severally liable

²⁰ M. Reichert, *The Future of Space Tourism*, SPACE FUTURE (Dec 7, 2020, 12:57 pm) http://www.spacefuture.com/archive/the_future_of_space_tourism.shtml#:~:text=Therefore%20future%20space%20tourism%20will,can%20be%20reached%20more%20easily.&text=It%20is%20likely%2C%20that%20the.allow%20several%20orbits%20around%20Earth.

for any harm or damage to the persons or property of other States Parties.²¹ These have been inadequate in addressing the waste generated and left in the orbit since such debris is almost always left unclaimed, and the broken down waste materials have the additional problem of determination of ownership of the ship/ spacecraft or any operator, and State Party.²²

This is where the *ace* card, the law of salvage, is required to be introduced.

The law of salvage, a core principle of the International Maritime Laws, provides for any person (*salvor*) to retrieve or recover any other person's (or ship's) ship or cargo at the sea. The salvor is then entitled to compensation and/or reward proportionate to the value of the property *salved*.²³

Without assistance from the salvors, without their acts of salvage, the lost goods or the goods subject at the mercy of the high seas would have been left for destruction. Therefore, it is a rewarding act, highly revered in the maritime community. Some jurisdictions also provide for aircrafts to be *salved*.²⁴

There are contractual performance of acts of salvage also present, however usually or according to the general principle it is a voluntary act, without being subject to any legal obligation or duties to give assistance to those in peril at sea, or to a ship after collusion. In such regards, the rise of the environment salvors and environmental salvage awards are also on the rise.²⁵ This paves way for a very interesting approach of adoption of the same by the organizations dealing in space activities.

²¹ Convention on International Liability for Damage Caused by Space Objects.

<http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introliability-convention.html> (last visited Dec. 7, 2020).

²² NSS Position Paper, *Space Debris Removal, Salvage, and Use: Maritime Lessons*, NATIONAL SPACE SOCIETY, (Dec 4, 2020, 11:47 pm) <https://space.nss.org/wp-content/uploads/NSS-Position-Paper-Space-Debris-Removal-2019.pdf>

²³ Louis De Gouyon Matignon, *The Law of Salvage*, SPACE LEGAL ISSUES, (Nov 25, 2020, 11:45 am) <https://www.spacelegalissues.com/the-law-of-salvage/>.

²⁴ Arnold W. Knauth, *Aviation and Salvage: The Application of Salvage Principles to Aircraft*, vol. 36, no. 2, Columbia Law Review, 224, 224–249 (1936) www.jstor.org/stable/1115382.

²⁵ Andreas, *infra* note 28.

Other Helpful Maritime Conventions

There are two remarkable conventions, maritime internationally-applicable conventions, which entail provisions or the capability to deal with the issue space debris and the pollution, to some extent — The London Convention and MARPOL 1973/1978.

The London Convention provides rules to deal with *dumping*, and related issues.²⁶ It therefore deals with the deliberate disposal of wastes and other matter, from both vessels as well as aircrafts. It actually prohibits dumping of wastes, subject to instructions and lists as part of the Convention.²⁷ These are ideal rules that can be adopted, post modification perhaps meeting special requirements according to the domain, for addressing waste disposal and dumping processes involved in space activities.

When clubbed in a combination with the renowned MARPOL 1973/1978, the ambit of protection that can be provided to the environment, both in maritime and the space domain, will increase drastically.²⁸ *MARPOL deals with the prevention of pollution by oil or chemicals, or by harmful substances in packaged form, sewage, and garbage.*²⁹

Again, these provisions do incite an origin of reasoning to initiate interpretation of laws in order to make them applicable interdependently on both the planes of concern, according to their respective needs.

The National Space Society has come up with a document and a mechanism to try to fill in the gaps of the existing conventions and utilizing the principles to form a detailed solution approach. The future is yet to unfold, though it is a relief to see organizations take accountability and work hard towards a concrete, applicable mechanism for resolving the issue.

²⁶ Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, vol. 1046, United Nations, Treaty Series, p 120 (1972). https://www.gc.noaa.gov/documents/gcil_lp.pdf.

²⁷ Id.

²⁸ NSS, supra note 22, at 6.

²⁹ International Convention on the Prevention of Pollution from Ships, 1973/1978.

<http://documents.worldbank.org/curated/en/860841468330898141/MARPOL-73-78-International-Convention-for-the-Prevention-of-Pollution-from-Ships> (last visited Dec 7, 2020).

CONCLUSION

Discussing the possibilities of interdependency between the domains of the outer space and the maritime region, due to their similarities as analyzed, we arrive at the concluding stage of the paper.

The paper began with the understanding of the realm of both maritime and the outer space, their differences, yet their similarities. This led to the understanding that the relation can be utilized in addressing the issues that both these domain face. Primarily addressing the issue that is caused to one by the other – the issue of pollution, maritime pollution by space debris and junk.

Discussing relevant legislations and analyzing them gives a leeway for interpretation which can aid in creating liability and laying down responsibility in dealing with the waste, more than often toxic, and help serve the interests of the maritime or the marine environment.

The chapter following that is the one addressing the unique flip side of the situation. It highlights the issue of space debris, space junk, and orbital pollution. The matter is pressing, and requires new approaches to combat the same. The National Space Society has attempted, as discussed, a system of ensuring liability and responsibility related to spatial junk. To enforce this, the major principles used for establishing it has been derived from maritime laws – *the law of salvage*.

Let us take a glance at the suggestions, the incorporation of the maritime principles, and the possibility and applicability of an efficient system through this.

Suggestions

The proposed suggestion is creation of Space Salvage Entity (“SSE”).³⁰

The basis of this is the utilization of a legal instrument. An intergovernmental multilateral agreement will establish a Space Salvage Entity. A certain set of responsibilities will be formulated describing their work and duties.

Primary responsibilities, as proposed, may include:³¹

³⁰ NSS, supra note 22, at 7-8.

³¹ Id.

- a) Assuming jurisdiction and control, ownership, and some degree of liability for unclaimed derelict space objects
- b) licensing and contracting commercial entities to deorbit or salvage space debris, whether in orbit or on a planetary surface, for immediate or eventual recycling of materials, or for spacecraft servicing, rehabilitation, refurbishment, enhancement, or repair
- c) Selling salvaged, recycled, or refurbished items at market auctions.

This approach is based on the law of salvage, derived from the maritime laws. It's just made a bit more formalized, and slightly deviated from the strict interpretations. Establishing an entity, a formal entity meant to take care of the concern of the orbital and space pollution, validating itself from the success and efficiency of working from the maritime domain.

A notional agreement, entailing a few points of framework for an ideal multilateral international agreement is provided for by the NSS.³²

A few of the noteworthy considerations are:

- i. SSE shall have the authority to license debris removal operations, approved under the Charter.
- ii. SSE will hold the power to set rewards for removal or salvaging the space debris – working along the lines of inspiration from *salvor's reward* or *salvage reward*.³³ This can apply to the orbital debris, space junk, etc. as per inclusion in the agreement.
- iii. Under the Charter, the SSE should also be allowed to yield the power to reimburse on a market cost basis or cost basis for enabling and accomplishing any removal or salvaging activities in the space, to the national and otherwise space agencies that are a part of the Charter.³⁴

It is a promising approach, also incentivizes governance and due care on behalf of the respective parties, along with active participation in the *cleaning-up* process. It also opens doors to further more such ambitious cross-overs that can enable judicial addressal of concerning issues.

³² NSS, supra note 22, at 10-11.

³³ Andreas Tsavlis, *Salvors call for Environmental Salvage Awards*, INTERNATIONAL SALVAGE UNION (Dec 7, 2020, 10:58 am) <https://www.marine-salvage.com/media-information/articles/>

³⁴ NSS, supra note x, at 10.

Final Remarks

The paper has thoroughly analyzed the aspects in alignment with the objectives and the scope of the paper. A whole new balance and two sided picture of two largely contrasting domains was observed and analyzed. Their interdependence and the capability to aid each other might help in addressing the root concern globally – the climate crisis.

Marine pollution or space pollution, both have the scope of impacting the climate and the sustainability of the planet in dangerous manners. Utilizing legal instruments, laws and conventions can help create liability, responsibility and take a progressive step in attempting to resolve this concern.