

Collecting Evidence and Investigating Ecocide in Ukraine: Problems, Innovations, Prospects

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Abstract

The relevance of this article lies in the study of the problems of collecting evidence and investigating ecocide in Ukraine during the armed Russian aggression and the formation of criminalistic recommendations for countering such crimes. The purpose of this study is to clarify the essence of ecocide in the context of an armed conflict, study the historical genesis of the problem, analyze national and international legal regulation of ecocide. An important aspect of covering the goals and problems of this article is the possibility of determining forensic means of countering ecocide during an armed conflict to form individual criminalistic recommendations for investigating the crime under study. Among the methods by which the study of this topic is carried out, one can highlight: the method of synthesis and theoretical analysis, the historical and legal method, the functional method, the analytical method, the dialectical method, the empirical method, the formal legal method, the systems method, the axiomatic method, the deductive method, the inductive method, the structural-genetic analysis and synthesis and event analysis and others, substantiating the topic of the study. Based on the study and analysis of judicial and investigative practice, a wide range of scientific sources and norms of national and international law, the essence of ecocide during an armed conflict is investigated. The position on the advisability of securing at the legislative level a separate article "Ecocide during an armed conflict" in the context of the requirements of international law is substantiated. The article reflects the forms of international interaction with state and non-state actors in the investigation of ecocide. The results of this article: conducting an analysis and providing a description of ecocide in the

context of its relationship with armed conflict; substantiating the position on the need to include ecocide in the jurisdiction of the International Criminal Court; clarifying and disclosing the features of the formation of individual sources of obtaining evidentiary information; characterizing the features of ecocide regulation from the point of view of national and international law; defining forensic means of counteracting ecocide and obtaining evidentiary information in the context of building an effective methodology for investigating such a crime. The provisions and recommendations proposed in this article are of scientific and practical value primarily for practitioners conducting pre-trial investigations, whose activities are directly aimed at identifying and investigating ecocide, as well as for all participants in this process and persons whose rights may be violated during the investigation and consideration of the ICC. The problems considered and the proposed conclusions will be useful for scientists, practicing lawyers, attorneys and judges.

Keywords: *environmental crimes; criminal proceedings; evidence collection; special knowledge; criminalistic strategy; forensic examination; criminalistic innovations; environmental safety.*

Збирання доказів та розслідування екоциду в Україні: проблеми, інновації, перспективи

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Анотація

Актуальність статті полягає в дослідженні проблем збору доказів та розслідування екоциду в Україні під час збройної російської агресії та формування криміналістичних рекомендацій протидії таким злочинам. Метою дослідження виступає з'ясування сутності екоциду в умовах озброєного конфлікту, аналіз історичного генезису проблеми та національного й міжнародного правового регулювання екоциду. Серед методів, за допомогою

яких здійснюється дослідження даної теми, можна виділити: метод синтезу та теоретичного аналізу, історико-правовий метод, функціональний метод, аналітичний метод, діалектичний метод, емпіричний метод, формально-юридичний метод, системний метод, аксіоматичний метод, дедуктивний метод, індуктивний метод, структурно-генетичний аналіз і синтез й івент-аналіз та інші, що обґрунтовують тему дослідження. На підставі дослідження та аналізу судово-слідчої практики, широкого кола наукових джерел і норм національного та міжнародного права розкрито сутність екоциду під час озброєного конфлікту. Обґрунтовано позицію щодо доцільності закріплення на законодавчому рівні окремої статті «екоцид під час озброєного конфлікту» в контексті вимог міжнародного законодавства. Висвітлено форми міжнародної взаємодії з державними й недержавними суб'єктами під час розслідування екоциду. Результатами цієї статті є: проведення аналізу та надання характеристики екоциду в контексті його взаємозв'язку з озброєним конфліктом; обґрунтування позиції щодо необхідності включення екоциду до юрисдикції Міжнародного кримінального суду; з'ясування та розкриття особливостей формування окремих джерел отримання доказової інформації; характеристика особливостей регулювання екоциду з точки зору національного та міжнародного права; визначення криміналістичних засобів протидії екоциду та отримання доказової інформації в контексті побудови ефективної методики розслідування такого злочину. Положення та рекомендації, запропоновані у цій статті, становлять науково-практичну цінність насамперед для практиків, які здійснюють досудове розслідування, діяльність яких безпосередньо спрямовано на виявлення та розслідування екоциду, а також для всіх учасників цього процесу та осіб, чий права можуть бути порушені під час розслідування та розгляду МКС. Розглянуті проблеми та запропоновані висновки будуть також корисні для науковців, практикуючих юристів, адвокатів і суддів.

Ключові слова: злочини проти довкілля; кримінальне провадження; збирання доказів; спеціальні знання; криміналістична стратегія; судова експертиза; криміналістичні інновації; екологічна безпека.

Introduction

It is important for world civilization to create a mechanism to ensure environmental safety for humanity. For the international community, the issue of ensuring the functioning of institutional mechanisms of responsibility for crimes against the environment and natural resources remains a pressing issue. A new challenge was the military aggression of the Russian Federation on February 24, 2022, which significantly affected all spheres of life and reflected on the dynamics of crimes against the environment in our country. Thus, as of August 29, 2023, 571 war crimes against the environment (ecocrimes) were committed on the territory of Ukraine [1].

According to preliminary estimates alone, the total damage to the environment from Russian aggression is more than \$ 54.7 billion. Of this, damage from air pollution is more than \$ 27.2 billion, damage to soil and land – more than \$ 24.6 billion. A third of Ukrainian forests were damaged; 20 % of Ukraine's protected areas are affected by the war; 35 % of Europe's biodiversity, which Ukraine owns, is under threat; Russia occupied 740 Ukrainian mineral deposits; approximately 40 % of our territory is contaminated with various types of ammunition; the Russian Federation contributes to and aggravates the climate crisis with its actions; the damage caused to the climate by the war is estimated at 33 million tons of additional greenhouse gas emissions into the atmosphere. The negative environmental impact will be felt for years. Since the environment has no borders, the consequences of military actions in Ukraine will be felt by the entire world [2].

According to the estimates of the Ministry of Environmental Protection and Natural Resources (Ministry of Environment and Natural Resources), the amount of damage from environmental pollution caused by the war is estimated at about 25 billion euros, with another 11.5 billion euros needed to eliminate the consequences of soil pollution. In particular, almost a third of the indicated amount of estimated damage, namely more than 407.3 billion hryvnias, is damage to the land resources of Ukraine. Of the total amount of damage, more than 176.5 billion hryvnias of damage was caused to the atmospheric air as a result of unorganized emissions of pollutants rising into the air during fires caused by shelling, including in forest areas and natural reserve areas. So far, a third of Ukrainian lands have already suffered from the war. The soils are heavily damaged: on average, there are 50 tons of metal and chemical compounds per 100 hectares of land. According to rough estimates, at least a hundred years will be needed for restoration. This applies not only to lands [4]. An estimated 900 of the country's protected areas have been affected by Russia's military activities. About 30% of all protected areas in Ukraine – 1.2 million hectares – suffer from the effects of the war [5]. Russia's invasion has set back the progress it had already made in addressing environmental challenges before the war began [6].

It is obvious that in conditions of armed conflict, ecocide is a particularly dangerous crime against the environment for the international community. The issue has become extremely important after the events surrounding the Kakhovka hydroelectric power station dam, the destruction of which UN Secretary-General Antonio Guterres called "a huge humanitarian, economic and environmental catastrophe in the Kherson region of Ukraine" [7]. As shown by the analysis of statistical data of the Prosecutor General's Office,

law enforcement agencies identified and initiated pre-trial investigations into 37 criminal offenses under Art. 441 of the Criminal Code of Ukraine (hereinafter referred to as the CC). In particular, in 2014–2015, no criminal proceedings were initiated for the commission of ecocide, in 2016, 1 crime of the type under study was recorded, in 2017 – 3, in 2018 – 2, in 2019 – 8, in 2020 – 6, in 2021 – 2, in 2022 – 15, in January–February 2023 – 0 [8].

Certainly, such threats require the development of the latest approaches to combating crime, modernization and updating of the criminal justice system to modern conditions and global threats of the 21st century [9]. It is no longer possible to solve environmental problems relying only on domestic experience and legislation, since these problems are simultaneously of a natural scientific, social and political nature and are undoubtedly connected with the issue of forming a European (possibly even global) system of environmental safety. The identified challenges determine modern trends in the development of legal science and determine the need to form and implement innovative approaches in forensic support for combating ecocide in modern conditions. Under such circumstances, there is a need to propose modern means of combating ecocide in armed conflict within the framework of forensic support in order to use all available national and international legal mechanisms to bring the perpetrators to criminal responsibility, as well as to invent mechanisms for compensation for the damage caused.

It must be acknowledged that the absence of a separate methodology for investigating ecocide in armed conflict conditions leads to a number of difficulties in criminal justice agencies, primarily related to the correct criminal-legal qualification of these acts; determining the scope and content of circumstances to be clarified; selecting areas and programs of investigation; collecting and examining evidentiary information, etc.

Effective means of solving this problem are the introduction of modern criminalistic scientific and methodological recommendations on issues of identifying, collecting, recording evidentiary information and conducting a proper investigation of ecocide specifically in armed conflict conditions. Taking into account the needs of investigative practice, the above circumstances determine the urgent need to intensify scientific research on the proposed issues of investigating ecocide and allow us to assert that the research topic is relevant.

The main objective of this study is to clarify the nature of ecocide in armed conflict, as well as to determine criminalistic means of counteracting ecocide and to formulate individual forensic recommendations for investigating ecocide in armed conflict.

Literature Review

Recently, issues related to fighting organized crime in its various manifestations have become the subject of scientific research in the works of V.M. Shevchuk (2023) [10, pp. 795-822], A.A. Zadnipryanets (2020) [11, pp. 160-163], V.O. Ukolova, E.O. Ukolova (2021) [12, pp. 353-356], S.K. Phillips (2021) [13], C. Voigt (2021) [14] etc.

Thus, the issue of combating crime was and remains a pressing one for both scholars and practitioners.

Materials and Methods

Among the research methods of this article, it is necessary to highlight general theoretical and special legal methods of scientific knowledge, the combination of which substantiates the chosen topic of research. According to the defined goals and objectives, the work uses a set of research methods of modern epistemology. Using the methods of synthesis and theoretical analysis, studies of scientific works on the commission of ecocide in the context of an armed conflict and the formation of individual forensic recommendations for the investigation were conducted. Historical and legal – to establish trends and development of individual provisions of legal regulation on ecocide in the context of an armed conflict. Functional – to study the mechanism of committing ecocide in the context of an armed conflict. The analytical method was used in the study and development of the necessary national and international regulatory framework.

The dialectical method is the basis of the scientific study of the problems chosen by the authors, since this method helps to understand all the processes associated with responsibility for ecocide and their impact on the development of criminalistic recommendations for the investigation. The empirical method, which was used at the initial stage of the study within the limits of collecting the necessary materials and statistical data on the commission of ecocide, should also be considered as effective research methods; the institutional method, which made it possible to reveal the features of sustainable development of Ukraine and the world community and the principle of its functioning.

By means of the formal-legal method of research, an analysis of the criminalistic essence and legal nature of ecocide was carried out, with the help of which its effective investigation is carried out; with the help of the systemic method, the range of problems under study was determined and proposals for their solution were developed. Effective methods of ecocide research should also be considered the axiomatic method, the task of which is to build a scientific theory in which some statements (axioms) are accepted without evidence and then used to obtain other knowledge

according to certain logical rules; the deductive method, which made it possible to determine the potential for mediation in armed conflicts with an environmental dimension; the inductive method, thanks to which it became possible to clarify the role of Ukraine in security cooperation with the international community on environmental and natural resource issues.

To study the problems of this topic, the authors used scientific works in the field of ecocide investigation, legal regulation of ecocide, forensic examinations, interaction and international cooperation. The main works that were used to write this article are the scientific works of such forensic scientists as: K. Ambos [15], O.M. Borshchetskaya [4, pp. 113-129], C. Voigt [14], V.A. Ukolova, E.O. Ukolova [12, pp. 353-356], A.V. Pchelina, V.B. Pchelin [16, pp. 187-189], V.K. Rybachek [17, pp. 82-87], E.Z. Stakhiv [18] and others.

Results and Discussion

Modern understanding of ecocide during armed conflict: international and domestic context

In today's realities, one of the most important trends in modern forensic science is the integration of knowledge and the proposal of innovative forensic tools aimed at solving the problems of combating crime in wartime conditions regarding the effective formation of evidence that can subsequently be used in both national and international courts [9, pp. 33-46]. Such activities are possible in the context of forensic support, which should be understood as the process of creating and providing scientific and proven forensic tools (technical and forensic, tactical and forensic, methodological and forensic, informational, preventive) used by employees of criminal justice bodies based on the knowledge and skills they have acquired, in accordance with the general principles and objectives of criminal proceedings in order to combat crimes [10, pp. 795-822].

To determine the subject and boundaries of proving the commission of ecocide, it is important to take into account the correct understanding of the essence of the concepts used. Today, the lack of a clear understanding of the nature and essence of ecocide negatively affects the devaluation of the evidence base for its investigation. It seems that history knows many cases of ecocide. For example, during World War I, German troops were the first to use chemical weapons of mass destruction (mustard gas and chlorine) against their enemies, the French and the British, near the town of Ypres (Belgium) in 1915; during World War II, German occupiers transported fertile black soil from Northern and Eastern Ukraine by train; during the Vietnam War, US fighters sprayed over 100 thousand tons of defoliants over Cambodia and Vietnam, due to the use of which almost half

of Vietnam's arable land was taken out of cultivation, 2 million hectares of forests were destroyed, and 2/3 of biological species became extinct; during the Gulf War, Iraqi government troops deliberately blew up 1,200 oil fields, a number of oil depots and tankers; US troops used phosphorus munitions in the 2004 bombing of the Iraqi city of Fallujah, which resulted in the death of people and catastrophic contamination of the surrounding soils with phosphorus compounds; the bombing of Hiroshima and Nagasaki by US troops in 1945 and other cases [11, pp. 160-163]. The term "ecocide" comes from Greek and Latin, for example, "oikos" means house, and "caedo" means to demolish or kill. Now its meaning is the destruction of large areas of the natural environment as a result of human activity in peacetime or wartime [19].

The legal definition of ecocide is relatively new. The term "ecocide" has been enshrined, calling for urgent international attention to the problems [12], as the widespread destruction, damage or loss of ecosystem(s) of a particular However, despite the refusal, the International Criminal Court subsequently agreed to consider cases of environmental destruction as "crimes against humanity" provided that they had a sufficiently detrimental impact on people living in the territory [20]. In 2019, the reason for the renewal of the movement towards criminalization of ecocide, which began in the 1970s, was a written statement to the ICC by A. Salim, a member of the Maldivian parliament, which contained the recognition of victims of climate change as an integral part of the international criminal justice system [13]. In order to formally define the term "ecocide", a group of international lawyers was established in November 2020, on the occasion of the 75th anniversary of the opening of the Nuremberg war crimes trials of Nazi leaders in 1945, to develop plans for a legally binding crime of ecocide - the criminalization of the destruction of the world's natural resources. The group is chaired by Philippe Sands, Dior Fall Slow and Florence Mumba. The proposed definition will eventually be adopted as an amendment to the Rome Statute governing the ICC [21].

In 2021, a concept paper by the NGO Stop Ecocide Foundation [22] was presented to define "ecocide" in order to begin the process of including this crime in the Rome Statute of the International Criminal Court [23]. "Ecocide is an unlawful and reckless act committed in the knowledge that there is a significant likelihood of serious and/or widespread or long-term harm to the environment caused by these acts". To define the terms given, the panel of experts provides an interpretation of each, in particular: 1) "Unreasonable" means reckless disregard for losses that would be clearly excessive in relation to the expected social and economic benefits; 2) "serious" means harm involving serious adverse changes, disruptions

or damage to any element of the environment, including serious impacts on human life or natural, cultural or economic resources; 3) "large-scale" means damage that extends beyond a limited geographic area, crosses national boundaries, affects entire ecosystems or specific species, many people; 4) "long-term" means harm that is irreversible or cannot be repaired through natural restoration within a reasonable time; 5) "Environment" means the Earth, its biosphere, cryosphere, lithosphere, hydrosphere and atmosphere, as well as outer space [17, pp. 82-87]. In our opinion, ecocide during an armed conflict as an international criminal offense is characterized by: 1) the open, aggressive nature of its commission; 2) great public danger; 3) the presence of long-term harm to the environment, great material damage and economic losses; 4) the presence of both immediate/direct consequences (pollution of land, air, reservoirs, sea shelf, destruction of fauna, flora), as well as remote (secondary) consequences (infertility of land, human diseases); 5) a high level of environmental pollution, destruction of ecosystems, which is explained by the use of military/lethal weapons; 6) limited possibilities of recording evidentiary information, certain facts and episodes of ecocide, which is explained by the use of military/lethal weapons and the difficulty of getting to the places of pollution and military operations; 7) causing harm to life and health of people, etc.

Criminalistics means and methods of combating ecocide in Ukraine

Criminalistics in Ukraine has chosen the European vector of development. European approaches are also manifested in the application of standards of proof in criminal proceedings [24, pp. 83]. It is believed that Art. 91 of the Criminal Procedure Code of Ukraine defines the list of circumstances that constitute the subject of proof and must be clarified.

However, when resolving this issue, it is necessary to proceed from the specifics of the crime under study, the conditions and means of its commission, the damage and consequences for the environment and ecosystems, as well as material (economic) damage. Therefore, in order to form a general idea of the content of methodological recommendations for investigating ecocide during an armed conflict, it is necessary to highlight the following groups of circumstances that must be established: 1) circumstances that are important for considering the act as an international crime (provisions of the Criminal Code and international treaties of Ukraine that determine the international illegality of the act); 2) circumstances related to the object/location of pollution (land, body of water, enterprise, warehouses, seaports and shelf, etc.): place, time and situation of pollution. The issue concerns the Chernobyl Nuclear Power Plant, spent nuclear fuel storage facilities and the Shelter facility; the Kyiv

Reservoir dam; the oil depot in Akhtyrka; the Zaporizhzhya Nuclear Power Plant[4]; the Azovstal plant; damaged nuclear facilities, nuclear waste storage facilities and other places where hazardous and toxic chemicals are stored [18]; damaged critical infrastructure facilities [25]; remnants of ammunition, missiles, and toxic substances [26]; 3) circumstances related to the consequences of ecocide: material damage; level of pollution, level of destruction of environmental objects and ecosystems, concentration of substances and damage; 4) circumstances determining measures to eliminate negative consequences; 5) circumstances related to the mechanism of ecocide: tools and means of committing ecocide; methods of committing ecocide; 6) circumstances determining the need to apply security measures in criminal proceedings; 7) circumstances related to identifying the perpetrators (states as subjects of international politics and political leadership of the state).

Moreover, organizing an investigation of ecocide in the context of an armed conflict requires the analysis of a large number of different materials, which can be divided into the following groups: 1) materials that reflect the state of objects before the moment of damage/pollution; 2) materials reflecting the consequences of ecocide, namely air, water, land pollution or the threat of their occurrence.

When speaking about recording cases of ecocide committed under martial law, it is necessary first of all to clarify that criminal-legal features are inherent in the category of criminal offenses under study. This will make it possible to distinguish ecocides from other illegal acts against the environment, in particular, to differentiate them from war crimes that infringe on public relations in the sphere of ensuring environmental safety [16, pp. 187-189]. Thus, according to the requirements of Art. 441 of the Criminal Code of Ukraine ecocide is considered to be the mass destruction of flora or fauna, poisoning of the atmosphere or water resources, as well as the commission of other actions that may entail an environmental disaster [27]. This crime has an unusual structure, which differs: 1) from ordinary formal crime compositions by the need for practical establishment, not counting the act, and also the creation by this act in a specific case of a real threat of the occurrence of consequences through an environmental disaster; 2) from typical material crime compositions by the non-obligation of the occurrence of such consequences for recognizing the crime as completed. However, without resorting to a thorough analysis of the crime composition, we will only note that in the national legislation of Ukraine the crime composition "Ecocide" includes too many evaluative concepts that are not reflected either in the current Criminal Code of Ukraine or in the legal positions of the Supreme Court of Ukraine [28].

However, in the context of an armed conflict, it is necessary to understand the difference between ecocide and a war crime against the environment. In particular, the requirements of Art. 8(2) (b)(iv) of the Rome Statute defines that a war crime is the intentional commission of an attack in the knowledge that such attack will cause incidental death or injury to civilians or damage to civilian objects or widespread, long-term and severe harm to the environment, which will be clearly disproportionate to the concrete and immediate overall military advantage anticipated [29]. However, in domestic criminal legislation, liability for such acts is provided for in Art. 438 of the Criminal Code of Ukraine. According to the specified article of the Special Part of the Law on Criminal Liability, the following violations of the laws and customs of war against the environment should be classified as: an attack on the environment as a civilian object; causing excessive damage to the environment or the possibility of causing such damage; causing large-scale, long-term and serious damage to the environment or the possibility of causing such damage; destruction or seizure of the environment or property used for the study and protection of the environment, unless this is required by urgent military necessity; striking objects under protection and used for the purpose of studying and protecting the environment; plundering objects associated with the environment and its elements; attacks, destruction, destruction or disabling of objects necessary for the survival of the civilian population; attacks on installations and structures containing dangerous forces; hostile use of means of influencing the environment; use of poison or poisonous weapons; an attack on the environment with the use of incendiary weapons [30, pp. 7-14].

To date, there is no legal basis for combating ecocide at the international level, and there is no mechanism for holding accountable corporate, government officials and states that make environmentally harmful decisions that cause oil spills, deforestation, and pollution of the world's oceans in peacetime, and during armed conflicts in general, ecocide can have unpredictable consequences, but should be assessed as a deliberate crime, since war itself is a crime and actions, therefore, are also, accordingly, a crime [4]. Protocol I to the Geneva Conventions in Part 3 of Art. 35 provides for a ban on the use of methods or means of warfare that are intended to cause, or may be expected to cause, widespread, long-term and severe damage to the natural environment [31] any other hostile use of environmental modification techniques, through the deliberate manipulation of natural processes, to alter the dynamics, composition and structure of the Earth, including its biosphere, lithosphere, hydrosphere, atmosphere or outer space. The Convention on Environmental Impact Assessment in a Transboundary Context establishes the duty not to resort to military or any other hostile use of environmental modification

techniques "that have widespread, long-term or severe effects, as a means of destruction, damage or injury to any other State Party". The term "environmental modification techniques" refers to any means of altering, through deliberate manipulation, natural processes, the dynamics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere and atmosphere, or outer space [33].

Therefore, the definition of a specific international legal construct that would fit into the logical structure of the legal concept regarding responsibility for committing ecocide during armed conflict is a pressing issue. In this context, it should be noted that it was only in March 2023 that the European Parliament voted to include ecocide in EU law. The Kakhovka disaster prompted the EU to accelerate the implementation of this ecocide law [34].

K. Ambos also focuses on the usefulness of a separate definition of "ecocide", examining whether the addition of a new international crime would better protect the environment than "the existing core international crimes that have an environmental component and on which the draft decision on ecocide is partly based". Professor K. Ambos specifically refers to Art. 8(2) (b)(iv) of the Rome Statute of the ICC, which provides a definition of an international war crime against the environment [15]. H. Voigt notes that the current reference to the Rome Statute of the ICC regarding harm to the natural environment, including harm related to military actions, is quite limited, since it does not take into account harm to the environment that may be caused in peacetime [14]. O.M. Borshchevskaya writes that ecocide harms not only humanity, but also the environment. Therefore, its recognition as a fifth grave crime offers a new, non-human-centric approach and places the environment at the center of international law. To accomplish the tasks of preventing ecocide, it is necessary to: introduce the crime of "ecocide" into the Rome Statute of the ICC and the Criminal Code of Ukraine, adding a new crime to international criminal law. Its recognition as the 5th grave crime offers a new, non-human-centric approach and places the environment at the center of international law. Including ecocide in international law will allow for the prosecution of environmental criminals even at the level of aggressor states. It is also necessary to introduce into the circulation of international humanitarian law an option, if a state is recognized as an aggressor, a terrorist, by the signs, then in a compulsory manner, without ratification of any conventions on its part, it is necessary to introduce into it a peacekeeping contingent of those countries that have decided on its illegal status. Even if the aggressor country has not ratified such a convention [4].

In the context of what has been said, we note that in the literature there are different positions and arguments regarding the implementation of the

Rome Statute in the national legislation of Ukraine [35-37]. However, we agree that Ukraine should still ratify the Rome Statute of the International Criminal Court and support the amendment to the Rome Statute, which provides for the inclusion of the crime of ecocide, which will end the immunity of top officials for committing the most serious crimes against the environment during military operations and peacetime, serving as a warning factor for the occurrence of environmental disasters in the future [38]. Moreover, it should be noted that granting Ukraine the status of a candidate for EU membership and in accordance with Articles 8 and 24 of the Association Agreement with the EU created an additional impetus for the harmonization of approaches and the intensification of actions to ratify the Rome Statute [39].

Consequently, an analysis of literary sources and legal acts governing liability for ecocide allows us to state that the existing international system of environmental law does not meet modern challenges. In our opinion, international legal norms governing ecocide issues during armed conflict are polysystemic norms of international law, since they are inherent in several institutions and branches of international law. All this emphasizes the scale of the public danger of ecocide, which occurs precisely during war.

Features of documenting, recording and investigating ecocide, problems of their improvement

It remains important in conditions of armed conflict to clarify the features of recording and investigating criminal offenses related to the commission of ecocide. Therefore, for this purpose, the National Council for the Recovery of Ukraine from the Consequences of the War and the corresponding subgroup on environmental security issues were created. As a first step, the environmental security group records all cases of environmental crimes by the occupying Russian troops in order to demand compensation for damages in international courts in the future [18].

Another problem on the way to recording and investigating ecocide in conditions of martial law is the timely detection of traces of this crime and their correct recording and removal. Unfortunately, the participants of the investigative and operational groups who go to the scene of the incident pay much more attention to damage to individual objects and human corpses. In this case, no actions are taken to search for traces of environmental pollution (soil, water resources, atmosphere, etc.), the scale of the death of representatives of the animal world, damage to the plant world, etc. are not detected and recorded. Moreover, quite often, ecologists are not included as specialists in the SOG, who would use certified equipment to search for

traces of ecocide, take samples and/or samples, determine the coordinates, area and volume of damage to ecosystem components [30, pp. 7-14].

The difficulties of investigating ecocide are due to the specific conditions of studying ecocide objects, which is explained by the use of firearms/ lethal weapons, means and sources of obtaining evidentiary information. However, in the conditions of military aggression of the Russian Federation against Ukraine, traditional forensic tools and forms of evidence collection may work to a limited extent due to the danger for all participants in investigative (search) actions, as well as the impossibility of direct access to the scene of the incident [40]. Therefore, the introduction of innovative technical and forensic tools aimed at documenting and investigating ecocide is of certain scientific and practical interest. We are talking about using the possibilities of using unmanned aerial vehicles (UAVs) capable of initiating and maintaining controlled flight and navigation without the presence of a person on board [41] – quadcopters and conducting forensic aerial photography.

The potential of this technology made it possible to consolidate the necessary forces and means to develop multifunctional unmanned aviation complexes and expand the use of the latter in conducting inspections of hard-to-reach places of various events and collecting evidence [42, pp. 368-380]. The peculiarity of the survey using UAVs is the safe and remote assessment of the consequences that were caused as a result of the ecocide, with the subsequent recording of the location of the discovery and removal of physical evidence and individual traces. Moreover, the use of UAVs in the process of forensic mapping will not only increase the accuracy of the collected data. The presentation of a three-dimensional image in the courtroom during the trial will allow a more accurate picture of the scene of the incident, and to clearly present all the physical evidence recorded at the scene [43, pp. 104-113].

Crimes committed by the Russian military on the territory of our state involve the investigation of a significant volume of events, the careful collection of a large amount of evidentiary information, the involvement of experts, specialists, and the conduct of a huge number of forensic examinations and forensic studies [44, pp. 49-53]. In this sense, the conduct of forensic examinations remains one of the main forensic means of obtaining evidentiary information during the investigation of ecocide in armed conflict [45]. During the investigation of ecocide in armed conflict, the objects of forensic examination research may be: environmental objects - soil (its properties), air, objects of the animal and plant world, watering places, feed, products and products of animal origin; corpses of various animals and birds, contaminated pastures; people (living and corpses);

substances, compounds and microorganisms that caused pollution of land, water bodies or air; sources of harmful effects on individual objects of the environment (including lethal weapons); technical condition and efficiency of the operation process of critical infrastructure facilities; damage caused to various environmental objects, natural resources; causal relationship between the cause - the conduct of hostilities (armed conflict) and the consequences.

During the investigation of ecocide, the following forensic examinations are assigned to clarify numerous circumstances: forensic-ecological, hydrological, forensic-technical, construction-technical, forensic-technological, agrotechnical, veterinary, forensic-ichthyological, chemical, sanitary-hygienic, forensic-medical, forensic-medical, forensic-scientific and other types of forensic examinations. Depending on the type of research, this allows obtaining the following forensically significant information (evidence) about: a) the source of poisoning and/or contamination of environmental objects during ecocide; b) the nature and extent of air, water, soil pollution (physicochemical properties and level of toxic substances); c) the causes of disease and death of animal objects; d) the extent of damage and negative anthropogenic impact on ecosystems (consequences of ecocide or threat of harmful consequences); e) the state of the technological process, mechanisms and equipment of critical infrastructure objects; e) the level of environmental protection of a certain region and territory (administrative unit of the state); f) substances, materials, compounds and objects (lethal or weapons of mass destruction) used in the commission of ecocide, storage, processing, the use of which is specially regulated by criminal and environmental legislation (radioactive, explosive, poisonous, potent substances, etc.); g) traces related to the commission of ecocide: traces of weapons used, explosive devices and ammunition, traces in the form of radioactive radiation absorbed by the air environment; g) traces of the death of objects of the animal and plant world and others. The activity of investigating crimes against the environment and natural resources, a type of which is ecocide, makes it possible to carry out this activity only within the framework of international cooperation and international cooperation of states [46], which should be understood as any coordinated activity of states, their bodies and state and interstate (and often non-state) organizations in terms of fulfilling common tasks [47, p. 161].

Usually, cooperation represents the cooperation of different states in countering criminal acts, the public danger of which requires the joint efforts of several states. We believe that the commission of ecocide during the armed conflict against Ukraine goes beyond its territory, violates both national and international legislation, which significantly

increases their public danger. In view of this, the counteraction to ecocide acquires an international character and must be clearly organized and methodically justified. An extremely important element of the mechanism of cooperation between states and international organizations to prevent ecocide is undoubtedly the presence of ratified international agreements on environmental protection.

To a large extent, the success of implementing the tasks of documenting ecocide in armed conflict depends on the standardization of the investigation process and the algorithmization of individual procedural actions. Therefore, innovative developments in this field of forensics should be aimed at creating methods for investigating new types of criminal offenses, tactical operations, algorithms for investigative (detective) actions, checking typical investigative versions, developing a forensic characteristic of criminal offenses, etc. [44, pp. 49-53].

According to V.A. Zhuravel, forensic investigation methodology is a mental image of a set of methods for the process (technology) of revealing and investigating crimes, determined by the relevant situations, while the methodology is an information and cognitive model, which reflects a set of methodological recommendations (advice) for solving practical problems of revealing, investigating and preventing criminal manifestations in accordance with certain situations that arise [48, p. 98]. The substantive part of forensic methodology, as noted by B.V. Shchur, constitute methodological recommendations, which are complexes of interconnected typical tips, tested by investigative practice, and proposed for use in the investigation of certain types of crimes, aimed at optimizing investigative activities [49].

An analysis of scientific sources [48; 50, pp. 176-222; 51, pp. 125-135; 52, pp. 52-67] allows us to propose the following elements as structural elements of a comprehensive methodology for investigating ecocide in armed conflict: 1) forensic characteristics of ecocide; 2) circumstances to be clarified during an ecocide investigation; 3) features of the initial stage of an ecocide investigation; 4) typical investigative situations; 5) tactics of individual procedural, investigative (search), and covert investigative (search) actions.

Conclusions

In the course of this study, a set of theoretical and practical issues of investigating ecocide in armed conflict was considered, and individual forensic tools were identified within the framework of forensic support for counteracting ecocide. Ecocide is the mass infliction of any harm (economic, ecological, anthropogenic) to human life and health, the environment,

ecosystems and natural resources as a result of armed conflict (military action). Ecocide during military operations as an international criminal offense is characterized by: open, aggressive nature of its commission; high public danger; presence of long-term harm to the environment, significant material damage and economic losses; presence of both immediate consequences, as well as remote (secondary) consequences; high level of environmental pollution, destruction of ecosystems, which is explained by the use of military/lethal weapons; limited possibilities of recording evidentiary information, certain facts and episodes of ecocide, which is explained by the use of military weapons and the difficulty of getting to the places of pollution and military operations; causing harm to life and health of people, etc.

An innovative technical and forensic tool aimed at conducting an inspection and study of the environment, recording the location of the discovery of material evidence and individual traces in conditions of limited access to the place of ecocide is the use of unmanned aerial vehicles (UAVs). The circumstances that need to be established are: a) circumstances that are significant for considering the act as an international crime; b) circumstances related to the object/location of pollution; c) circumstances related to the consequences of ecocide: material damage; level of pollution, level of destruction of environmental objects and ecosystems, concentration of substances and damage; d) circumstances determining measures to eliminate negative consequences; e) circumstances related to the mechanism of ecocide: tools and means of committing ecocide; methods of committing ecocide; f) circumstances determining the need to apply security measures in criminal proceedings; g) circumstances related to the identification of the guilty persons (states as subjects of international politics and the political leadership of the state).

It is assumed that the forensic methodology support provides for the development of a comprehensive forensic methodology for investigating ecocide in military situations, the structure of which consists of the following elements: forensic characteristics of ecocide; circumstances to be clarified during the investigation of ecocide; Features of the initial stage of ecocide investigation; typical investigative situations; tactics of individual procedural, investigative (search), covert investigative (search) actions.

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