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NEW BOUNDARIES OF THE ENVIRONMENTAL LAW OF UKRAINE

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Abstract. The article shows the necessity of the newest vector of environmental law development, connected with the expansion of its spatial base to the near-Earth outer space. The historical context of the problem is being investigated, beginning with the first UN treaties on outer space. The gradual penetration of certain principles, provisions and requirements for the environmental safety of space activities into the national space and environmental legislation of space faring countries is analyzed. Taking into account foreign experience, the ways of the Ukrainian environmental law development with regard to involve outer space in the sphere of its protection are outlined.

Keywords: environmental law, national legislation, international space law, international environmental law, near-earth outer space, ecological safety of space activities.

1. INTRODUCTION

In the 90 years of the XX-th century, that is, during the formation of the Environmental Law of the independent Ukraine, the domestic ecological legal system was oriented to limitation of its scope of regulation by the Earth's atmosphere. This was understandable and justifiable, since it was precisely within such limits that human activities were extended for that period. Of course, this scope was not limited to a purely "terrestrial" environment, taking into account their penetration into the depths of the Earth, and to the bottom of the World Ocean. However, there was no objective reason, at that time, to look into the space outside of the Earth's atmosphere and to regulate the ecological requirements in this space.

The rapid development of astronautics at the turn of the millennium, the diversification of human activities in outer space, intrusion of humans into the extraterrestrial environment (including – in the deep outer space) have posed many questions on environmental sustainability of human life in outer space. This caused a lot of problems face to the environmental law, both international and national, especially of those countries that already carry out their space activities, or plan to implement it in the near future.

Let's try in this article to analyze the current status of the legal regulation of environmental safety of space activities, its improvement, as well as the main directions of further development of the respective branch of law to meet the needs of environmental safety in outer space.

2. ANALYSIS AND DISCUSSION

2.1. Overview of Environmental Threats to the Near-Earth Space, Requiring Legal Regulation

At the turn of the XX-th and XXI-st centuries, however, there were a large number of environmental threats of space activities that require their legal regulation. Historically first, the pollution and other influence caused by space activities on the Earth's environment and population began to emerge. This was due to the negative environmental effects of the ground space infrastructure operation (space launches, areas of rocket surplus falling, etc.). As these problems fit into the overall context of the environmental impact of economic activities, they fell under the existing environmental legal regulation.

Gradually, however, with the enlargement of space activities, environmental problems that go beyond the traditional boundaries of environmental legal regulation became perceived. These are the ecological legal status of cosmonauts/astronauts and other participants of space missions; the pollution associated with the use of nuclear energy sources in outer space; the problem of contamination of near-Earth space by so-called "space debris" and some other. Let's consider these problems in more detail.

As of March 2018, there are 565 people who performed orbital space flight [2]. Moreover, in addition to professional cosmonauts, at the end of the twentieth century, new actors appeared in space arena – space tourists, that is, persons carrying out space flights or near-Earth space orbit for entertainment or cognitive purposes, financed from their own funds or other private sources. It should be noted that suborbital commercial space flights began before the legal status of these participants in space missions was determined; without guarantees of their safety, including ecological ones. From an environmental point of view, however, is extremely important the definition of sanitary-hygienic and medical factors of life support of astronauts and other participants of space missions, setting threshold values of radiation, weightlessness, noise, lighting, gas composition of the environment, water supply and other factors, affecting the human body aboard spacecraft, space stations and in the open space.

Among the harmful influences on the near-Earth space the use of nuclear power sources (NPS) in outer space is one of the most dangerous. The use of NPS in outer space is a logical result of scientific and technological progress. It is objectively necessary for the successful continuation of the exploration of outer space in the interests of all mankind. But the fuel used in nuclear power sources has extremely dangerous properties that require special precautions. Accidents that can occur with space objects equipped with NPS are of a special nature, the elimination of their consequences is significantly different from the cases of emergency return to the densest layers of the atmosphere of space objects using traditional energy sources [25, p. 3–15].

Another set of environmental threats to outer space is associated with the influence on it of space debris, that is, the remnants of space objects (fragments, splinters, associated and derived elements) that completed their life cycle, used their resources, but remained in outer space, since their return to Earth or destruction after working out of a life cycle proved to be economically ineffective or technically impossible. The most contaminated areas of orbits are the most often used for the operation of spacecraft: near-Earth orbit – up to 2000 km (NEO), a geostationary orbit (GSO), and a solar-synchronous orbit (SSO). According to the UN Office for Outer Space Affairs (UNOOSA), by date for October 2009, only in NEO, there were about 300,000 objects of space debris with a diameter of more than 1 cm [27]. At the same time, only about 6% of the monitored objects are active. The negative effects of space debris on the space environment and the operating space objects are increasing in geometric progression.

New threats to space environment and celestial bodies will most likely be associated with the exploration of their resources, which is already being actively discussed.

2.2. Current Status of the Environmental Issues of Space Activities in the International Space Law

Does the law adequately respond to emergence of threats for the outer space environment? Since

outer space is recognized as the common heritage of mankind, it is logical first of all to look for the answer to this question in International Law.

5 international UN instruments in the domain of space activities make the core of International Space Law. One should not forget that these instruments were created in the so-called “pre-ecological” era (the core of this branch of law was formed in the 60's and 70's of the twentieth century), when the problem of environmental protection of outer space has not yet gained today's acuteness; it was considered secondary, in a certain way “exotic”; such that it did not require the taking of immediate measures and adequate regulation. As a result of this – the lack of systematic regulation at the international level of the environmental issues that may arise during exploration and use of outer space. Neither of the International Space Law instruments is particularly targeted at relationships with respect to environmental safety. Nevertheless, some of their provisions are applicable in environmental relations, although they do not directly regulate them.

Therefore, the inclusion of principle to avoid harmful contamination of the Moon and other celestial bodies as well as the adverse changes in Earth's environment as a result of the delivery of extraterrestrial matter on the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (hereafter – Outer Space Treaty), entered into force on 10 October 1967 (Art. 9) [26, p.6–7], is considered as apogee of prospective international outer space regulation.

We also find separate legal provisions having environmental content in subsequent UN outer space treaties. Thus, the Convention on International Liability for Damage Caused by Space Objects (Liability convention) regulates issues of liability for damage being caused by space objects not only on the surface of the Earth or to aircraft in flight, but elsewhere than on Earth environment, in other words – in outer space or on board of spacecraft [6, p.14–23].

Further regulation of environmental issues relating outer space and other celestial bodies was extended by the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies. In particular, according to para. 1 of the Art. 7 of this Agreement, “in exploring and using the Moon, States Parties shall take measures to prevent the disruption of the existing balance of its environment, whether by introducing adverse changes in that environment, by its harmful contamination through the introduction of extra-environmental matter or otherwise” [1, p. 33].

The search for international space law requirements having ecological “coloration” brings us to the analysis of Article 4 of the Outer Space Treaty where States parties undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, not install such weapons on celestial bodies, or station such weapons in outer space in any other manner [26, p. 4]. This provision, aimed at preventing the militarization of space, at the same time, prevents its pollution, first of all, the most dangerous of its kind – radiation. The radiation pollution of space came to the forefront quarter century after with adoption by the UN General Assembly on December 14, 1992 of the Principles Relevant to the Use of Nuclear Power Sources in Outer Space. [22]. States parties are primarily required to minimize the amount of radioactive materials in outer space, to restrict space missions which cannot be operated by non-nuclear energy sources in a reasonable way. Although the relevant Principles primarily recognize as objects of protection the Earth's population and the biosphere. The space environment is also recognized as protected; however, the safety criteria for this object are not as rigid: The design and use of space objects with nuclear power sources on board shall ensure, with a high degree of confidence, that the hazards, in foreseeable operational or accidental circumstances, are kept below acceptable levels.

As for space debris mitigation, it should be noted that International Space Law even does not refer to the concept of space debris. That does not imply the total legal vacuum in this domain.

Several specific not binding instruments were grafted to resolve the issue:

- the Inter-Agency Space Debris Coordination Committee (IADC) – the IADC Space Debris Mitigation Guidelines [12];
- the Committee on Space Research (COSPAR) – Planetary Protection Policy [7];

– the Committee on the Peaceful Uses of Outer Space – the UN COPUOS Space Debris Mitigation Guidelines [24].

In recent years International Organization for Standardization adopted the set of relevant international standards, including ISO 24113: 2011 (“Space systems – Space Debris Mitigation Requirements”) – Technical Committee ISO / TC 20, Aircraft and Space Vehicles, Subcommittee SC 14, Space Systems and Operations [13].

In 2000 the European Space Agency (ESA) adopted the ESA Resolution for a European Policy on Protection of the Space Environment from Debris Damage Caused by Space Debris; in 2004 the European Code of Conduct for Outer Space Activities (CoC) was approved and in 2014 the ESA Space Debris Mitigation Policy for Agency Projects was adopted.

Finally, when examining the problems of environmental safety of space activities, one can not ignore the concept of the long-term sustainability of this activities, the concept dominant in the consideration of space security issues in UN international organizations (first of all – UN Committee of peaceful use of outer space, but also Conference on Disarmament [5] and some other), starting from 2010. As a result of this, Guidelines for the long-term sustainability of outer space activities have been elaborate on 2017 [11].

All the above instruments belong to the so called “soft” law, as they are not binding, but contain recommendations that guide both states and international organizations in their choice of certain behavior with the purpose to reduce space debris volume. The majority of States use them as indicative materials when they set up their domestic frameworks to limit the space debris amount. At the same time, we should not underestimate the relevant instruments, as their majority point out that implementation of their requirements should take place through formulation of the national instruments or through agreements with the interested states.

2.3. National Space Legislations with Regard to the Environmental Safety of Space Activities

To date, more than 20 countries of the world, including Ukraine, have adopted national space legislation. Although we could not find the legislative definition of the environmental/ecological safety of space activities in the national space laws, the content of this concept is done by the general provisions of these laws, with regard to ensure the space activities safety.

For example, Art. 5. §1 of the Belgian Law On the Activities of Launching, Flight Operation or Guidance of Space Objects, among other provides that the King may determine the conditions for granting authorizations with a view to ensuring the safety of people and property, *protecting the environment, ensuring the optimal use of air space and outer space...* [15].

The Austrian Federal Law on the Authorization of Space Activities and the Establishment of a National Space Registry (Austrian Outer Space Act, adopted by the National Council on 6 December 2011, entered into force on 28 December 2011), determining conditions for authorization of space activities, declares that authorization, among other, shall be issued if the space activity does not cause harmful contamination of outer space or celestial bodies or adverse changes in the environment (§ 4. (1). 5) [3].

In all four laws on space activities, adopted in post-Soviet states, special sections are devoted to the appropriate provisions. This is Section V “Space Safety” (Articles 22–25) of the Federal Law of the Russian Federation of August 20, 1993, No. 5663-I “On Space Activities” ((with following amendments) [9]; Section V “Ensuring the Safety of Space Activities” (Articles 20–25) of the Law of Ukraine of November 15, 1996 No. 502/96-VR (with following amendments) “On Space Activities” [19]; Chapter 5 “Space Safety” (Articles 27–30) of the Law of the Republic of Kazakhstan of January 6, 2012 “On Space Activities” [16]; Chapter VI “Space Safety” (Articles 32–36) of the Law of the Republic of Turkmenistan of November 21, 2015 No. 307-V “On Space Activities” [18].

All these laws, as well as the space laws of other space faring countries, are based on safety relations targeted on humans, environment and property protection on Earth, practically leaving aside the safety of outer space or touching this matter partially and declaratively. Thus, according to the Part 1 of Art. 22 of the RF Law on space activities, such activities should be carried out taking into account

the level of permissible man-made pressures on the environment and *near-Earth space* (highlighted by myself – NM). The laws on space activities of Ukraine, the Republic of Kazakhstan and the Republic of Turkmenistan contain provisions regarding the prohibition of the launch into orbit, the deployment of weapons of mass destruction or testing of such weapons in outer space (Part 1, Article 9 of the relevant Law of Ukraine, Article 30.1 (2) of the Law Republic of Kazakhstan and Article 36.1 (2) of the Law of the Republic of Turkmenistan). In accordance with the relevant laws of Ukraine (Part 1, Article 9) and the Republic of Kazakhstan (Article 30. 1 (4)), in addition, the prohibition of violation of the international norms and standards concerning pollution of outer space is declared. Space legislation of Ukraine also extends prohibitions during exercising space activities to use space technology as a means of influencing the environment for military or other dangerous purposes for humanity and for the use of the Moon and other celestial bodies for military purposes.

Unfortunately, these restrictions and prohibitions, proclaimed by many national laws on space activities, have not yet found their detailed development. On the other hand, many states responded to the not binding guidances of the intergovernmental organizations on space debris mitigation and integrated the requirements related to minimization of debris on orbits into the body of their domestic law on space activities (primarily, it is true with respect to those states that recently adopted their relevant law), or they approved special national standards or other regulations for the purpose of space debris mitigation.

Thus, Belgian Law of 17 September 2005 On the Activities of Launching, Flight Operation or Guidance of Space Objects 2005 requires that, when deciding on the minimization of space debris, the guidelines of international organizations (UN COPUOS, IADC, ITU-R S.1003, as well as the European Code on Space Debris) are to be guided [15].

Austrian Federal Law on the Authorization of Space Activities and the Establishment of a National Space Registry (Austrian Outer Space Act, adopted by the National Council on 6 December 2011, entered into force on 28 December 2011), among conditions for space activities authorization contains the requirements of space debris mitigation: the operator has to make provision for the mitigation of space debris in accordance with the state of the art and in due consideration of the internationally recognized guidelines for the mitigation of space debris. Especially measures limiting debris released during normal operations have to be taken. The law also requires that the European Code for Space Debris Mining and the Standard ISO 24113 be tacked into account when planning appropriate measures [3].

The detailed provisions for the respective issues are in the legislation of Canada. In particular, according to 2017 Licensing of Space Stations Circular, to obtain a license requires a Satellite Removal Plan. There are also requirements for licensees to develop a plan of destruction, where it is necessary to specify which method is used, its reliability; indicative duration of the removal process; the amount of debris that reaches the Earth, the size, the territory of the defeat; calculation of reliability level; names and number of hazardous materials contained in each satellite; the estimate airborne contamination may be caused by a random explosion, an orbital malfunction, a deliberate breakdown, and measures aimed to reducing the impact of space debris [21].

Standards and guidelines for limiting space debris are actively being developed in the United States [28]. Mandatory legal instruments for the minimization of space debris have also been adapted in France, Germany, Italy, Japan, the Netherlands, Nigeria, the United Kingdom, the United States, Russia, as well as in Ukraine [4].

2.4. International and National Environmental Law in the Face of the Threats of Ecological Degradation of Outer Space Due to Anthropogenic Activities

Environmental law, both international and national, until recently, remained practically inert to regulate relationships associated with new area of space activities – outer space, first of all – its near-Earth part. International environmental law, being one of the most rapidly developing branches of international law, does not yet consider the space environment as an object of its scope.

This general rule allows exceptions. In this context, we should first of all recall the Moscow Treaty on the Prohibition of the Use of Nuclear Weapons in the Atmosphere, in Outer Space and Under Water, of August 5, 1963. This Treaty traditionally refers to international environmental law, although the scope of its regulation goes beyond the scope of the international environmental law of the 60-th of the XX-th century.

In a specific way, in the matter of protecting the space environment, acts of “soft” ecologic law can be applied. This is, for instance, Principle 13 of the Rio Declaration, which proclaims that States shall cooperate to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control *to areas beyond their jurisdiction (highlighted by myself – N.M).* [23].

It should be noted that the national environmental laws of many countries takes more account of the space activities features. In this context, it is useful to draw attention to an interesting innovation of the environmental protection legislations of some post-Soviet states. Thus, Laws On the protection of the Environment the Republic of Belarus (Arts. 1, 5) [14], of the Russian Federation (Arts. 1, 4) [8], of the Republic of Tajikistan (Art.1) [17] and, determined in their national laws of environmental protection, near-Earth space as one of the components protected by environmental law, along with its traditional components (land, subsoil, water, air, forests, objects of animals and plants).

As to the environmental legislation of Ukraine, it contains a single special provision for taking into account the environmental consequences of planned space activities. This is the rule of Art. 49 of the Law of Ukraine “On Use of Nuclear Energy and Radiation Safety” of February 8, 1995 (as amended on December 18, 2017), which provides special conditions on terms of spacecraft with nuclear installations and sources of ionizing radiation on board safety. When designing, constructing and operating such devices, their possible accidents must be taken into account, and the radiation exposure to humans and the environment must not exceed the limits established by the provisions, rules and standards of nuclear and radiation safety [20]. A similar article 43 is also in the Federal Law of the Russian Federation “On Use of Atomic Energy” of November 21, 1995 (as amended by the Federal Law of 10 February 1997 with subsequent amendments) [10]. Attention is drawn to the objects of protection against the possible harmful consequences of the use of nuclear sources in spacecraft: these are the humans and Earth environment. Space environment in this context remains out of brackets.

It is sure that the modern development of astronautics needs that the environmental legislation of Ukraine includes outer space as a component of the environment to be protected.

But it is necessary to go further in comparison with the above-mentioned post-Soviet states. It is not enough to proclaim near-Earth space as a component of the environment that needs to be protected by environmental law. It is extremely important to provide special regulation on the matter to implement this general rule. Separate norms and requirements of foreign legislation in this connection can be used. It is also necessary to “weave” this new regulation into the existing environmental law of Ukraine. From the formal legal point of view, it is necessary to take into account the features of the modern period when the concept of the systematization of the environmental legislator is being developed, in particular, the draft of the Environmental Code of Ukraine. In this act, a special chapter devoted to the regulation of the environmental safety of outer space should be allocated.

3. CONCLUSIONS

A feature of environmental law is its linkage to the environment surrounding the human beings. Legal mechanisms of this branch of law aim to ensure the protection of all elements of the environment where humans live and act. Until recently, *conditio sine qua non* was the limitation of this environment by the Earth's biosphere. However, in the past half-century, man's activities has moved beyond the biosphere and began to explore and use outer space increasingly. Every year, an growing number of space objects are launched into outer space, including manned ones. A new kind of travel – space tourism, becomes widespread. At the same time, space objects that have runned out their resources,

remain, completely or partially, in orbit, clogging it. The threat to the space environment is represented by nuclear energy sources used in space, and other factors.

Environmental law, both international and national, to date remains inert to the challenges associated with space activities. Expanding of human activities beyond the Earth's gravity and its spacewalk creates preconditions for expanding the scope of the environmental law regulation into near-Earth space.

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У статті ставиться питання необхідності розвитку нового вектора екологічного права, пов'язаного з розширенням його просторової бази аж до навколосемного космічного простору. Проблематика досліджується в історичному контексті, починаючи з перших договорів ООН щодо космічного простору. Аналізується процес поступового проникнення певних принципів, норм та вимог екологічної безпеки космічної діяльності до національного космічного та екологічного законодавства космічних держав. З врахуванням зарубіжного досвіду окреслюються шляхи подальшого розвитку екологічного права України з метою включення до сфери його охорони навколосемного космічного простору.

Ключові слова: екологічне право, національне законодавство, міжнародне космічне право, міжнародне екологічне право, навколосемний космічний простір, екологічна безпека космічної діяльності.