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CONTEMPORARY CHALLENGES AND THREATS TO NATIONAL SECURITY: ENVIRONMENTAL AND LEGAL ASPECTS

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SUMMARY: The article is devoted to the analysis of environmental and legal problems caused by the war in Ukraine, which should be considered comprehensively, as environmental security issues can easily transform into social threats. The article proves that the pollution caused by the war has a significant negative transboundary impact, in particular, the Russian invasion has not only damaged the environment of Ukraine, but also threatened the achievement of climate goals and even the world's ability to adapt to climate change. The purpose of the study is a comprehensive study and analysis of national and international environmental, humanitarian and criminal law through the prism of modern environmental challenges and threats. In this regard, the methodological basis of the article is a set of general philosophical, general scientific, special scientific and legal methods. The paper also analyzes the impact of modern threats in the field of environmental security on the state of national security, as well as the state of implementation of measures in the field of environmental security. Based on their own conclusions and generalizations, the authors' proposals and recommendations for improving the current national legislation and greening the sectoral components of national policy are presented.

Key words: *environmental safety; civil liability for environmental damage; environmental risks; international legal support of national security; ecological state; environmental policy; environmental and legal conflicts*

INTRODUCTION

Warfare is a factor of large-scale, long-term and complex jeopardies and threats. As a result of hostilities, functioning of all natural life support systems is disrupted, affecting the state of natural resources, as well as the possibility and pace of their reproduction and restoration, etc. Back in 1972, during the Environmental Forum, a joint statement of nongovernmental organizations recognized warfare as 'the greatest threat to hu-

manity and environment.' (Aaronson, 2010) Later, the provision saying that 'warfare inevitably has a devastating impact on the process of sustainable development' was established as the 24th principle of the Declaration of the United Nations Conference on Environment and Development (*Rio de Janeiro Declaration on Environment and Development, 2000*).

Although wars had accompanied humanity throughout its existence, they acquired a particularly negative meaning in the twenty's century, since a threat to the existence of humanity arose owing to the wars, as well as to the consequences associated with them. It must be stated that according to the 16th Annual GlobalPeaceIndex (GPI) Report in 2021, the average level of global

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peacefulness deteriorated by 0.3%, which was the eleventh peacefulness deterioration in the past fourteen years and the lowest indicator in the past fifteen years. As a matter of fact, Russia and Ukraine were recognized as two of the five countries with the greatest deterioration in peacefulness (along with Guinea, Burkina Faso, and Haiti). It should be mentioned that in 2022, Russia took a hundred-sixtieth place out of 163 countries, and Ukraine - a hundred-fifty-third one (*Institute for Economics & Peace, 2022*).

Ukraine has been suffering from ongoing Russian aggression since 2014. Daily hostilities cause damage to its environment and natural resource potential. Whereas the 'conflict in Eastern Ukraine' was recognized as one of the 'biggest threats to international security' in 2018 (*Magazova, 2018*) the new stage of the eight-year war, commenced on February 24, 2022, with a full-scale invasion of the Russian Federation, is a world-class threat. It must be stated that Russia's aggression against Ukraine has caused military expansion on the southern flank of Europe and created an ever-growing security policy as well as a hybrid threat for Eastern and Southeastern Europe, the Azov and Black Sea regions, the Mediterranean, and the Middle East (*Kolisnyk, 2021*).

In Ukraine, the issue of ecological risks for the environment is also becoming of a significant relevance, especially considering a great many of environmentally hazardous objects, which have been damaged since the beginning of hostilities. It should be noted that according to the data of the State Register of Potentially Dangerous Objects, more than 24,000 objects have been registered in Ukraine, including industrial enterprises, main gas, oil, and product pipelines, mines, quarries, hydraulic and technical structures, railway junctions, storing hazardous substances sites, forearthes and industrial waste landfills, etc., (*Official web portal of the State Archival Service of Ukraine..., 2015*) and all these are located on the territory of the country where hostilities are taking place. The latter presents a daily danger to the population and the environment.

Pollution caused by the war also has a significantly negative transboundary impact on the environment of the countries, bordering with ours. It can disrupt the achievement of climate change

mitigation goals or even jeopardize the world's ability to adapt to climate changes, which was stated by United Nations (further - UN) Secretary General Antonio Guterres at the Conference on Climate Changes (*Harvey, 2022*). Thus, instead of an accelerated transition to renewable sources and energy efficiency development, countries are seeking to replace Russian fossil fuels with sources from other countries. For example, at the end of June 2022, in Germany, the share of Russia's natural gas supplies from Russia decreased from 55% to 26%, while the supply of Norway's and the Netherlands' natural gas as an alternative to Russian gas is increasing (*Bundesministerium für Wirtschaft und Klimaschutz, 2022*). In addition, Germany included 16 coal-fired power plants onto the demothballing list (*Wacket & Inverardi, 2022*), whereas India demothballed 20 mines at once, increasing coal production by 33 % (compared to 2021) (*Press Information Bureau Government of India, 2022*). Great Britain (*Davies, 2022*) and France (*Desai, 2022*) also joined the coal energy restoration process.

The latter has postponed its commitment to shut down coal generation in 2022 and is instead planning to commission a large 600- megawatt plant in St. Avold, recently closed. It should be added that the Netherlands, Austria and Germany have lifted all restrictions on coal-fired power plants (the capacity was previously limited to 35 %) (*Koc, 2022*). The given facts indicate that the consequences for the environment may not seem to be a priority problem against the background of human losses, energy and food crises. Scientists also draw attention to this fact, emphasizing that 'the impact on the environment due to the extraordinary humanitarian situation in the Ukrainian-Russian war is not taken into account.' (*Pereira et al., 2022*). The Russian-Ukrainian war subject is mainly considered in the context of financial problems for people and states, refugees, food availability, and less impact on the environment. According to APENA 2 communications expert Ivetta Delicatnaya, the indicative fact is that the environment subject is occasionally mentioned in the news with other main ones.

On the one hand, it confirms that there is the impact of the war on the environment, but on the other hand, it shows the priority of problems and

sometimes not very high interest of the West in the problem mentioned. Mostly, issues, having a direct impact on the lives of citizens, cause the interest, particularly in Ukraine. The top three ones include the following: 'war and nuclear power plants' (31 % of the total mention array), 'pollution due to explosions' (21.7 %), and 'mining and fires' (16 %). Other environmental issues take only a sixth place, which is only 8% of the entire mention array in the information space. It should be noted that the greatest interest in the 'environment and war' sub-issue is observed in France (25.8 %) and Britain (16.8 %) (*Delicatnaya, 2022*). However, the damage caused to the environment has long-term consequences that will remind of a full-scale Russian invasion for decades. It must be stated that due to the declared partial mobilization in the Russian Federation, as well as the threat of using tactical nuclear weapons by the President of Russia (September 21, 2022), the world information field began to cover the subject of the Ukrainian-Russian war in a new light (*EU: Putin's nuclear threats must be taken seriously, 2022, Lillis & Bertrand, 2022*).

Therefore, the issue of 'nuclear war' and 'nuclear security' is becoming of a significant relevance for the whole world against the background of the growing tactical threat level. It must also be stated that active hostilities on the territory of Ukraine cause a risk of disrupting world food markets and provide spreading hunger all over the world. It thus results in emerging an unprecedented humanitarian crisis, which has covered the entire territory of Ukraine, as well as new environmental threats and risks to human life and health, the integrity and sustainability of ecosystems, environmental security, which, in addition, have led to biodiversity destruction, water, air, and soil pollution, etc. In this regard, the participants of the UNECE Convention on Long-Range Transboundary Air Pollution meeting (April 11, 2022) condemned Russia's barbaric actions in the war against Ukraine, accompanied by a humanitarian catastrophe, massive nature destruction as well as environmental pollution (*Official government portal, 2022*).

The above confirms that the aggressor-country's actions violate not only the established national legislation prescriptions, but also inter-

national law norms. Against this background, scientific research of environmental risks and threats to our country's state sovereignty, territorial integrity, and security protectability, also including environmental, food, energy, and other national security components, is becoming of a great relevance.

THE STATUS OF RESEARCH

The theoretical basis of this scientific research is formed by scientific achievements of domestic and foreign scientists in the field of environmental and international law, statistical data, and analytical studies. It should be noted that the issues of environmental risks and threats, as well as the problems of legal provision of environmental safety, have repeatedly been the subject of scientific research. Thus, the scientific and theoretical concepts of forming national environmental policy, ensuring environmental safety, liability for violating environmental legislation, and compensation for environmental damage, etc., have been revealed in the works of such scientists as V. I. Andreitsev (2002), H. I. Baliuk (2015, 2012, 1997), A. P. Hetman (2019), B. P. Karnaukh (2022), R. S. Kirin (2022), M. V. Krasnova (2016, 2008), Yu. A. Krasnova (2018), N. R. Malysheva (2020), M. O. Medvedeva (2015), T. Sadova (2021), M. M. Sirant (2020), M. Weller (2015), O. M. Shumilo (2021) and others.

Scientific works devoted to the analysis of environmental risks or threats, as well as the legal provision of environmental safety in the period of martial law or an armed conflict, should be separately highlighted. It should be added that some of them are specifically related to the war in Ukraine. Thus, the scientific research 'The Russian-Ukrainian War Affects the General Environment' by P. Pereira, F. Basic, I. Bohunovych, and D. Barcelo aims at elucidating the potential impact of this conflict on ecosystems and their services (*Pereira et al., 2022*).

In addition, the work 'War in Ukraine and Significant Damage to Forests in Central Europe: Additional Challenges for Forests and Wood or the Beginning of a New Era?' (*Prins, 2022*) by K. Prince examines the long-term effects of the war

on forest resources, considering climate changes and biodiversity loss. On the contrary, C. Fernandez- Lopez, R. Posada-Baquero and J.-J. Ortega-Calvo in their research 'Nature-based Approaches to Reducing the Environmental Risk of Organic Pollutants Resulting from Military Activities' (*Fernandez-Lopez et al., 2022*) analyze general theoretical concepts of military activity, which potentially release organic pollutants to land, classifying it as infrastructural and basic operations, exercises, and armed conflicts. However, despite the large number of publications on the investigated problem, the mentioned scientists have not fully covered the ways of its solution under the conditions of martial law, considering the ongoing European integration processes.

Thus, the specified problems are believed to require further comprehensive study and understanding in view of their doctrinal importance and significance for practice. The purpose of the research is to comprehensively study and analyze the norms of national and international environmental, humanitarian, and criminal law through the prism of environmental threats and inclusion of an environmental component in international lawsuits, claims of Ukraine against the Russian Federation in order to obtain reparations for restoring ecosystems. The chosen purpose predetermined the formulation and solution of the following tasks:

- to analyze modern challenges and threats to human security, environment and international legal order caused by Russian military aggression;
- to investigate the modern foundations of forming national environmental and legal policy in the aspect of ensuring environmental safety in conditions of martial law;
- to consider the impact of current challenges and threats in the field of environmental security on the state of national security, as well as the state of implementing measures in the field of ensuring environmental security.

Taking the above into account, the methodological basis of the article is a complex of general philosophical, general scientific, special scientific and legal methods, in particular dialectical,

comparative legal, formal legal, formal logical, analysis and synthesis and prognostic methods, etc. The methodological basis of scientific research is the dialectical method of cognition, applying which made it possible to analyze modern challenges and threats to the security of mankind, environment and international legal order caused by Russian military aggression. The current legislation norms, which are the legal basis for ensuring environmental safety, have been analyzed with the formal logical method of cognition.

The method of analysis and synthesis has been used while studying the impact of current threats in the field of environmental security on the state of national security, as well as the state of implementing measures in the field of ensuring environmental security. Based on own conclusions and generalizations, the authors' proposals and recommendations for improving the current national legislation and greening the sectoral national policy components have been provided. The comparative legal method has been used for a comparative analysis of international environmental legal norms on ensuring environmental safety and national environmental legislation. The logical-legal method has been applied to formulate the main conclusions in accordance with the purpose of the research. It should be added that the above- mentioned research methods are based on a comprehensive analysis of the processes and phenomena of social development in the field of ensuring environmental safety. Applying these methods is thus conditioned by the requirements of an objective and comprehensive analysis of the processes, taking place in Ukraine under martial law.

THE PRESENTATION OF THE MAIN INFORMATION

Most Ukrainians are concerned about the consequences of the war in Ukraine for the environment, which is evidenced by the survey results (May 2022), conducted by Kyiv International Institute of Sociology on behalf of the APENA 2 Project with the financial support of the European Union (*Official portal of the Ministry of Environmental Protection and..., 2022*). Among

the critical consequences for our country's environment, Ukrainians distinguish the following:

- possible radiation pollution due to nuclear power plant shellings;
- agricultural land and forest plantation mining;
- hazardous substance emissions from shelling oil depots, gas storage facilities, and chemical industry facilities.

According to analytical data, firstly, 'almost all the respondents have believed that there are certain critical environmental consequences due to a full-scale war' and, secondly, 'according to the respondents, the top critical consequence for Ukraine as a whole or for them personally is radiation pollution due to nuclear power plant shellings' (56 % consider it critical for the country as a whole, whereas 51 % - for them personally). Other critical top consequences include the following: mining agricultural lands and forest plantations (39.5% believe it critical for the country as a whole, whereas 31 % - for them personally), spreading dangerous substances due to oil depot shellings, etc. (36.5 % and 27 % respectively); (*Official portal of the Ministry of...*, 2022). Thus, the key challenges and threats, which are dangerous for humanity and international legal order under martial law, must be further analyzed.

Threats to nuclear and radiation safety

Many various issues in the world can be described as 'important' or 'extremely significant'; however, the problem of nuclear safety is of an existential nature for all mankind and directly affects its biological survival (*Kudryachenko, Potehin, 2019*). Taking the importance of ensuring nuclear security for the modern world into account, this topic is constantly regarded by both scientists and the international community. It should be noted that four global nuclear safety Summits have already taken place (Washington, April, 2010, Seoul, March, 2012, The Hague, March, 2014; Washington, March-April, 2016). An interesting fact is that Russia boycotted the 2016 Washington Summit (*The White House explained Russia's refusal to participate...*, 2016). Then in 2022, the constant rhetoric of the Russian Federation to launch a nuclear strike against the cities

of Ukraine, as well as the seizure and constant shellings of nuclear power plants, made it possible to consider the Russian aggressor's actions a 'nuclear terrorism' manifestation, recognized as 'one of the greatest threats to international security' (*Communiqué of the Washington Summit on Physical Nuclear Security, 2010*); (*Communiqué of the Washington Summit...*, 2010).

There are currently 5 nuclear power plants (further - NPP) in Ukraine (South Ukrainian, Rivne, Khmelnytsky, Chornobyl NPPs) (*Website on nuclear safety, radiation protection and non-proliferation...*, 2022) and the largest one in Europe - Zaporizhzhya NPP with an installed capacity of 6 million kilowatts, which also has a storage facility for spent nuclear fuel). There are 15 power units in operation, 13 of which have VVER-1000 and 2 VVER-440 reactors with a total installed 13,835-megawatt capacity, which is 26.3% of the total installed capacity of all power plants in Ukraine. It must be stated that for the first time in world history, full-scale hostilities are taking place in the country with such a large number of nuclear reactors and thousands of tons of highly radioactive spent fuel. None of the Ukrainian NPPs, like any NPP in the world, is designed to be in the midst of hostilities.

Therefore, the consequences of an accident on any of them are catastrophic for both Ukraine and the EU (it can make a significant part of the European continent uninhabitable for many decades) and can exceed the Chornobyl and Fukushima emissions. For example, an accident at Zaporizhzhya NPP will have six-ten times as many consequences as Chornobyl NPP (*How Russia threatens the world with a nuclear disaster...*, 2022). Experts note that the area of the potential exclusion zone will be up to 30,000 square kilometers (like 10 Chornobyl exclusion zones) in case of a disaster, as a result, Zaporizhzhya region will be unsuitable for inhabiting and farming. Meanwhile, the area of potential contaminated territory may reach up to 2 million square kilometers, and the degree of contaminating other territories of Ukraine, Europe, the Russian Federation, and Belarus will depend on the wind direction (*Digest of the key consequences of Russian aggression...*, 2022).

It is worth emphasizing that according to the Geneva Conventions (*International Convention*

on the *Fight against Acts...*, 2015), works and installations containing dangerous forces, namely weirs, dams and nuclear power plants, should not become attack targets. Thus, the fact of violating international law norms by the Russian Federation must be stated. In addition, in accordance with the Article 56 on 'Protection of works and installations containing dangerous forces' of the Additional Protocol (1) to the Geneva Conventions (August 12, 1949), concerning protection of international armed conflict victims (Protocol I) (June 8, 1977) (*Additional Protocol to the Geneva Conventions, 1949*), nuclear facilities cannot be used for military purposes. Meanwhile, failing to comply with the rules of warfare established by international law, Russia is constantly committing nuclear terrorism acts.

Firstly, it is a matter of the thirty-five-day (from February 24 to March 31) occupation of the Chernobyl nuclear power plant, which the Russian army used to create an additional platform to launch Russian missiles and deploy military forces, as well as political currency during so-called 'peace negotiations.' The ChNPP Exclusion Zone is currently continuing to recover from the Russian occupation, during which, according to the International Atomic Energy Agency (further - IAEA) Director Rafael Grossi, the radiation level was 'abnormal,' and the situation in the ChNPP Exclusion Zone was 'very, very hazardous (*Kasiyan, 2022*).'

Among the consequences of the Russian occupation of the ChNPP, the following should be highlighted:

- destructing the unique SSE EcoCenter laboratory as a single and functional complex;
- damaging the ChNPP buildings and facilities with subsequent theft of the Office and laboratory of the Institute for Safety Problems of Nuclear Power Plants;
- causing a number of damages to the physical protection system of the complex of producing facilities for decontamination, transportation, processing and disposal of radioactive waste 'Vector' (*State Agency of Ukraine for Management of the Exclusion Zone, 2022*);
- stealing and damaging 133 sources with a total activity of about 7 million Becquerels,

which can be compared with 700 kilograms of radioactive waste with the presence of beta and gamma radiation (*Official portal of the Ministry of Environmental Protection and Natural Resources of Ukraine, 2022*);

- disrupting, with subsequent loss, connection with the monitoring posts of the automated radiation control system, and data transmission (*Official portal of the Ministry of Environmental Protection and Natural Resources of Ukraine, 2022*); (*the Automated Radiation Monitoring System (ARMS) (State Agency of Ukraine for Management of the Exclusion Zone, 2022)* has already been restored, and most of the 39 detectors sending data from the Exclusion Zone (30 kilometres around the ChNPP) are now visible on the IRMAS map. It should be particularly drawn attention to the fact that on June 6, 2022, the IAEA received data from the detectors for the first time since the hostilities outbreak) (*International Atomic Energy Agency, 2022*);
- destructing forests in the Exclusion Zone (according to satellite images during the month of the Russian invasion and Exclusion Zone occupation, more than 30 foci of large fires with an area of about 10.287 hectares were discovered there. The last large fire was an area of 176 hectares) (*Official portal of the Ministry of Environmental Protection and Natural Resources of Ukraine, 2022*), etc.

In addition, 500 Russian soldiers not only set up positions on radioactively contaminated lands and the known 'Red Forest,' but also 'redeployed' armored vehicles through the territory where radioactive materials have been buried and where the number of radioactive particles goes off-scale. Taking the above into account, specialists of the State Scientific and Technical Center for Nuclear and Radiation Safety, on behalf of the State Nuclear Regulatory Inspectorate, will conduct a radiation inspection of Kyiv region territories, which were temporarily occupied by Russian troops, where there are still hazards associated with transferring radioactive contamination from the Exclusion Zone beyond its borders (*Official page of State Scientific and Technical Center for Nuclear and Radiation Safety, 2022*).

It should be noted that inventorying and assessing the amount of damage to the ChNPP from the Russian occupation is still underway. According to preliminary estimates, the damage to the Exclusion Zone caused by the Russian troops' actions is almost UAH 2.5 billion. The occupiers destroyed almost 100 units of expensive analytical equipment, which has no analogues in Europe, and stole the equipment worth more than \$135 million, not to mention the software (*Verkhovna Rada of Ukraine. Official website of the Parliament of Ukraine, 2022*). As for the environmental damage caused by Russia's aggression, it is currently almost impossible to fully assess it due to the lack of relevant expert opinions and available special methodologies for calculating the damage caused. It is worth stating that only four methodologies have come into force by now.

The following ones in particular: 1) Methodology for determining losses caused by water pollution and/ or clogging, unauthorized water resource use, approved by the Order of the Ministry of Environmental Protection and Natural Resources of Ukraine No. 252 dated July 21, 2022 (*State Environmental Inspectorate of Ukraine, 2022*); 2) Methodology for calculating unorganized emissions of pollutants or a mixture of such substances into the atmospheric air as a result of emergencies and/ or under martial law and determining the amount of damage caused, approved by the Order of the Ministry of Environmental Protection and Natural Resources of Ukraine No. 175 dated April 13, 2022 (*Order of the Ministry of Environmental Protection and Natural Resources of Ukraine No. 175..., 2022*); 3) Methodology for documenting the amount of damage caused to the land and soil as a result of emergencies and/ or armed aggression and hostilities under martial law, approved by the Order of the Ministry of Environmental Protection and Natural Resources of Ukraine No. 167 dated April 4, 2022 (*Order of the Ministry of Environmental Protection and Natural Resources of Ukraine No. 167..., 2022*); 4) Methodology for determining damage and losses caused to the land fund of Ukraine as a result of the Russian Federation's armed aggression, approved by the Order of the Ministry of Agrarian Policy and Food of Ukraine No. 295 dated May 18, 2022 (*Order of the Ministry of Agrarian Policy and Food of Ukraine No. 295..., 2022*). Develop-

ping other methodologies for calculating damages caused by emergencies and/ or armed aggression and hostilities under martial law is still ongoing (*Shvets et al., 2013*).

Secondly, Zaporizhzhya NPP is continuing to operate under occupation, and its territory is being used as a military base. Thus, on the night of March 3 to 4, 2022, the first in world history forceful seizure of a nuclear power plant - Zaporizhzhya NPP - took place, as a result of which the Russian Federation's armed forces killed three Ukrainian defenders and created unprecedented threats to the plant's nuclear safety, which could lead to a disaster of a planetary scale (*Open appeal of the Acting Chairman of the State Atomic Energy Regulatory Authority to the IAEA, 2022*). According to the Main Directorate of Intelligence of Ukraine, the occupiers are endangering safe Zaporizhzhya NPP operation, because there are practically no spare parts and consumables at the plant (¹*Official portal of the Ministry of Environmental Protection and Natural Resources of Ukraine, 2022*). It should be added that while shelling Zaporizhzhya NPP, the Russian invaders had damaged a number of facilities on its territory, causing losses, which, according to preliminary estimates this April, amounted to UAH 18.3 billion.

Moreover, according to Energoatom's estimates as of May 15, 2022, the losses reached UAH 36 million, UAH 18 billion of which is the damage to the facilities (*Energy Minister Herman Galushchenko and US Chargé d'Affaires of Ukraine Kristina Quinn..., 2022*). Zaporizhzhya NPP is currently acting as an occupiers' weapons depot. The corresponding fact was also confirmed by the members of the IAEA mission in the 2nd Summary Report by the Director General (April 28 - September 5, 2022). Noting that Russia had deployed 'military personnel, vehicles and equipment at various Zaporizhzhya NPP locations, including several military cargo trucks on the first floor of the turbine halls in power units 1 and 2 (*IAEA mission on nuclear safety, security and safeguards in Ukraine..., 2022*).' The experts of the IAEA mission also recorded the Rosatom expert group presence, which, according to the Russian side, 'provides advice on nuclear safety, security and actions to the ZNPP management.' After that, the IAEA head, Raphael Grossi, called

for the immediate cessation of shellings in the area of the occupied Zaporizhzhya NPP and the 'security zone' creation around it (*International Atomic Energy Agency, 2022*).

It should be noted that adopting the IAEA Board of Governors' Resolution GOV/2022/17 'Consequences of the situation in Ukraine for security, physical protection and guarantees' (March 3, 2022) was of a great significance (*Murphy, 2022*), according to which the Russian Federation should immediately cease all actions against nuclear facilities in Ukraine and return control over all seized nuclear facilities to the Ukrainian side. In addition, in accordance with Paragraph 4 of this Resolution, the IAEA Director General and the Secretariat of the Agency are assigned with monitoring the situation in Ukraine and reporting to the Board of Governors concerning relevant violations and threats to the safety of nuclear facilities in Ukraine. However, Russia has refused to withdraw its troops, equipment and Rosatom personnel from the territory of the seized Zaporizhzhya NPP, as stated by the Russian Federation Permanent Representative to the international organizations in Vienna, Austria, Mikhail Ulyanov (*Russia refuses to comply with the IAEA resolution..., 2022*).

Thirdly, radiation safety is threatened by missile strikes on the territory of Kharkiv Institute of Physics and Technology, where the Neutron Source nuclear research reactor (further - NRR) is located. According to the information provided by the operating organization of National Scientific Center 'Kharkiv Institute of Physics and Technology' (further - NSC KIPT), the damage to the Neutron Source NRR, already detected as a result of shelling the site by Russian troops on March 26, 2022, are as follows: significant damage to the thermal insulation cladding of the Neutron Source NRR building; partial shedding of cladding materials in the experimental installation hall. Besides, the situation at the Neutron Source NRR remains deeply sub-critical (in the 'long shutdown' mode), transferred to which on February 24, and the personnel is monitoring the situation to a limited extent. The radiation situation on the site (according to the portable dosimeter indicators) is within the normal range (*Official Facebook page of the State Nuclear Regulatory Inspectorate of*

Ukraine, 2022). Meanwhile, the probability of new damage to the Neutron Source nuclear installation remains high owing to constant shelling of Kharkiv by Russian troops.

Fourthly, the situation is deteriorating due to constant missile attacks on the territory of Ukraine by the Russian Federation, which, ignoring possible hazards and catastrophic consequences, directs them against nuclear power plants. Therefore, on April 26, 2022, the anniversary of the Chernobyl NPP tragedy, three Russian missiles flew over three Ukrainian nuclear power plants (*Official Facebook page of the Office of the President of Ukraine, 2022*). In addition, cruise missiles like the Kalibr system ones were recorded over Khmelnytsky NPP (April 25, 2022), Zaporizhzhya NPP (April 28, 2022) and South Ukrainian NPP (April 16, 2022; June 5, 2022 (*Official portal of the Ministry of Environmental Protection and Natural Resources of Ukraine, 2022*); September 19, 2022) in particular.

Thus, by its actions, the Russian Federation demonstrates outright disregard for international institutions, norms and rules and commits actual nuclear terror. Although negotiations on creating a nuclear safety zone around the Zaporizhzhya nuclear power plant (the ZNPP) in Russian-occupied Energodar started on September 21, 2022, the explosion near the South Ukrainian NPP, taken place on September 19, 2022, shows the potential danger at other nuclear facilities of our state. Therefore, the issue of threats to nuclear security remains of the priority both for Ukraine and for the whole world.

It should be added that Ukraine lacks an integrated automated monitoring system for detecting, analyzing and predicting possible consequences of radiation accidents, emissions of which may spread beyond the sanitary protection zones of nuclear power plants, other nuclear installations and radiation-hazardous facilities in Ukraine and beyond its borders. In addition, Ukraine lacks a unified decision-making preparation system, which would provide an opportunity to assess the consequences of accidents both within and beyond responsibility of object decision-making systems or in conditions of transboundary contamination as well as to carry out calculations of radioactive emission transfer models, necessary

for preparing radiation protection decision-making recommendations on the territory of Ukraine. Taking the above into account, the Order of the Cabinet of Ministers of Ukraine No. 323 dated April 29, 2022 (*Order of the Cabinet of Ministers of Ukraine No. 323-r..., 2022*) approved the Strategy of the Integrated Automated Radiation Monitoring System for the period until 2024 and the corresponding Operational Plan for implementing the Strategy for the Integrated Automated Radiation Monitoring System for the period until 2024.

Meanwhile, Ukraine is taking the first steps towards implementing the European Union Directive Provisions on the establishment of basic safety standards for protection against hazards associated with exposure to ionizing radiation (*Council Directive 13/59/Euroatom on the establishment of basic safety standards..., 2013*). It is a matter of the Draft Law of Ukraine No. 6425 'On amendments to the Law of Ukraine 'On permit activities in the sphere of nuclear energy use' dated December 13, 2022 (¹*Draft Law of Ukraine No...., 2022*), considered on first reading and adopted as a basis, which provides for introducing the practice of prior notification by a subject of activity of the state regulatory nuclear and radiation security body about their intentions to carry out activities before enabling. In addition, introducing the Institute of Radiation Protection Expert is provided by the Draft Law of Ukraine No. 3869 dated September 20, 2022 (*Draft Resolution No. 3869-P..., 2022*), which will lead to increasing the efficiency of providing radiation protection to the population.

Moreover, the Draft Law of Ukraine No. 5860 'On amendments to the Law of Ukraine 'On the use of nuclear energy and radiation safety' dated September 20, 2022 (*Decree of the Verkhovna Rada of Ukraine No. 2608-IX..., 2022*), considered on first reading, proposed updating the definitions of the terms 'radioactive material' and 'nuclear installations' in order to bring terminology in line with the European Union Directives, as well as introducing definitions of the terms 'spent nuclear fuel' and 'radioactive substance.' It is worth adding that all draft laws coincide with the list of draft laws in the areas of European and Euro-Atlantic Integration for 2022, defined as priority by the Government.

Critical consequences of mining agricultural lands and forest plantations

In the doctrine of law, soil pollution by remnants of the conflict, such as mines, cluster munitions and other explosive remnants of war, is recognized as a subsequent direct environmental impact and legacy of conflicts even after they have ended (*Post-conflict mine action, 2022*). It should be added that destroyed military equipment and ammunition, as well as exploded missiles and aerial bombs pollute the soil, forests and groundwater with chemicals, including heavy metals. Hence, according to the statistics published on EcoZagroza, the official resource of the Ministry of Environmental Protection and Natural Resources of Ukraine, as of September 22, 2022, 13.824 units of enemy equipment had been destroyed in Ukraine, thus generating 33.689 tons of air emissions and 279.675 tons of waste (*Official data of the Armed Forces for the period..., 2022*).

Therefore, several hazardous substances such as nitrogen dioxide, ammonia, carbon dioxide, lead and its inorganic compounds, mercury oxide, arsenic, inorganic compounds, nickel oxide, benzo(a)pyrene, etc., had reached the soil, water bodies, and atmospheric air (*Ecozagroza. Official resource of the Ministry of the Environment, 2022*), leading to ecosystem degradation and biosphere imbalance. Besides, natural territories with degraded ecosystems are becoming dangerous for citizens to habitate, whereas conducting economic activities there is risky and inefficient, hence requiring further restoration/ reproduction.

It must be elucidated that the Ukrainian Nature Conservation Group, having applied the methodology of calculating the consequences of shelling for soils, developed by the International Charity Organization 'Environment-People-Law' for the east of Ukraine, have received a great many of disappointing conclusions about the soil condition after studying the image of fields sown with winter crops. For example, 480 craters from 82 mm shells, 547 craters from 120 mm shells, and 1.025 ones from 152 mm shells have been counted on an area of 1 square kilometer. It should be emphasized that only there, 50 tons of iron, 1 ton of sulfur compounds and 2.35 tons of copper have got into the soil. Besides, 90.000 tons of soil in the least possible degree has been

uprooted by explosions (*What should be the fate of Ukrainian territories affected by explosions, 2022*). Meanwhile, a significant part of the ammunition still requires demining.

Contaminating and clogging natural resources and complexes, spreading migration processes in society, blocking access to vital supplies, such as agricultural land, water, and forest resources, etc., owing to mining territories, spreading degradation processes, destructing ecosystem connections, thus, violating their natural balance - all these do not represent a complete list of consequences of polluting soil and other natural objects by remnants of the war in Ukraine. Therefore, one of the pressing issues Ukraine is currently facing is to clear the territory from the following remnants of the war: mines, aerial bombs, cluster munitions and other explosive devices, as well as destroyed military equipment and other objects.

Due to the first wave of Russian armed aggression against Ukraine in 2014, about 16.000 square kilometers of Luhansk and Donetsk regions needed to be cleared. In April 2022, the figures had already reached around 80.000 square kilometers of the territory of Ukraine (*Statement of the Ministry of Foreign Affairs of Ukraine..., 2022*). As of June 11, 2022, approximately 300.000 square kilometers required humanitarian demining owing to a significant amount of ammunition left by the occupiers (*Official portal of the Ministry of Environmental Protection and Natural Resources of Ukraine, 2022*). In addition, according to the UN Office for the Coordination of Humanitarian Affairs, 'more than 30% of agricultural fields in Ukraine will not be used for sowing wheat, barley, sunflower, and corn. Ongoing hostilities could further cause a global food crisis, since 36 countries depend on Ukrainian and Russian exports (*Official website of the United Nations Office for the Coordination of Humanitarian Affairs..., 2022*).' It must be stated that part of the farmlands, currently involved in economic circulation, also needs demining due to constant shellings.

It must be elucidated that according to the UN Environmental Program on Curtailing Explosive Weapon Use in Populated Areas (abbr. - EWIPA), our country has become one with Afghanistan, Iraq, and Syria, whose population, urban and natural environments have suffered huge losses and

destruction because of using such weapons in inhabited areas (*Environmental legacy of explosive weapons in populated areas, 2021*). It should be added that one day of active hostilities in a certain territory is equal to one month, necessary for neutralizing and clearing the land from mines, unexploded ammunition and other so-called 'gifts. (*Mamka, 2022*)' Thus, the issue when the territory of Ukraine might be completely cleared of Russian aggression consequences is of the priority.

As of September 9, 2022, the State Emergency Service pyrotechnicians had already inspected about 70.000 hectares and neutralized almost 200.000 explosive devices (*Yenin, 2022*), including 1.988 aerial bombs (*Official Facebook page of the State Emergency Service of Ukraine, 2022*), but it was a drop in the bucket. Moreover, it is a matter of the so-called primary (operational) territory demining, which, according to preliminary estimations, may last one year after the end of all hostilities in the country. According to approximate optimistic estimates, it may take from 5 to 10 years to completely demine fields, forests, and water reservoirs (*One year is required for primary demining of the territories of Ukraine, 2022*). However, according to the analytical Environment-People-Law document, demining the affected territories of Ukraine may last up to 70 years, since the area of mined territories may reach up to 15 % of the whole territory after the end of hostilities and will cost \$250 billion (*Planning for environmental restoration: an analytical Environment-People-Law document, 2022*).

It must be noted that in the first month of the war, the General Staff of the Armed Forces of Ukraine estimated the demining process at \$250 billion, but as of the end of June 2022, due to experts estimations, the cost had already reached \$400-900 billion (*Mamka, 2022*). It is apparent that the demining process is impossible without partnership assistance (to compare, in April 2022, the government allocated UAH 555.4 million to the Ministry of Internal Affairs to eliminate the consequences of armed aggression to maintain additional State Emergency Service (further - SES) staff of formed pyrotechnic units and emergency rescue ones (*Order of the Cabinet of Ministers of Ukraine No. 302-r..., 2022*).

In May 2022, the USA provided Ukraine (particularly, the international organization for life support in hazardous areas, The HALO Trust) with \$4 million of assistance to deploy 10 teams to clear the territories (*Official website of United States Embassy Kyiv, 2022*). It should be added that SES is creating 80 new pyrotechnic units to carry out humanitarian demining of Ukraine's territory (*Portal of the Ministry of Internal Affairs, 2022*). The UN Mine Action Service (abbr. - UNMAS) plans to deploy its mission in the country (*The UN Mine Action Service UNMAS plans to deploy its mission in Ukraine., 2022*). In addition, to accelerate the demining process, the Interregional Center for Humanitarian Demining and Rapid Response of the SES Ukraine has signed a memorandum in the field of mine action with the Geneva International Center for Humanitarian Demining (*Official Facebook page of Geneva International Centre for Humanitarian Demining, 2022*), the Croatian Mine Action Center, and others.

A particular attention should be paid to the fact that there exist environmental hazards from disposing of ammunition, especially by undermining, thus, adversely affecting people and the environment. It is emphasized that the All-Ukrainian Environmental League has published its official position against the Ministry of Defense's plans to dispose of ammunition in the mentioned way, in which it strongly denies this extremely hazardous for the environment method (*Official position of the All-Ukrainian Ecological League on the disposal of ammunition by blasting, 2022*). Among the hazards associated with disposing of explosive devices by undermining, it is necessary to elucidate the following: significant landscape destruction; considerable soil contamination by toxic chemicals; long-term negative impact on water resource state, further resulting in water disappearing in the nearby settlement wells; air pollution with hazardous chemicals; absolute natural ecosystems destruction in the places of undermining, as well as unique flora and fauna species loss.

In addition, while performing such activities, serious threats to the geological environment appear, since shocks from explosions can cause unstable geological rock layers destruction at a considerable depth. Undoubtedly, such a posi-

on of the environmental protection organization is aimed at achieving the environmental safety, preventing new environmental hazards and threats, though it might not be further complied with, considering current conditions and the area of Ukraine's territory to be demined.

It should be noted that minimizing the negative impact of explosive devices, their neutralization, clearance, destruction and disposal on the environment and economic activities. Along with ensuring population and their livelihoods safety, are recognized as national interests of Ukraine in the field of mine action (*Article 4 of the Law of Ukraine No. 2642-VIII 'On mine action in Ukraine' dated December 16, 2018*); (*Law of Ukraine No. 2642-VIII 'On mine action in Ukraine, 2018*).

Consequently, the main objectives of mine action in Ukraine are as follows:

- reducing risks which may arise as a result of firing explosive devices to a level safe for human life and health, which will allow using natural resources of the territories cleared of explosive devices for economic purposes;
- minimizing and preventing threats of accidents caused by unauthorized explosive devices handling;
- reducing social tension among the population living in or near territories contaminated with explosive devices;
- preserving and ensuring unique ecological systems reproduction within the territories polluted with explosive devices, without involving additional investments (*Article 3 of the Law of Ukraine No. 2642-VIII 'On mine action in Ukraine' dated December 16, 2018*).

It should be stated that the Interregional Center for Humanitarian Demining and Rapid Response of the SES Ukraine, within its authorities, has executed mine action measures in accordance with the International Mine Action Standards (further - IMAS) (*Order of the Ukrainian Research and Scientific Center for Standardization..., 2016*) implemented in Ukraine. According to which 'national mine action authorities and organizations are responsible not only for safe, efficient and rational

demining operations, but also for minimizing the impact on the environment. It is crucial to leave the latter in the same or even better condition than it was before, and to ensure the possibility of planned land use after demining operations completion (*Official website of the Ministry of Defense of Ukraine, 2013*). It should be added that the IMAS standards contain recommendations concerning main measures to protect the environment from degradation because of survey and clearing/ demining operations, and its suitability for the planned land use mentioned above.

Summing up, it should be noted that mine action always involves direct or indirect interactions with the environment, and therefore may have a significantly negative impact. Taking the above-mentioned and European integration processes in Ukraine into consideration, the following is regarded of a great importance. Firstly, to adopt the State Mine Action Strategy as a long-term strategic document aimed at forming national policy foundations in the field of mine action. Secondly, to accelerate Ukraine's accession to the EU Civil Protection Mechanism (further - CPM). Especially taking into account the Agreement of September 5 2022 signed by the Ministry of Internal Affairs and the SES of Ukraine with European partners to assist Ukraine in joining the EU CPM (*Partner countries have officially supported Ukraine..., 2022*) to fully integrate the unified state civil protection system of Ukraine into the relevant EU ones.

Dangers due to hazardous substance emissions from shelling oil depots, gas storage facilities and chemical ones

In addition to nuclear hazards, shelling and occupation increase the risk of toxic waste emissions from Ukrainian industrial enterprises. Part of the enterprises listed in the State Register of Potentially Dangerous Objects is currently in the war zone, the largest number of which is located on the territory of Donetsk, Dnipropetrovsk, Zaporizhzhya, Kharkiv, and Lviv regions (*A month of the war. Crimes against the environment, 2022*). Here are some examples below.

From the very first days, industrial and energy facility shellings and bombardment, oil depot explosions, Black and Azov Sea pollution (prima-

rily due to sunk ships) had been recorded. Thus, under the Rivne Regional Prosecutor's Office procedural guidance, a pre-trial investigation into a missile strike on the oil depot (Rivne region) in the evening of March 28, 2022, resulting in fuel tank destruction has been initiated, taking the facts of ecocide and laws of the war violation into consideration (*Article 441; Part 1 of Article 438 of the Criminal Code of Ukraine*) (*Missile strike on the oil based on Rivne region..., 2022*).

In total, according to SaveDnipro data, (*Oil base was destroyed: the consequences, 2022*) there had been 32 missile strikes on oil infrastructure facilities on the territory of Ukraine since the beginning of the war, having destroyed 27 oil depots (as of May 24, 2022) (*Klochko, 2022*). Missiles also destroyed the Kremenchuk Oil Refinery (Poltava region) with an 18.6-million-ton design capacity, the fuel production of which used to meet 15-20 % of the Ukrainian oil market needs before the war (Occupiers destroyed the Kremenchuk oil refinery, 2022). In addition, according to preliminary estimates, environmental damage from a single fire at an oil depot in the village of Kriachky, Kyiv region, reached UAH 810 billion (*Official page of the Ministry of Environmental Protection and Natural Resources, 2022*). Fires caused by oil depot airstrikes are accompanied by uncontrolled emissions into the atmosphere, causing a local impact on nearby areas.

The consequence of oil product combustion in large volumes is the release of carbon monoxide (causing fatal human poisoning), benzopyrene (a powerful carcinogen and mutagen), sulfurous and sulfuric anhydride, carbon monoxide (IV), nitrogen oxides, gaseous and solid products of incomplete fuel combustion, vanadium compounds, sodium salts, acid gases, etc. In addition, because of oil product combustion, aromatic compounds, aldehydes, and ketones as well as soot (the most dangerous carcinogen occurring in everyday life) appear. The above mentioned are only the consequences of combusting oil products for humans.

The consequences for the environment require assessing the amount of harm separately. Since only sulfur dioxide, or sulfurous anhydride, is particularly harmful to green plantations and forests, whose action may cause chlorosis (namely, leaves yellowing or discoloration) and dwarfism.

In addition, combustion products, getting into the soil and water bodies, cause irreparable damage to all ecosystem components. For example, on April 11, 2022, due to Samara-Western Direction oil product pipeline explosion in the village of Rudnya, Zhytomyr region, diesel fuel spilt because of depressurization (*Official portal of the Ministry of Environmental Protection and Natural Resources of Ukraine, 2022*).

In addition, due to the facts that there have been fighting on the territory of our country, a significant part of Ukraine's chemical industry, thermal power plants, gas pipelines, as well as heavy industry enterprises, accompanied by hazardous substance emissions into the atmosphere, soil and water bodies contamination (including those cases due to chemical pollution, when solid, gaseous and liquid substances, chemical elements and artificial compounds get into the biosphere, disrupting the substance and energy circulation processes, established by nature.

Thus, as of March 5, 2022, because of shelling, missiles were recorded to hit the network of Ukraine's natural gas transportation system in Kharkiv, Mykolaiv, Zaporizhzhya, Kyiv, Donetsk, and Luhansk regions, which led to uncontrolled natural gas combustion, further causing air pollution by salvo emission of pollutants (*State Environmental Inspectorate of Ukraine, 2022*). On March 7, 2022, active hostilities in the city of Bucha, Kyiv region, led to catching the territory of Glass Plastic and Fiber Research Institute warehouses on fire, further resulting in a large-scale fire, forming a thick smoke curtain, which covered the cities of Bucha and Irpin. While the very next day, as a result of destructing the polyethylene products plant LLC 'Planet Plastic' and catching its main shops on fire, thick black smoke again covered the city of Irpin (*State Environmental Inspectorate of Ukraine, 2022*).

On March 21, 2022, Russian missiles struck the capacities of the Public Joint-Stock Company (abbr. - PJSC) Sumy Khimprom, where there was an ammonia leak with the affected 2.5-kilometre area, with the village of Novoselytsa, Sumy region, falling into the affected radius afterwards (*State Environmental Inspectorate of Ukraine, 2022*). On April 9, 2022, in the town of Rubizhne, Luhansk region, Russians struck a tank containing 4

tons of non-concentrated nitric acid, as a result of which, an explosion occurred with further release of a significant amount of nitric acid into the air. A poisonous cloud was carried away by the wind towards Russian troop positions near the villages of Kudryashivka and Varvarivka, Luhansk region (*Official portal of the Ministry of Environmental Protection and Natural Resources of Ukraine, 2022*).

In addition, the Azot chemical plant in Severodonetsk, Luhansk region, was under constant artillery shellings (for example, on May 31, 2022, a tank with Azot chemical association nitric acid was hit, as a result of which a toxic pink cloud rose over residential areas. Similar situations took place on May 14 and 20, 2022. Besides, on the same day, because of shellings, a coal bunker caught fire in Lysychansk, Luhansk region) (5 large-scale eco-crimes of Russia in Donbas against Ukrainians and the environment, 2022). On June 16, 2022, the Severodonetsk chemical non-standardized equipment plant was also shelled (*Environment-Law-People, 2022*).

Ukraine's energy sector losses due to the war have already been estimated at \$13.4 billion (including total direct and indirect energy sector losses as of September 5, 2022 (though excluding the strikes in Kharkiv region on September 11, 2022). Thus, Chernihiv, Okhtyrsk, Kremenchuk and Kharkiv thermal power plants (further - TPP) were destroyed. The power plants most affected by the war are as follows: Sumy TPP, Eshar TPP-2, Zmiiv TPP, Vuhlehirsk TPP, Kryvyi Rih TPP, Mykolaiv TPP, and Avdiivka TPP (Power plants are victims of Russian aggression, 2022). It should be added that on June 12, 2022, Russian troops shelled Vuhlehirsk TPP, the most powerful plant in Ukraine, with artillery near Svitlodarsk, Donetsk region, because of which a strong fire broke out on the territory of the TPP, and the administrative building was destroyed (*Official portal of the Ministry of Environmental Protection and Natural Resources of Ukraine, 2022*).

Exploding and combusting oil products; setting chemical and metallurgical enterprises, targeted by the occupiers, on fire; and causing chemical reactions from gunshots - all these result in poisonous substances getting into soils, further leading to losing their fertility and useful properties,

as well as polluting Ukraine's water bodies and harming people's lives and health. Taking the above into consideration, it is worth elucidating that in conditions of military aggression, a particular attention should be paid to both assessing ecological damage and priorities in order to restore Ukraine's environment, especially in terms of the state of ecosystems, soils, surface waters, possible threats from industrial enterprises and flooded mines, as well as their impact on forest plantations, protected areas and biodiversity. Moreover, such threats have existed on the temporarily occupied territories of Donetsk and Luhansk regions, the Autonomous Republic of Crimea and the city of Sevastopol since 2014.

The damage caused to Ukraine's environment and its natural resource potential in conditions of military aggression is enormous. Day by day, we are becoming aware of new and new crimes committed by the Russian Federation. Meanwhile, the post-conflict impact on the environment; increased risks to human lives and health, which may arise and/or have already arisen resulting from damage caused to the environment; new migration processes, caused by the ecological catastrophe, on the verge of which our country is teetering - all these must be considered. In addition, taking the above into account, ecological migration is already regarded because of violating citizens' constitutional right to an environment safe for life and health (*Article 50 of the Constitution of Ukraine, 1996*), war crimes against the environment, as well as crimes against human safety and international legal order. Therefore, the issue of seeking damages is becoming of a particular relevance in today's conditions, primarily due to the need to include the environmental component in international lawsuits, Ukraine's claims against the Russian Federation in order to obtain reparations for restoring ecosystems.

Taking the above into account, it must be added that there is an official web resource of the Ministry of Environmental Protection and Natural Resources of Ukraine called *Ekozagroza*, providing a Dashboard with environmental threat data (*Ekozagroza, 2022*). In addition, according to the Laws of Ukraine No. 389-VIII 'On the legal regime of martial law' (2015) dated May 12, 2015, and No. 1264 'On environmental protection'

(1991), the Decree of the President of Ukraine No. 64/2022 'On the introduction of martial law in Ukraine' (2022), the Resolution of the Cabinet of Ministers of Ukraine No. 275 'On approval of the regulation on the State Environmental Inspectorate of Ukraine' (2017), and based on the Order of the State Environmental Inspectorate of Ukraine No. 73 (2022). The Operational Headquarters was established in order to record, organize information and form a unified register of losses caused to the environment as a result of Ukraine's territory invasion by the Russian Federation (*Official web portal of the Operational Headquarters at the State Environmental Inspectorate of Ukraine, 2022*).

The Operational Headquarters includes the Committee of Representatives of the Verkhovna Rada of Ukraine on Environmental Policy and Nature Management, the Committee of the Verkhovna Rada of Ukraine on Transport and Infrastructure, the Ministry of Environmental Protection and Natural Resources of Ukraine, the State Environmental Inspectorate of Ukraine, the National Security and Defense Council of Ukraine, the National Security Service of Ukraine, the Specialized Environmental Prosecutor's Office and other state bodies. It should be noted that the Operational Headquarters of the State Environmental Inspectorate of Ukraine has formed an Expert Working Group of 73 people to develop international approaches to the principles and damage assessment, coordinated by M. Zheleznyak, Professor at the Fukushima Institute of Radioecology (Japan).

In addition, the Expert Working Group ensured the work of 10 subgroups formed from experts, involving the following State Environmental Inspectorate of Ukraine employees: 1. International legislation. 2. Analytics, geographic informational system (abbr. - GIS), information collection. 3. Impacts on the state of the air. 4. Soils - pollution and clogging, waste management. 5. Sea water area. 6. Land surface waters. 7. Subsoils. 8. Forest systems. 9. Bioresources. 10. Environmental radiation, Chernobyl Exclusion Zone. All these groups are developing draft methods for estimating the damage caused by Russian armed aggression. In this regard, it should be particularly emphasized that until February 2022, no Methodology for calculating damages caused by armed conflicts had been formed in Ukraine.

CONCLUSIONS

By the thirty-first Independence Day of Ukraine, half a year had passed since the beginning of the large-scale invasion of Ukraine's territory by the Russian troops. The portrait of modern indestructible Ukraine had been formed by destroyed cities and villages, tens of thousands of dead and wounded civilians and soldiers, migration crisis, economic losses of hundreds of billions of dollars, as well as ecosystem fires, biodiversity loss and threats to Red Book species, soil and water pollution by oil and other dangerous chemicals compounds, harmful negative impact on landscapes and settlements, air pollution with smog and dangerous emissions, etc.

The fact that the environment and society are in the same network of systemic interactions is unchanged and its future directly depends on the environment and country's natural resource potential state. Ukraine is seeking peace, which is the key to its development. Establishing peace, restoring Ukraine's sovereignty and territorial integrity within its internationally recognized state borders is considered as the highest priority of the state (*Decree of the President of Ukraine No. 392/2020 'On the Strategy of National Security of Ukraine' dated September 14, 2020*). Meanwhile, in today's conditions, challenges and threats to national security in the environmental sphere are becoming of a particular relevance. Since the damage caused to the environment while hostilities lead to deteriorating ecosystems and natural objects for a long period after the end of the conflict, further affecting more than one generation. In addition, in some cases, the consequences of pollution may spread beyond the territory of hostilities, therefore, having a continental or planetary scale with the synergistic nature of hazards increase. The war unleashed by the Russian Federation against Ukraine has increased the losses of Ukraine's industrial infrastructure, led to spreading degradation processes in ecosystems, resource and socio-demographic losses, financial sector depletion, life support infrastructure destruction, etc.

Taking the above into account, the state's ecological function to ensure environmental security and rights, as well as to maintain ecological ba-

lance on the territory of our country should become a priority of today, a fundamental vector of national and world politics. The practical significance of updating the organizational and legal environmental policy foundations is determined by its ability to prevent and/ or neutralize the negative impact of such threats and challenges on national security as nuclear terrorism, armed aggression, climate migration, hunger, water shortage, etc., which according to qualitative indicators, take the first places. This issue is also of a significant relevance, considering the fact that ensuring environmental safety, creating safe conditions for human life, in particular on the territories affected by hostilities, developing an effective civil defense system are recognized as ones of the main directions, based on which Ukraine's national interest priorities and ensuring national security are realized.

It is also expedient to further develop conceptual legal frameworks for the environmental security component inclusion into the Strategy for Post-War Reconstruction and Development of Ukraine (and the corresponding Action Plan), as well as sectoral country's reconstruction programs. It is appropriate to develop proposals for modernizing state policy visions based on the European Green Course and sustainable development, considering the requirements for fulfilling the Copenhagen criteria to join the EU in the context of implementing cross-cutting environmental policy in the war and post-war periods, complying with environmental standards and legal mechanisms to ensure environmental safety while planning and developing the country, and restoring its natural resource potential. In addition, when developing infrastructure and industrial facility projects, the EU Taxonomy should be considered, further providing criteria for environmentally sustainable, 'green' projects and activities. Therefore, it is worth developing proposals for introducing amendments and additions to the following Laws of Ukraine 'On the national security of Ukraine,' 'Strategy of environmental safety and adaptation to climate change until 2030,' 'Basic principles (strategy) of the state environmental policy of Ukraine for the period until 2030,' etc. taking current conditions into account.

It should be emphasized that when developing a new paradigm of the National Security of Ukra-

ine and its component - environmental security. A particular attention should be paid to the legal provision of overcoming the consequences of Russia's armed aggression against Ukraine. Preserving biodiversity, sustainable forest fund management, reforming waste management, achieving climate neutrality, sustainability in the food production chain, harmonizing environmental policy with other state policies, strengthening the response to the consequences of climate change and achieving sustainable low-carbon development goals in all sectors of the economy. As well as researching national vulnerability and ability to adapt, European legal framework and organizational mechanisms, policies, strategies, and perception of best practices. In addition, national paradigm renewal should take place within the framework of Ukraine's development as an 'ecological state,' ensuring not only the solution of current issues, but also considering future threats and challenges to national security. Therefore, the best foreign countries' experience regarding the legislative development of environmental policy and national policy provision in conditions of contemporary challenges and threats must be taken into consideration.

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SUVREMENI IZAZOVI I PRIJETNJE NACIONALNOJ SIGURNOSTI: OKOLIŠNI I PRAVNI ASPEKTI

SAŽETAK: Članak je posvećen analizi problema povezanih sa zaštitom okoliša te pravnih problema koje je izazvao rat u Ukrajini. Ova tematika zahtijeva sveobuhvatno razmatranje jer se problemi zaštite okoliša lako mogu pretvoriti u društvene ugroze. U članku se dokazuje da zagađenje izazvano ratom ima značajan negativni učinak koji prelazi granice ugroženih područja, tj. da ruska invazija nije rezultirala samo onečišćenjem okoliša u Ukrajini, već je zaprijetila ostvarenju ciljeva povezanih s usporavanjem klimatskih promjena, kao i sposobnosti svijeta da se prilagodi tim promjenama. Svrha ove studije jest provedba sveobuhvatne analize legislative u sferama zaštite okoliša te humanitarnog i kaznenog prava na nacionalnoj i međunarodnoj razini kroz prizmu izazova i ugroza koji se pojavljuju u području zaštite okoliša. Metodologija provedbe analize osniva se na skupu općih filozofskih i znanstvenih metoda, kao i specifičnih metoda iz područja znanosti i prava. Analiziran je i utjecaj suvremenih ugroza u području zaštite okoliša na opće stanje nacionalne sigurnosti, kao i trenutno stanje u primjeni mjera zaštite okoliša. Na temelju zaključaka provedene analize predložene su preporuke za poboljšanje trenutno važeće nacionalne legislative te za ozelenjavanje sektorskih komponenata nacionalne politike.

Ključne riječi: sigurnost okoliša, građanska odgovornost za zagađenje okoliša, ekološki rizici, međunarodna pravna podrška nacionalnoj sigurnosti, ekološko stanje, ekološka politika, ekološki i pravni sporovi

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