

# INTERNATIONAL LAW ON THE ENVIRONMENT OF SPACE: TOWARDS A SUSTAINABLE DEVELOPMENT

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*The technological advantages derived from space exploitation cannot be over-emphasized. it ranges from communication; TV signals, transmission of wireless radio, the use of GPS systems in our cars and listening to weather forecast derived from remote sensing satellite. However, the resources of outer space are finite and the continuous abuse facing the environment of space as a result of human exploration and exploitation is damaging and causing serious degradation. The intention of this paper is to review the International laws relating to the environment of space for their effectiveness and proffer recommendation where necessary in order to sustain the resources of space.*

## INTRODUCTION

The quest of man to be productive has brought out the exploitative nature of man. The developmental effort in all spheres which include manufacturing, processing, industrialization, housing, construction, agriculture, rural and urban growth and development have all brought about environmental changes experienced now. The negative impact has also brought its own problems resulting from lack of concern, control and of course negligence.<sup>1</sup>

It is trite that the typical nature of man include being opportunistic i.e using or tapping from nature's gift without concern with the negative consequences that may occasion where adequate care is not taken to

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<sup>1</sup> Obabori A.O, Ekpu O.O and Ojealoro: An Appraisal of the concept of sustainable Environment under Nigerian Law. See also Convention on Civil liability for Damages Resulting from activities Dangerous to the environment, June 21 1993, Lugano 32, ILM 1228 (1993)

protect such nature for continuous use. It is highly important to keep our environment safe for continuous and future use. This can be done by putting in place policies by which the environment can be rid of degradation. One of the most effective means of protecting the environment is by making laws and putting in place guidelines for the protection of the environment.

It is pertinent to point out that the environment is not limited to the earth, water and air, it includes the Celestial bodies as well (Moon, Sky, Outer Space etc)

This paper intends to focus on one of Man's most important environment/ nature, that is Outer Space; its exploration, exploitation, abuse/degradation and the effectiveness of the regimes available for its protection. How adequate are these laws to safeguard its finite resources and make recommendations.

## THE EXPLORATION AND EXPLOITATION OF OUTER SPACE

Outer space can be described as the near emptiness in which all objects in the universe move. It is not a complete vacuum as it is often thought; it contains a low density of particles like hydrogen, plasma, electromagnetic radiation, magnetic fields and neutrinos<sup>2</sup>

The year 1957 can be said to be ground breaking as it marks the beginning of space age when the first unmanned artificial satellite was launched successfully in Space, ever since, different satellites have been launched on space for different purposes by developed States like the United States of America, United Kingdom, Germany and Russia. Developing countries like Nigeria has also exercised their interest (though not directly) in space exploitation<sup>3</sup>.

Satellite launching has been on the increase since the first attempt especially from the USA, Russia, Japan, Canada, Brazil, Israel, China and of course Nigeria. The functions of these satellites include

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<sup>2</sup> Science Daily: outer Space. [www.sciencedaily.com](http://www.sciencedaily.com) Accessed on 16/03/2014

<sup>3</sup> Nigeria's first satellite was launched into orbit on 27 September, 2003 as an earth observation satellite called the NigeriaSat-1 with a five years life span and then communication Satellite code-named as NIGCOMSAT-1 in 2007 and recently Nigeriasat-2 and Nigeriasat-x in 2011

Communication, Navigation, Weather forecasting, Intelligence gathering and Military reconnaissance. Space based technology have become an essential part of our daily lives as we are able to use GPS systems in our houses and Cars, fly in Aircraft that rely mostly on Satellite navigation, the use of phone: calling, messaging, bluetooth, infrared and Internet are all derived from space based resources.

However, as important as this may sound in human existence, the activities of man in space have brought about environmental abuse. The continuous use of Space for military activities and the dumping of waste/debris<sup>4</sup> which though seldom causes collision on the surface of the earth calls for serious attention now rather than wait till it becomes a usual occurrence.

Space debris has been and still remains a growing threat for the International space community. As a source of pollution, orbiting debris adversely damages the space environment. There is an increasing risk of additional debris being generated by colliding space objects, and such fragments remaining in space permanently together with the use of weapons in outer space. Every space farers, be it State-sponsored, civilians or commercial, are affected by the space debris population. Human lives are endangered as astronauts undertaking extra-vehicular activities or even the paying public enjoying commercial human spaceflights runs the risk of colliding with pieces of debris. The continuing growth of debris in heavily used orbital regions, like Low Earth Orbit (LEO) and Geostationary Earth Orbit (GEO), not merely causes minor or complete abruptions to space operations, but potentially could prevent launches of planned space vehicles; thus, denying future access to and use of Outer space.<sup>5</sup>

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<sup>4</sup> Space debris is defined as all man-made objects in Earth orbit, including their fragments and parts that are non-functional with no reasonable expectation of assuming or resuming their intended functions or all man-made objects including fragments and elements thereof, in Earth orbit or re-entering the atmosphere, that are non functional and which are detrimental to the carrying capacity of the outer space.

<sup>5</sup> Chaddha.S. Space Debris Mitigation. University of Manchester. Social science research Network. Sept 29, 2011  
.http://www.papers.ssrn.com >accessed 17/03/2014

A NASA<sup>6</sup> scientist, Donald Kessler, pointed out that debris from one collision could go on to create more and eventually an entire orbit would be rendered useless for generations. Activities of the astronauts on space like the construction and repairs of damaged satellites, space stations, modules and spacecraft, leaving on the space, waste from such repairs, fragments of paint to entire dead satellite, defunct satellites, discarded rockets and even nuclear rockets cores and bits of old rockets and smashed space equipment orbit along with dropped items which include tools and odd gloves on the space can also result in the damage of spacecraft which eventually result in environmental damage both on the Space and on Earth surface.

Aside from the debris and hazard caused by human activities on Space, Space flight by aircraft most often causes debris to fall on the surface the earth. This could occur from Aircraft crash either when lifting, landing or re-entering the earth atmosphere. Example of such crash occurred in 2003 when a U.S shuttle broke apart over the South Western United State as it re-entered the Earth's atmosphere. The accident occurred about 16 Minutes before the shuttle was due to land, all the seven crew members died. After the disaster NASA halted shuttle flights and appointed an independent Commission to investigate the accident, the investigators collected thousands of pieces of shuttle debris that had fallen into Earth surface after the accident<sup>7</sup>

Just as human activities on Earth surface generate lots of waste/debris, the increasing traffic of satellite in Outer space has created growing amount of debris that are in constant danger of colliding and disrupting the services of Satellites.<sup>8</sup>For example, in 2009, the Soviet Union Communication satellite<sup>9</sup>

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<sup>6</sup> National Aeronautics and Space Administration.

<sup>7</sup> Oberg J. Space exploration. World book online Reference center 2004.  
[www.worldbookonline/web/article?id=ar](http://www.worldbookonline/web/article?id=ar)

<sup>8</sup> Gaziyeve J. Space Debris: Orbiting Debris Threatens Sustainable Use of Outer Space.  
<http://www.oosa.unvienna.org/oosa/en/press-release>>accessed on 01/ 03/ 2014

<sup>9</sup> COSMOS 2251

collided with the United States satellite<sup>10</sup> that created a cloud of nearly 700 pieces of space debris that could threaten orbiting space craft for decades.

The Environment of Space has become more dangerous by old and defunct satellites with other debris that has stayed long in the space, it also result in threatening of astronauts, operating satellites and other space craft. According to a press release<sup>11</sup> a piece of metal space junk, the size of a tennis ball is as lethal as 25 sticks of dynamite. It is sad to think that almost sixty years into what has become known a Space Age, the condition of outer has become dangerous as more than 50 Nations own satellites and Commercial operators even own more.<sup>12</sup> An author, Al Huebner,<sup>13</sup> observed that there are now nearly 1,000 active satellite orbiting the planet, carrying out critical roles in Telecommunications, Navigations, Banking, Science and other Civilian and Military operations and that despite the obvious importance of satellite operations, the space above the Earth has come to resemble what space security expert, Laura Grega calls the Wild West as there are few restrictions on the behavior of the satellites entering the region.

The activities of some technologically advanced countries like U.S and China in increasing space debris is worth mentioning. In 2007, china used an anti-satellite (ASAT) weapon to destroy one of its old Weather Satellite, thereby contributing more than 100,000 pieces of space debris to the already exiting objects/debris threatening Space. A year later, the U.S also used a sea-level missile defense interception to destroy one of its failed satellites.<sup>14</sup>

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<sup>10</sup> Iridium 33

<sup>11</sup> United Nations Information Services.UNIS/OS/388. 1<sup>ST</sup>,OCT, 2009. <http://www.un.org/apps/pressrelease>

>accessed on 17/03/ 2014

<sup>12</sup> Al Huebner. The politics of garbage in outer space.April 2010. <http://towardfreedom.com>

>accessed on 7/ 02/ 2014

<sup>13</sup> ibid

<sup>14</sup> ibid

It is pertinent to state that States parties to International Agreements in respect of Outer Space are allowed to test their weapons in the outer space which could lead to chemical emission and perhaps be of adverse effect to the environment of space.

#### THE INTERNATIONAL LAWS REGULATING THE ENVIRONMENT OF OUTER SPACE.

Different International treaties, Agreements and Conventions are available for space regulation but how far they have gone in curbing space users in destroying the environment of space is the concern of this paper.

The *Treaty Banning Nuclear Weapon Test In The Atmosphere, In Outer Space and Under Water*<sup>15</sup> was the first International Treaty that specifically and expressly involved the legal regulation of Man's Space activities. The Treaty was drafted at the beginning of both Space exploration and nuclear development. The reason behind the making of this Treaty include the fact that it is necessary to keep space free of nuclear force, nuclear pollution, nuclear explosions for both testing and non-testing purposes<sup>16</sup> and the need to stop excessive release of nuclear fall- out into the planet atmosphere. This became more pronounced after the United State successfully tested a hydrogen bomb and thermonuclear device with the power of eight megatons of TNT in early 1950s and when the USSR detonated a 50-megaton nuclear warhead in 1961<sup>17</sup>

The parties to the Treaty are enjoined to prohibit, prevent and not to carry out any nuclear weapon test explosion or any other nuclear explosion. Article 1 of the Treaty provides that:

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<sup>15</sup> Entered into force on 10<sup>th</sup> Oct, 1963. often called "Partial Test Ban Treaty (PTBT), Limited Test Ban Treaty (LTBT) OR Nuclear Test Ban Treaty (NTBT)"

<sup>16</sup> Britton. E. "The corpus juris spatialis" <http://www.suit101.com>>accessed on 17/ 03/ 2014

<sup>17</sup> Ibid

*“Each of the parties to this treaty undertakes to prohibit, to prevent, and not to carry out any nuclear weapon test explosion, or any other nuclear explosion, at place under its jurisdiction or control:*

- a) In the atmosphere; beyond its limits, including outers space; or under water, including territorial waters or high seas; or*
- b) In any other environment if such explosion course radioactive debris to be present outside the territorial limits of the state under whose jurisdiction or control such explosion is conducted. It is understood in this connection that the provisions of this subparagraph are without the prejudice to the conclusion of a treaty resulting in the permanent banning of all nuclear test explosions, including all such explosions underground, the conclusion of which, as the parties have stated in the preamble to this treaty, they seek to achieve”*

Suffice to say that this particular Treaty applies not only to the Outer Space but to atmosphere and under water. In fact, at the proposal stage, the Treaty intended to include banning of nuclear weapon test underground but the Soviet Union would only agree to test ban under Water, Outer Space and Atmosphere but not underground, a position the Western powers had long favored as an alternative to a more comprehensive underground environment ban. The intention to still accommodate banning of nuclear weapon underground is reflected in Article 1 (b).

The other 4 Articles only provide for amendment of the Treaty, ratification, withdrawal and the deposit of the English and Russian text of the Treaty in the Archives of the depositary Government<sup>18</sup>

The Treaty however fails to ban other types of weapon except nuclear weapon with radioactive emission coupled with the provision that suggest that the explosion should not be carried out outside the jurisdiction and control of a State. The provision also failed to provide for sanctions in the event that one of the signatory States contravenes the provision of the Treaty.

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<sup>18</sup> See articles 2, 3, 4 & 5

Another major defect of this provision is that it limits the test ban to a situation where the explosion would cause radioactive debris to be present outside the territorial limit of the State without providing for remedy where the debris found its way into a state.

Also what happens when the debris caused by the explosion is not radioactive in nature but other types of debris which could include parts of the missile or the weapon itself? The only excuse for such lacuna could be an explanation as to the fact that the Treaty was clearly the first step towards a complete preservation of space for peaceful purpose as it was drafted at the beginning of both space exploration and nuclear development.

There is also the *Treaty On Principles Governing The Activities Of States In The Exploration And Use Of Outer Space, Including The Moon And Other Celestial Bodies. 1967*<sup>19</sup> generally referred to as the “Outer Space Treaty” The Treaty was inspired by the prospects opening up before mankind as a result of man’s entry into Outer Space with the realization and belief that the exploration and use of Outer Space should be carried on for the benefit of all people irrespective of the degree of their economic or scientific development thus resulting and contributing to the development of mutual understanding and strengthening of friendly relations between states and people.<sup>20</sup>

The Treaty call upon States to refrain from placing in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction and from installing such weapons on celestial bodies which was adopted unanimously by the United Nations General Assembly on 17 October 1963.

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<sup>19</sup> (the "Outer Space Treaty", adopted by the General Assembly in its Resolution 2222 (Xxi)), opened for signature on 27 January 1967, entered into force on 10 October 1967, 98 ratifications and 27 signatures (as of 1 January 2008) [www.oosa.unvienna.org/oosa/spacelaw/outerspace.html](http://www.oosa.unvienna.org/oosa/spacelaw/outerspace.html)>accessed on 7 July 2010

<sup>20</sup> See the preamble to the “Outer Space Treaty”

The provision of Article IV is one of the very important provisions of the Treaty as it deals with the prohibition of weapons on the outer space. The provision says that:

*States Parties to the Treaty undertake not to place in around the earth any objects carrying nuclear weapons or any other kind of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner.*

*The Moon and other Celestial Bodies shall be used by all States Parties to the Treaty exclusively for peaceful purpose. The establishment of Military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for the peaceful exploration of the moon and other celestial bodies shall also not be prohibited.*

Without doubt, this provision is a development on the 1963 Partial Test Ban Treaty.<sup>21</sup> The issue now is the adequacy of the provision despite the development, for the purpose of environmental protection. While the 1963 Treaty prohibits nuclear weapon testing alone, Article 4 places emphasis on the prohibition of placing of objects carrying nuclear weapons or any kind of weapons of mass destruction on the outer space. Can this be said to mean that where States test nuclear weapon in outer space temporarily or without placing the object used in carrying the weapon on the space, such provision will avail it? Especially since the provision did not state whether the placement prohibited is that of a temporary, permanent or outright placement prohibition. Also what happens where the actual weapon is placed in outer space and not the object used in carrying it to outer space.

According to Malcolm Shaw, there are disagreements as to the meaning of this provision,<sup>22</sup> he went further to say that the article bans only nuclear weapons and weapons of mass destruction from outer

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<sup>21</sup> See Article 1

<sup>22</sup> This issue became particularly controversial in the light of the US strategic Defense Initiative (star wars), which aimed to develop a range of anti-satellite and anti-missile weapons based in space. The UN committee on the peaceful uses of outer space considered the issue, although without the participation of the US, which objected to the matter being considered: see e.g. 21(6) UN Chronicle 1984.p18

space, the Celestial Bodies and from orbit around the earth ,but Article 1 does emphasis that the exploration and use of Outer Space shall be carried out for the benefit and interest of all Countries and it has been argued that this can be interpreted to mean that any military activity in space contravenes the Treaty<sup>23</sup>

This paper disagrees a little with this argument because from the provision, one can deduce that the only military activity allowed by the Article is where the military activity is necessary for the peaceful exploration in the areas which include deployment of military personnel for scientific research and peaceful purposes.

The Treaty also fails to prescribe sanction as to the contravention of this provision. Also, what would be the reaction where a non-State party places nuclear weapons on the Outer Space? This Treaty also fails to define what peaceful purposes is within the context of the Treaty, Does it include the use of nuclear weapon on/from the outer space to rescue people whose Country is plagued with war crimes and genocide as well as the United Nations's right of intervention under the UN charter?

The second paragraph of Article 4 states that it is only the moon and other celestial bodies that must be used exclusively for peaceful purposes which has been interpreted to mean that (a) only aggressive military activity is banned (b) and that all military activity is banned. States Parties to the Treaty are enjoined to pursue studies of outer space, including the moon and other celestial bodies, and conduct exploration of them so as to *avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter* and, where necessary, the state party is to adopt appropriate measures for this purpose and that outer space is to be used for peaceful purposes and the banning of weapons in outer space.

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<sup>23</sup> Shaw. M.N. International Law. Fifth Edition. Cambridge University Press. P482

Countries, especially the technologically developed ones, still have and continue to use weapons in outer space for one reason or the other which adversely affect the preservation of space for human use. A typical example of the use of weapon in outer space occurred on 11 January, 2007, when a Chinese ground-based missile was used to destroy a spacecraft<sup>24</sup> This military success demonstrated China's ability to use weapons to target regions of space that are home to various satellites and space based systems. This military act created debris that is now spreading around the earth.

The United States have also had its share of space weaponization and have expressed the intention to expand its military capabilities and have weapons in space. While this has the advantage of providing additional important defense mechanism to the US, there is concern about the interest of the International community in their use of Outer Space, aside the fact that it could be referred to as the beginning of arms race, if each Country starts deploying space weapons.

Although Countries like China has made effort in pursuing a global ban of outer space weapons. The United State under President Bush, declared that they would seek to dominate space military and prevent a global treaty to ban weapons in outer space<sup>25</sup>

From the foregoing it can be deduced that instead of utilizing the outer space for peaceful purpose and for the benefit of mankind, Countries like US, China and Russia are more interested in the military use of outer-space either for defense purpose, space dominance or to show how powerful they are technologically.

As pointed out earlier, there are other International Agreements in respect of States activities on Outer Space. The two identified here are basically the ones that try to provide on space environment as regards degradation. Also none of these laws have made any provision concerning debris creation on outer

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<sup>24</sup> Fengyun-1C. An aging satellite orbiting more than 500 miles in space since May, 1999

<sup>25</sup> Shah. A. Militarization and Weaponization of Outer Space Author and Page information  
<http://www.globalissues.org/article/69/militarization-and-weaponization-of-outer-space>>accessed on 15/03/

space. The other laws include the *Convention on International Liability for Damaged caused by Space Objects 1972*, *Convention on Registration of objects launched into outer space (1975)*, and the *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space 1968*

A critical weakness in the International law on space is that the existing space law is related to the use of space and not to debris regulation. This means that commercial and government-sponsored space launches can still create more debris without limits.<sup>26</sup>

With increasing growth of space technology and activities, the quality of the space environment is degrading, therefore, preserving and sustaining that environment as a valuable resource for future space users has motivated interested Space bodies to consider mechanisms to control the increase of debris. Such International meetings like the 5th European Conference on Space debris and the United States House of Representatives Committee on Science and Technology's Subcommittee on Space and Aeronautics on 'Keeping the Space Environment Safe for Civil and Commercial Space users have concluded that it is better to have Internationally agreed Space Debris Mitigation Methods for debris reduction and remedial mechanisms in the event of default.<sup>27</sup>

The role of non-profit organization, NGOs or civil society in mitigating space debris is also worth mentioning. Organizations like American Astronautical Society and Committee on Earth Observation Satellites often create awareness on space debris through forums, newsletters, events and publications related to space<sup>28</sup> Another inter-governmental organization dedicated to resolving issues involving space

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<sup>26</sup> Shri U. Determining Liability for Damage Caused Due to Debris in Outer Space: - Portal to a new regime. National Law University Jodhpur India. [www.isro.org](http://www.isro.org) accessed 17/03/2014

<sup>27</sup> Chaddha, S. Space Debris Mitigation. University of Manchester. April 8, 2010.

<sup>28</sup> Senechal T. Space Debris Pollution: A Convention Proposal. [www.pon.harvard.edu/wp.../Art.2-Part-A](http://www.pon.harvard.edu/wp.../Art.2-Part-A) accessed 15/03/2014

debris is the long-standing Committee on the Peaceful Uses of Outer Space established in 1958, COPUOS often create forum for the exchange of Space related information and encourages International cooperation in outer Space activities. COPUOS holds annual meetings on Outer Space issues.<sup>29</sup>

In meeting up with its responsibility on space affairs the UNCOPOUS has put in place measures or seven (7) space debris mitigation guidelines<sup>30</sup>, which was subsequently adopted by its Scientific and Technical Sub-Committee. Member States and International Organization are enjoined to voluntarily take measures through national mechanisms or through their own applicable mechanisms to ensure that the guidelines are implemented to the greatest extent feasible, through space debris mitigation practices and procedures.

Pertinent to point out that these measures are not binding under International Space Law, compliance is therefore not mandatory.

## CONCLUSSION AND RECOMMENDATION

Needless to restate the importance of Outer Space resources in Man existence. It is therefore necessary for States at International level to rethink about the incorporation of provisions on Space debris creation in the existing International Laws on Space or rather a new Agreement that will bear the concern of Space environment i.e outright prevention of space debris creation and sanctions for default of the relevant provision. Therefore this paper recommends the following:

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<sup>29</sup> Robert. B.C. Procedural challenges to environmental regulation of space debris. Space Debris Mitigation and Prevention .Publication: American Business Law Journal Saturday, March 22 2003. <http://www.allbusiness.com/american-busineslaw-journal>>accessed on 7 July 2010

<sup>30</sup> All the guidelines can be sourced directly from United Nations Office for outer space affairs (DOCS). Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space. United Nations, Vienna 2010, Austrai.V.09-88517-Jan2010-1,000.<http://www.iadc-online.org>.<http://orbitaldebris.jsc.nasa.gov/library/space>>accessed on 11/03/2014

1. That there is the need to prevent Space debris formation and minimize its creation as well as to minimize the impact of already formed debris to the human being whether on space or in the Earth surface and in the environment
2. That there should be a Space Debris Convention which should aim at defining a liability and compensation for contravention.
3. A legal regime should be put in place to provide for a dispute settlement mechanism to determine liability for contravention of the Space Debris Regime and all other Space Laws. Aside the International Court of Justice, the dispute mechanism to be put in place should provide for Alternative dispute resolution mechanisms<sup>31</sup> as this allows for easy and transparent processing since the dispute settlement would require the participation of all parties to the dispute.
4. State parties to the Space Debris Convention must be expected to make contribution to funding the liability and dispute settlement mechanism.
5. More importantly. there should be provision for sanctions for the contravention of the provisions of the space regimes

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<sup>31</sup> That Is, Negotiation, Mediation, Conciliation, Arbitration etc

