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ASSESSMENT OF AND COMPENSATION FOR ENVIRONMENTAL DAMAGE FROM RUSSIAN AGGRESSION IN UKRAINE – AN ECOSYSTEM APPROACH AND LEGAL INSTRUMENTS

Abstract: The purpose of the article is to search for legal instruments for compensation for environmental damage caused to Ukraine because of the armed aggression of the Russian Federation (RF). In addition, the aim is to present prospects for the use of ecosystem services (ES) in the assessment of environmental damage, as well as the application of the Costanza methodology for ES assessment. Methods of compensation for losses that can be applied in the near future have been analyzed. The use of ES can significantly increase the amount of reparations that the RF will have to pay Ukraine in the future for environmental damage. This is exemplified with an assessment of the damage that the RF has caused to forest and agrarian ecosystems. Assessing ES in wartime conditions is complicated by the lack of access to the occupied territories. The article shows the prospects of assessing ES losses in the conditions of Russian aggression in Ukraine.

Keywords: ecosystem services, damage, war, Ukraine, Russian aggression

Introduction

The full-scale aggression of the Russian Federation (RF) in Ukraine, which was a huge surprise for the West (Kaszuba 2023), had negative consequences in various dimensions (Krzykowski 2022), including a negative impact on all the components of the natural environment, and the number of environmental crimes committed by the RF is constantly increasing (Ecozagroza… 2024). When assessing damage to the environment, it is necessary to take into account not only direct economic losses and threats to the life and health of the population, but also the loss of all ecosystem services (ES) as a result of war (Varukha 2022). The very process of documenting

and assessing the consequences of war in the field of the environment is quite complex. Here, it is necessary to take into account both the large areas of destroyed territories and the interdisciplinary nature of the features of environmental damage assessment. As the President of Ukraine Volodymyr Zelenskyy emphasized at the meeting with the members of the International Working Group on the Environmental Consequences of the RF aggression which was held on June 29, 2023, it is important for Ukraine not only to punish the aggressor for all the crimes of ecocide committed in Ukraine since 2014, but also to force the RF to compensate for all the damage to the environment (Ekolohichni… 2023).

It is worth noting that for punishment it is necessary to improve Article 441 of the Criminal Code of Ukraine. In particular, it is necessary to specify its norms and minimize evaluative judgments that characterize the composition of an environmental crime, as well as to comply with the Rome Statute of the International Criminal Code, and propose to include the concept of the crime of ecocide in it (Kozak 2023). Unfortunately, the definition of the crime of ecocide, which was developed by the Independent Group of Experts in 2021, has not yet been adopted in any international document, although the very aggression of the RF in Ukraine has showed that the concept of ecocide is still relevant. To date, it has been proven that certain actions of the Russian army directed against the natural environment in Ukraine meet the requirements of the crime of ecocide, since these actions were illegal, intentional, and committed with the knowledge that they could cause severe and long-term or extensive environmental damage (Kozak 2023). As for reparations, the ES approach proposed in global practice (Affek | Kowalska 2017; Haines-Young | Potschin 2018) should become the basis of the future compensation mechanism, which will allow for a significant increase in the amount of reparations that the RF will pay to Ukraine. A modern assessment of ES in war conditions is not easy, since there is no access to occupied territories, and the already liberated territories often require demining first. Despite the complexity and uncertainty, the article provides examples of assessment of ES in the conditions of aggression. We did not set out to develop a detailed mechanism for calculating the cost of damages, but only applied the methodology described by Costanza et al. (1997) to estimate ES. Moreover, the purpose of our publication is to search for legal instruments to compensate for the damage caused to Ukraine as a result of the armed aggression of the RF and to present the prospects for the application of ES to determine the environmental damage.

1. Legal instruments for the compensation of Ukraine's losses due to the aggression of the RF

The creation of a legal doctrine of compensation for the damage caused to the environment because of the armed aggression of the RF against Ukraine is an urgent necessity today. Now, the main normative legal act that regulates the relations with the determination of damage and losses caused to Ukraine because of the armed aggression of the RF is Resolution No. 326 of the Cabinet of Ministers of Ukraine dated March 20, 2022. It defines the directions of damage and losses to the forest fund, subsoil, water area, nature reserve fund, water resources, water infrastructure facilities, land resources, atmospheric air (Postanova… 2022). The resolution obliges relevant state bodies to develop damage assessment methods within six months. Such methods have been developed, but without mechanisms for the compensation for the damage caused to the environment of Ukraine. Moreover, the sources and mechanisms of compensation for damage are also not clearly defined in modern international law. International cases of compensation for damage to the environment because of hostilities are not fully suitable for solving similar issues in Ukraine. Therefore, it is important to develop legal instruments for compensation for the damage and losses caused to Ukraine because of the armed aggression of the RF, considering international legal mechanisms, international experience, and judicial practice. To this end, the President of Ukraine has signed Decree No. 346, dated May 18, 2022 "On the working group on the development and implementation of international legal mechanisms for compensation for the damage caused to Ukraine as a result of the armed aggression of the RF" (Pro robochu… 2022). The compensation model of the Iraq-Kuwait war (The United… 2022) was taken as the basis when the Compensation Commission was established (the outcome of the approach was the recognition by the Iraqi government of the commission's powers and the fulfillment of all its requirements). For Ukraine, the question of the work of the Compensation Commission remains open in case the RF does not recognize and blocks the decision of the UN Security Council on the creation of such a commission. Another problem is the replenishment of the compensation fund. If, in the case of Iraq-Kuwait, UN decisions established deductions to the Compensation Fund from Iraq's oil exports, the question of the compensation fund for Ukraine remains unanswered.

Currently, a working group has been created in Ukraine for the development and implementation of international legal mechanisms for compensation for the damages caused to Ukraine because of the armed aggression of the RF. The working group has proposed to conclude an international agreement on a compensation mechanism for damages caused by the Russian aggression, which will involve strategic partners, on whose territory most of the frozen assets of the RF are located.

According to the Minister of Justice of Ukraine D. Maluska, agreements should be signed with the countries where Russian assets are located. Additionally, an approach proposed by the Prosecutor General of Ukraine A. Kostin is also promising. He suggested opening a representative office of the International Criminal Court in Ukraine so that Ukraine can receive international verification of recorded crimes and damages. On March 23, 2023, in the Hague, an agreement on the opening of the office of the prosecutor of the International Criminal Court in Ukraine was signed (V Ukrayini… 2024). Thus, the search for mechanisms and the development of experience in compensation for damage to the environment of Ukraine continues. The process of collecting, analyzing, and evaluating evidence of damage caused to nature, monitoring the state of the environment will allow to objectively reflect the amount of compensation for the restoration of Ukraine's environment. Existing mechanisms for compensation for damage caused to the environment of Ukraine need further refinement. It is worth noting that the search for legal instruments to compensate for the damage caused to Ukraine because of the armed aggression of the RF requires the participation of all international partners. It is obvious that such mechanisms should also be created, which can (as a backup option) provide compensation to Ukraine for the environmental damage caused by the armed aggression of the RF, even in the absence of the RF's consent to this.

2. Assessment of damage to the environment without taking ES into account

When calculating the damage to the environment as a result of the armed aggression of the RF, the Ukrainian government uses a methodology that is based on uncollected revenues from fees, taxes and other regulatory payments for pollution caused by municipal and industrial emissions and military destruction. According to an assessment by the government of Ukraine, the total amount of damages caused by the RF to the destruction of the environment as of May 2023 amounted to almost 52 billion dollars: 27 billion dollars for air pollution, 1.6 billion dollars – pollution of water resources, 23 billion dollars - funds for waste disposal and 0.3 billion for soil pollution (Demydenko | Stakhiv 2023). The number of committed crimes against the environment is increasing every day. According to the official resource of the Ministry of Environmental Protection and Natural Resources of Ukraine (Ekodozor 2024), as of February 6, 2024, damage was recorded in the atmospheric air (1 622 acts were recorded resulting in the amount of 28.4 billion dollars), land resources (2 912 acts of destruction were recorded resulting in the amount of 26.9 billion dollars), water resources (216 acts with the cost of 2.2 billion dollars were recorded). It should be noted that there are also other assessments (Stakhiv | Demydenko 2023), such as the Ukraine Rapid Damage and Needs Assessment

(Ukraine… 2024), which was conducted by the World Bank in coordination with the EU and the government of Ukraine. The assessment covers a full year of Russian aggression against Ukraine (from February 24, 2022 to February 24, 2023). It is worth remembering that the amount of environmental damage and the cost of long-term environmental restoration on the territory of Ukraine will probably increase significantly, since the military aggression of the RF in Ukraine continues and, in the process of the military aggression of the RF on the territory of Ukraine, all the components of the surrounding natural environment are subject to further destruction

3. Toward the economic evaluation of ES in Ukraine

ES is all the useful resources and benefits that people can obtain from nature (Affek | Kowalska 2017). In general, a joint international classification of ES has been formed, in which four groups of ES are distinguished: services from products provided by ecosystems; services regulating ecosystem processes; cultural services; and support services (Haines-Young | Potschin 2018).

To date, there has been no legislative support for the ES concept in Ukraine. In accordance with the Recovery Plan of Ukraine, the Ministry of Environmental Protection and Natural Resources of Ukraine is tasked with developing a draft of the Law of Ukraine "On Ecosystem Services", as well as with developing draft by-laws that will determine the list of ES, methods of their inventories and assessments, implementation mechanisms within six months from the date of its adoption (Stakhiv | Demydenko 2023). In addition, in April 2022, the Ministry approved the methodology developed by the State Environmental Inspection of Ukraine (SEI). In June 2022, the working group of the SEI of Ukraine considered the development of methods and procedures for calculating the damages caused to natural resources because of the Russian invasion. The working group also indicated a year ago that the UN Compensation Commission is the most appropriate approach for the situation in Ukraine.

The current state policy of Ukraine in the field of environmental protection is aimed primarily at the implementation and compliance with the European environmental standards, which is an important factor in ensuring Ukraine's implementation of the provisions of the Association Agreement with the EU. Over the past two years, the legislative framework, and mechanisms for introducing European norms into the environmental policy of Ukraine have been changed in Ukraine. In addition, at present, the work of state authorities and the entire community continues the practical implementation of innovations to preserve the environment from destruction. Considering the European integration course of Ukraine, one of the priority strategic tasks of the country's environmental policy

was, in particular, conducting an information and educational campaign about the value of ES in Ukraine, as well as the formation and further application of the assessment of ES.

Many researchers (Costanza et al. 1997; Costanza | Folke 1997; Mishenin | Dehtyar' 2015; Soloviy 2016) have studied ES. In European practice, due to the evaluation of ES, considerable attention is paid to the problems of people's well-being on the way to sustainable development (Shashula | Sakal' | Tretyak 2019). However, today the issues of managing the sphere of ES, their evaluation, accounting, and mapping are innovative and relevant in Ukraine and need further research and practical implementation. Several authors (Shashula | Sakal' | Tretyak 2019) join the actualization of the information and educational campaign about the value of ES and their evaluation in Ukraine, exploring the content of the economic category of public welfare through the prism of ES.

4. Attempts at applying ES to determine the environmental damage caused by the military actions of the RF in Ukraine

Currently, the primary task for Ukraine is to assess the ES that the Ukrainian people do not receive, with the aim of adding this amount to the total amount of reparations that the RF must pay to Ukraine. The existing methods for calculating environmental damage discussed above do not take into account ES due to the lack of appropriate methods (Churylova | Strel'nyk 2022, 93; Shashula | Sakal' | Tretyak 2019). During the war, the loss of ES has quite devastating consequences for Ukraine.

In Ukraine, ES losses due to the aggressive actions of the RF must be monetized, that is, determined in monetary terms. Such monetization is necessary in order to include the cost of destroyed ES in the amount of reparations that the RF must pay to Ukraine. When creating a compensation mechanism, it is worth taking into account the international practice of compensation for damage to the environment caused by military actions, in particular, the practice of the UN International Court of Justice. It is necessary to consider both the direct and indirect consumer value of ES and goods in order to calculate the losses of the destroyed environment accurately (Certain… 2010). This will also be facilitated by the creation, in accordance with the order of the Ministry of Environment Protection and Natural Resources of Ukraine of May 1, 2023 No. 274, of the Working Group on the Development of the Concept of State Policy on the Implementation of Ecosystem Services. It is also worth remembering that it is currently impossible to assess the damages objectively, for example, on the occupied territories or the territories that have not yet been demined. In such situations, Ukraine will not be able to fully account for all the damages caused to its resources. This will mean that soon these

incomplete calculations may become the basis for compensation for the damages caused by the terrorist actions of the RF. Not thinking of the full losses of the ES from the war, Ukraine will be forced to take them on in the future. This is unfair and unacceptable. It is also worth noting that ES are especially important for the economies of developing countries and low-income countries, including Ukraine. Many households in Ukraine make direct use of ES. In this case, the services may have a higher value than their market price (Varukha 2022). In Ukraine, the situation is further complicated by the fact that information on the characteristics of ecosystems and biological diversity on the territories destroyed or damaged by military actions is often missing or incomplete. For example, on the territory of the forest fund, there is information about the forest, wood stocks, and in some cases there is general information about the living ground cover, but there is no information, for example, about the species of flora that are under protection. In the nature reserve fund, often due to danger, the lack of funding and the lack of specialists, the data may be incomplete and not cover the entire territory.

Taking into account the existing difficulties, we propose the calculation of ecological damage taking into account ES, in particular, the methodology described by Costanza et al. (1997). In their methodology, they estimate the cost of ES in US dollars calculated per year for 1 hectare. In 2020, the ES of forest cost 5,383 dollars/hectare/year, and the ES of grasslands cost 1,597 dollars/hectare/year (De Groot et al. 2020). According to the head of the State Agency of Forest Resources of Ukraine Y. Bolokhovets, about 3 million hectares of forests were covered by fights and, according to his estimates, the direct losses of forestry from military operations reach 13.2 billion UAH. i.e. 347 million dollars (Rozminuvat… 2024). According to our calculations with the methodology of Costanza and the calculation based on the prices from 2020 (De Groot et al. 2020), the loss of ES for forests due to aggression of the RF can reach more than 16 billion dollars/year (Table 1). Nevertheless, these are calculations for one year exclusively. Growing, for example, a destroyed 100-year-old tree stand means waiting 100 years for it to mature, that is, it is a failure to obtain the ES in a 100-fold larger amount. Calculations of the loss for the agriculture ecosystems have showed that for the mined 5 million ha of grasslands (Ponad… 2023), ES losses can reach more than 7.9 billion dollars/year.

Table 1. The loss of ES due to aggression of RF

Loss calculation	Cost, $/ha/year		Total loss of ES	
	forest	agriculture	forest	agriculture
For the area destroyed by the war in Ukraine	5,383	1,597	16,149,000,000	7,985,000,000

Conclusions

When assessing the environmental damage caused by the military aggression of the RF in Ukraine, as well as creating a compensation mechanism, it is important to take into account the international practice of compensation for environmental damage caused by military actions, in particular, the practice of the UN International Court of Justice and the experience of the UN Compensation Commission. The damage caused to the environment as a result of the aggression of the RF against Ukraine will increase, since the military aggression of the RF in Ukraine continues. Therefore, it is important to constantly assess the losses so it can be objectively presented in any procedure or mechanism for compensation. At the same time, it is necessary not only to assess the losses of the ES at the moment, but also to take into consideration future funds for the reproduction of the loss. The calculation of damage to natural ecosystems should cover not only direct economic losses or threats to human health or biodiversity, but also indirect losses. The methodology for determining the scope of ES should be based on objective indicators. It remains important to calculate the damages caused by the aggression of the RF against Ukraine, allowing for the methodology developed by the Ukrainian government, with additions to the estimates of the lost or weakened ES. It is possible to apply various methods of evaluation of ES, including the Costanza method used in the article. At the same time, it is necessary to demand in international courts compensation for the damages caused by the RF to the environment of Ukraine, including the lost and weakened ES. At the moment, given the existing difficulties, as well as the fact that there are still occupied territories, it is necessary to actively work on the assessment of the ecological damage caused to ecosystems and the assessment of the loss or weakening of the ES. In addition, the further in-depth development of the assessment of ES losses and the calculation of their economic value remains relevant.

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