



Implications of Space Exploitation and Exploration on The Environment by Human Rights

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Abstract

This study aims to require an instrument of international law on the laws of space which is an ecological perspective by including the right to get a good and clean environment for everyone. Then, it will need to be found in the application of international-law instruments that have existed by launcher and private states to engage exploitation and exploration activities in space. This type of study results in normative juridical research that guides current international laws and regulations and other legal materials by studying library materials of legal materials that are relevant to the topic. The results of this study suggest that the destruction of exploitation and space exploration is a structural problem due to the political economic domination, both of developed and private countries and capital. By power and capital superiority, the exploitation and exploration of space are done far away from the perspective of human rights.

Keywords: Human Rights, Enviroment, Exploitation

Introduction

Advances in technology and coupled with the increasingly dialectical development of science have become the destiny of human civilization that lives on earth. In fact, the technology used in space missions is no exception. Of course, the development of technology used in space exploration and exploitation missions is increasingly massive.

The development of technology used in launching missions into space is certainly not something ahistorical. This is evidenced by the fact that the Soviet Union launched Sputnik I on October 4, 1957. Not to be outdone, the United States which incidentally was a competitor to the Soviet Union at that time also did the same thing by launching the EXPLORER 1 satellite in 1958 (Sumardi, 1996) . and the Apollo 11 landing on the Moon on July 20, 1969. Although we agree that space utilization activities were carried out by superpowers that clashed with each other in the cold

war contestation at that time (I Dewa Gede Palguna, 2015) . The success of the Soviet Union and the United States in launching satellites became the starting point for various countries to do the same because they assumed that the use of space would trigger global problems. This is certainly due to advances in science and technology, especially in space flight technology which is very influential on international law.

The historical facts above are like the gateway to human civilization which has entered activities along with technological developments, namely the activity of using space. This is also supported legally by one of the principles of space law, namely the principle of freedom of exploration and use (freedom of exploration and use). Thus, every country regardless of its economic level or level of technological capability can explore and utilize outer space (Pramono, 2011) .

In Article I Space Treaty 1967, it is stated that there shall be freedom of scientific investigation in outer space including the moon and other celestial bodies, and States shall facilitate and encourage international co-operation in such investigation. Simply put, the substance of this article is that every country can freely exploit and explore outer space including the moon and other celestial bodies in terms of investigation and use for peaceful purposes by all without distinction of any kind and based on equality and in accordance with international law and space law (Tronchetti, 2010) .

The affirmation of the international regulations above has sparked developed countries which incidentally have the financial and technological capabilities to utilize outer space. In fact, in practice, the exploitation and exploration of space are carried out not only with the background of war, but also there is a political economy motive behind the tendency of the intended use. For example, related to space commercial activities carried out in the form of telecommunications and information, space transportation, remote sensing, direct broadcasting, mining in space (mining), manufacturing industry, space stations (Ida Bagus Rahmadi Supancana, 2003) .

In this era of increasingly unstoppable globalization, technological developments in exploiting and exploring outer space have triggered structural problems that are truly heart-wrenching. One of the structural problems is the occurrence of uncontrolled environmental damage. Supported by the capital capitalization process, the exploitation and exploration of outer space are not only carried out by the state, but have spread to the private sector which opens space tourism. We can see this with the existence of space flight companies such as Zeff Bezos' Blue Origin, Richard Branson's Virgin Galactic, Elon Musk's Space X, and others.

Various environmental damage can be observed as a result of the use of outer space activities. For example, rampant air pollution, erratic climate change, waste in outer space, the extinction of biodiversity, depletion of the ozone layer, and others. In addition, the activities of exploration and exploitation of outer space also have a

negative impact which is marked by the proliferation of space debris caused by the debris of celestial bodies or the remains of celestial bodies that failed to launch. The occurrence of environmental damage as above phenomena should be something problematic and a scourge of threats to the sustainability of human life on earth. In the concept of human rights, the right to the environment is a right that must be upheld and respected by the international community indiscriminately. The urgency of a healthy living environment is a manifestation of the international community's political will in fulfilling human rights.

Methods

In this paper, the type of normative juridical research is used which is guided by applicable international laws and regulations as well as other legal materials by reviewing library materials in the form of legal materials relevant to the topic under study (Mahmud, 2016). Normative legal research methods are essential in contributing to a deeper understanding of the law and providing a foundation for legal debate and the development of better law. This approach is also used in the formulation of legal policy and guides legal practitioners in solving complex legal problems.

Discussion and Result

Space Exploration and Exploitation Activities as a Structural Problem

The problem of exploitation and space exploration is like a bitter pill for the inhabitants of the earth. Environmental damage that arises as a result of any activity in the use of outer space is a serious threat. Of course, it has become something axiomatic that environmental sustainability is a fixed price for the realization of human survival. But on the other hand, the increasingly dialectical human civilization is actually a pure contradiction of the preservation and protection of the environment. It is undeniable, the development of human civilization, which is supported by advances in science, certainly has an impact on the use of the environment. As a result, environmental damage is something that cannot be avoided.

Previously, space exploration and exploitation activities were carried out under the pretext of developing science for peaceful purposes. However, along with its development, space utilization activities are now transitioning to a more exploitative and explorative pattern in terms of economy. Problems in the field of air and space law actually cannot be seen apart from the motives for controlling the economy and politics of a country. It will appear, for example, that there is an imbalance in our earth given the existence of countries consisting of:

1. Technologically advanced countries in terms of space (*Space Powers*)
2. Developing countries (non-space powers) are geographically different

(egcountries of the equator and not); unequal natural wealth and land; of course then the differences in other respects.

As it is known that the status of outer space, which should be a common heritage of mankind, prohibits anyone, both the States, as well as private parties or other legal entities, to use space for common purposes in the form of exploration and research for commercial purposes. It is undeniable that the exploitation and exploration of outer space are carried out only by developed countries and private parties that certainly have the large financial capital.

If it may be said, that the dominance of developed countries and investors engaged in the exploitation and exploration of space is actually a real description of inequality and injustice. Their dominance in the use of outer space, both for the purpose of developing science, demonstrating superiority in the politics of war, as well as the economy, is certainly a scourge for the international community that in fact lives in third world countries or developing countries and even the international community as a whole.

This is in line with the thesis of Political Scientist and War, Samuel Huntington in his book "Clash of Civilizations" or The Class of Civilization. The starting point of Huntington's thinking itself includes several things, some of which are the growing awareness of civilization, the thickening of the line of difference between western and non-western civilizations and the increasing economic regionalism. In this case, we can see the dominance of capital from developed countries and entrepreneurs with fantastic capital engaged in the use of outer space.

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When the cold war flared up, there was an anomaly in the politically motivated co-optation process and the superiority of the power of developed countries that made use of outer space with the intention of not being peaceful or war. For example, the placement of telecommunication and military satellites and the rampant production of weapons such as ballistic missiles and weapons specifically operating in space. In fact, there is a strong suspicion that of the thousands of satellites launched into earth orbit, almost 50% are used for military purposes, although none of them are formulated to have a military function (I Dewa Gede Palguna, 2015) .

On the other hand, the private sector also with large financial capital invests in the increasingly massive space tourism business. There are several private companies engaged in the space business.

1. Elon Musk's SpaceX, where Falcon 1 became the first liquid-fueled rocket to successfully orbit around Earth. Then, right on February 6 2018, SpaceX also managed to launch the Falcon Heavy which is claimed to be the most powerful rocket in the world.
2. Orbital ATK, founded by David W. Thompson, Bruce Ferguson, and Scott Webster, which focuses on designing and building small and medium-sized rockets for commercial, military, and government purposes. This is because since 1983, this company has a contract with NASA. The production of the Pegasus rocket that they developed can carry a load of about 443 kilograms which is used to orbit small satellites. In fact, this company flies cargo carrying various supplies for the occupants of the ISS and can carry loads up to more than 3 (three) tons using Cygnus, an unmanned rocket in 2013.
3. Blue Origin, which focuses on making rockets, founded by Jeff Bezos. On November 23, 2015, their success in space missions occurred on November 23, 2015 where the launch of the New Shepard rocket became the first rocket to perform a vertical soft landing after flying to an altitude of 100.5 kilometers. In fact, New Shepard is a rocket that has been flown into space 7 (seven) times.
4. Bigelow Aerospace, founded by Robert Bigelow, focuses on building human habitation in outer space.
5. SpaceDev, which is a subsidiary of Sierra Nevada Corp. which focuses on manufacturing and developing rockets that can be used commercially. This company was once listed as a company that developed a spacecraft, Dream Chaser in collaboration with NASA. In fact, this company also received funding from NASA for 20 million US dollars to develop a spacecraft that can carry passengers on February 1, 2010. Finally, Virgin Galactic, founded by Richard Branson, has a mission to facilitate travel to outer space. As a company that focuses on the development of space tourism, on May 1, 2017.

From the description above, a common thread can be drawn that the dominance of developed countries and the private sector with large capital as the culprit in the process of exploitation and exploration of outer space is a real structural problem. This can certainly be seen from the tendency of developed countries to launch telecommunication satellites used in military activities through Direct Broadcasting by Satellite (DBS) and Remote Sensing By Satellite (RSS). Both of these can be used for political purposes that are not desired by the recipient country; broadcasts are propaganda; interfere in the internal affairs of another country containing incitement, slander; can create social tensions; dangerous for the ideology of a nation; especially developing countries (Martono, 1987) . In addition, space technology is also used to sense the natural resources of other countries for the

benefit of the sensing country, third countries, the general public, individuals, or organizations, in which there is no perfect regulation.

From here, we can see how solid the dominance of developed countries and the private sector with large capital in technology, especially space technology, is increasingly unstoppable. Of course, the massive use of outer space is a threat to the life of the international community, especially to the quality of the environment, which is increasingly sad.

Environmental Damage as an Implication of Exploitation and Exploration Activities in Space

The environment is a system in which there is an embodiment of the civilization of a life. Not only humans, but also all living things need a place to stay alive in an increasingly dialectical civilization situation. Of course, living things have a strong relationship with the environment. Relationships are like two hands that clean each other. Human activities in the field of exploitative and exploratory technology on space are a threat to the environment. This argument appears to have concrete reasons. Advances in space technology, the complexity of inter-state interests and growing economic motives have become a tendency for humans to utilize space.

As it is known, human civilization that continues to develop will always be counterproductive to the future of environmental conservation. In terms of the relationship between humans and their environment on earth alone, we are still limping in the scope of the problem. Ecological awareness has not yet touched the minds of the international community. Simply put, we are not finished with the environmental problems that exist on our earth in the midst of the potential threat of environmental damage caused by activities in outer space.

In practice, the exploitation and exploration of outer space are inversely proportional to the expectations of the international community for a decent living environment. This is supported by findings from space-track.org researchers who state that, currently there are more than 12,000 space debris orbiting above the earth and can pose a significant threat to active satellites. Based on Spacetrack's research, it is also stated that there are 3 (three) countries that contribute the most space debris, namely the United States, Russia, and China which incidentally are very broad countries that have access to exploit and explore space.

Facts about the exploitation and exploration of space can be seen from the activities of launching rockets, satellites, spacecraft, and the manufacturing infrastructure on earth. Space utilization activities can cause environmental pollution, depletion of the ozone layer and the occurrence of biological contamination.¹⁵ Crucial problems that arise as a result of these activities occur not only in outer space, but also on the earth's surface. Every rocket or satellite that is launched certainly uses a large amount of propellant or propulsion material that is

used to produce in a chemical reaction, the reaction mass (mass propulsion) is released at a very high speed.

In a propellant, chemicals undergo an exothermic chemical reaction to produce hot gas which then stirs nitrogen to create nitrogen oxides in the Stratosphere layer so that it impacts the atmosphere where ozone acts as a shield against ultraviolet radiation from the sun experiencing depletion. While in the Troposphere, which is closer to the ground, the heat can add to the ozone but is more like a greenhouse gas that retains heat. In addition, there is also solid fuel used in launching rockets and satellites that produce chlorine and bromide which also damage the ozone layer as happened in Antarctica in the form of a hole in the ozone layer. In addition, hydrocarbon fuels such as kerosene and methane produce carbon dioxide, a well-known greenhouse gas and black carbon which absorb heat and warms the earth's temperature.

The result of ozone depletion has fatal consequences in which the phenomenon we know as global warming appears, namely an increase in temperature on the earth's surface, causing the melting of polar ice caps. result in an increase in sea level. In addition, global warming also causes an anomaly called the climate crisis that causes changes in seasons and rainfall in the form of flash floods, excessive snow or long erratic droughts. namely the increase in temperature on the earth's surface, causing the melting of polar ice caps which has an impact on increasing the volume of sea water. In addition, global warming also causes an anomaly called the climate crisis that causes changes in seasons and rainfall in the form of flash floods, excessive snow or long erratic droughts. namely the increase in temperature on the earth's surface, causing the melting of polar ice caps which results in an increase in the volume of sea water. In addition, global warming also causes an anomaly called the climate crisis that causes changes in seasons and rainfall in the form of flash floods, excessive snow or long erratic droughts.

The process of heating fuel for rockets, satellites and spacecraft also causes sulfur dioxide pollutants in the atmosphere, triggering acid rain which triggers hemispheric-scale ecosystem disturbances (Pramudianto, 2019) . which can have serious effects on human health, wildlife and the mass (propulsion mass) that is ejected at very high rates. In a propellant, chemicals undergo an exothermic chemical reaction to produce hot gas which then stirs nitrogen to create nitrogen oxides in the Stratosphere layer so that it impacts the atmosphere where ozone acts as a shield against ultraviolet radiation from the sun experiencing depletion. While in the Troposphere, which is closer to the ground, the heat can add to the ozone but is more like a greenhouse gas that retains heat. In addition, there is also solid fuel used in launching rockets and satellites that produce kypiorin and bromide which also damage the ozone layer as happened in Antarctica in the form of a hole in the ozone layer.

In addition, hydrocarbon fuels such as kerosene and methane produce carbon dioxide, a well-known greenhouse gas. As a result of ozone depletion, it has fatal consequences where the emergence of a phenomenon known as global warming (Global Warming), namely an increase in temperature on the earth's surface, causing the melting of polar ice caps which has an impact on increasing the volume of sea water. In addition, global warming also causes an anomaly called the climate crisis that causes changes in seasons and rainfall in the form of flash floods, excessive snow or long erratic droughts.

The heating process of rocket fuel, satellites and spacecraft also causes sulfur dioxide pollutants in the atmosphere to trigger acid rain which triggers hemispheric-scale ecosystem disturbances that can have serious effects on human health, wildlife and aquatic species (Gumirat et al., 2021). In line with the opinion of environmental chemists from the University of Missouri, Columbia, Manahan (2013) stated that an area exposed to acid rain will experience soil damage, changes in the pH of surface water and groundwater, damage to plant leaves, and accelerate the corrosiveness of metal materials.

In every activity of exploitation and exploration of space, of course there are fatal consequences in outer space that can potentially pose a threat to life on earth. For example, the rise of space debris (Space Debris) caused by the number of satellites, rockets or spacecraft that broke due to explosions or collisions, resulting in hundreds or even thousands of debris in outer space. Space debris certainly has a serious impact on life on earth.

There is an impact caused by space debris (outer space), one of which is the potential risk of lumps of garbage being sucked into the earth if it is located in the lowest orbit. This potential hazard can only occur if the chunks of garbage are large enough and do not burn out in the atmosphere and fall in residential areas, it will cause disasters and of course material losses.

Not only that. With the development of exploitation and exploration activities in outer space, it certainly requires various energy sources in the form of fuel and also materials that will be used in the manufacture of rockets, satellites or spacecraft. This will certainly result in more massive extractive material mining activities that will damage ecosystems on earth. In fact, ecosystems take a very long time up to millions of years to stabilize in supporting human life.

Environmental Damage from Exploitation and Exploration Activities in Outer Space in the Perspective of Human Rights

Human rights are rights that are universally recognized as rights inherent in humans because of the nature and nature of their birth as humans. It is declared 'universal' because these rights are part of the human existence of every person, regardless of skin color, gender, age, ethnicity and culture, religion or spiritual belief.

This right is inherent in the nature of his birth as a human and does not come from the gift of any power organization (Ohoiwutun & Haryanti, 2019) .

The problem of environmental damage as described above is certainly a common structural problem felt by the international community. Environmental damage as it is known is a serious discourse that is developing globally. The impact of damage due to exploitation and exploration of outer space on the environment is certainly very contradictory to the concept of human rights. This is because the study of the environment has an important position in the study of human rights.

In the context of the use of outer space, in fact there have been various agreed international legal instruments which regulate all aspects of the use of outer space. We can observe several legal instruments regarding air and outer space, namely: first, the 1967 Space Treaty which is the foundation of International Space Law in order to anticipate legal problems that arise regarding the use of outer space for commercial purposes. Second, the 1972 Liability Convention as a further explanation of Article VII Space Treaty 1967 which laid the foundation for the basic principles of international responsibility from the launching state to a third country in the event of damage or loss caused by the launch of its celestial bodies.

This can be seen in article IX which confirms that if a country that is going to apply for compensation to the launching country must be responsible because its space vehicle falls within its jurisdiction, if that country does not have diplomatic relations with the launching country, it can apply for compensation through another country. which is also a member of this convention which has diplomatic relations with the launching state, or through the Secretary-General of the United Nations. Third, the 1975 Registration Agreement, which was agreed to address the complexity of problems related to space utilization activities, namely losses that arise to certain parties, both parties that have participated in space activities or those who have not or not at all.

Therefore, it is necessary to have a mechanism for registering objects used in the launch even though the registration process only focuses on the need for identification of celestial bodies for the launching country. Finally, the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, which arose from the concerns of developing countries over inequality in access to moon launch missions. Of course, the various international legal instruments above are made based on principles that rely on the concept of human rights. The principles in terms of the use of space related to the exploitation and exploration of space, among others: (Pramono, 2011)

1. The principle cannot be owned (non-appropriation principle). Space cannot be owned by anyone or any country and in any way, for example by occupation.
2. The principle of freedom of exploration and use which states that every

country regardless of its economic level or level of technological capability can explore and utilize outer space.

3. The principle that general international law applies (applicability of general international law) because space law is one part of international law.
4. The principle of restriction on military activities, namely limiting military activities or minimizing the possibility of things that endanger peace.
5. The legal status of space as "res extra commercium" or "res omnium communis" which states that there is no ownership in space by anyone because space is a common property of the world community.
6. The principle of "common interest" and "common heritage", namely because outer space is in great demand, then space and objects in the sky are the common property of mankind that cannot be claimed or placed under the sovereignty of a particular country.
7. The principle of international cooperation "principle of international cooperation" as an absolute condition of exploration and use of space for peaceful purposes.
8. The principle of responsibility (principle of responsibility and liability). In space activities there must be a responsible and accountable party.

However, what needs to be seen is that both in terms of international legal instruments and the principles of space law, there is no perspective on the urgency of the right to the environment. In fact, environmental issues have a major influence on the development of human rights. This can be seen in the conception of human rights in the fourth generation in which various international communities have criticized the dominance of the state's role in the development process that focuses on economic development without regard to environmental sustainability.

Historically, we can see that international agreements on space law first appeared since 1967 through the Space Treaty, which was 5 (five) years after the 1972 Stockholm declaration. This means that the description of the right to the environment has not emerged as a discourse that is consumed by countries. This has later become a legal problem where in every agenda of exploitation and exploration of outer space it is still far from an ecological perspective. On the other hand, there are inconsistencies from both developed countries and private parties (investors) in complying with international instruments related to space law. Simply put, As is known, the protection of environmental functions has been implicitly stated in human rights instruments.

Meanwhile, the explicit recognition of the right to a healthy environment, apart from being stated in the 1972 Stockholm Declaration, can also be further explored in the Rio Declaration as non-binding principles non-binding. In this case, the right to the environment becomes something that must be protected, fulfilled, and respected.

Environmental damage due to space exploitation and exploration activities can be regarded as a form of serious human rights violations. This is because the impact is very far from the principles of human rights related to the right to the environment. As part of the fundamental rights, both authoritatively and historically, the principle regarding the human right to a good and healthy environment can be referred to the first principle of the 1972 Stockholm Declaration, namely "Human Rights (HAM) must be affirmed, all forms of apartheid and colonialism must be abolished". Here, we can understand that the fulfillment of the right to the environment is automatically a manifestation of the fulfillment of human rights so that any form of activity, especially related to exploitation and outer space exploration, needs to respect, protect and fulfill human rights.

Regarding the exploitation and exploration of outer space, launching countries and private parties engaged in the space tourism business should comply with the principles of environmental rights as contained in the United Nations Subcommission on Human Rights and the Environment.

There are several principles that must be met in terms of the use of outer space, namely: the right of all people to be free from pollution, environmental degradation and activities that can have a negative impact on the environment or threaten life, health, the survival of other living creatures or sustainable development; protection and preservation of air, oil, water, sea ice, flora and fauna and processes, as well as essential areas needed to maintain biological diversity and ecosystems; the highest standards of health that are free from environmental hazards; safety and healthy food, and sufficient water for all soil creatures and living conditions; ensure the environment in a healthy and ecological manner; the house or land is not polluted as a result of decisions or actions that damage the environment, except in an emergency which aims to benefit society as a whole which cannot be done or achieved in any other way; provide assistance at any time in the event of natural or technological and or other events, which cause natural disasters that directly affect humans; benefit equally from the observation and sustainable use of natural (outer space) resources for cultural, ecological, educational, health, survival, recreational, spiritual and other purposes (von Domarus, 1948).

In the aspect of enforcing the right to the environment in every activity of exploitation and exploration of outer space, the launching state and the private sector engaged in this field need to understand every principle of human rights, especially the right to the protection of environmental functions, namely: first, the launching state and the private sector. in carrying out activities using outer space, it is obligated to fully recognize human rights as regulated in international legal instruments concerning the right to the environment; second, respecting human rights by avoiding all activities and steps that threaten or interfere with the full realization of all human rights in the use of outer space; need to actively avoid redressing acts of

discrimination; fourth, prioritize human rights in every agenda in the form of policies and programmatic matters in the exploitation and exploration of outer space; fifth, to ensure that every international community inhabiting the earth fully enjoys their rights, especially the right to a good and clean environment; lastly, protecting human rights in the environmental field with concrete actions in every activity of using outer space.

Conclusion

Environmental damage due to the exploitation and exploration of outer space is a structural problem because there is a motive for the domination of the political economy from developed countries and private parties that have the large capital. With the superiority of power and capital, the process of exploitation and exploration of outer space is carried out which is of course very far from the perspective of human rights. Massive environmental damage can be seen in various anomalous phenomena, for example the occurrence of the climate crisis which has an impact on global warming due to ozone depletion, high acid rain which has a destructive effect on ecosystems on earth, as well as countless space debris.

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