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Introducing "Agriecocide": Framing War-Related Agricultural Destruction in Ukraine

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Abstract: This paper introduces the concept of *agriecocide*, a term that highlights environmental damage at the intersection of agricultural losses and food security. To do this, the study adopts a multidisciplinary approach combining bibliometric analysis, the Russian invasion of Ukraine as a critical case study, and normative legal methods. Bibliometric analysis mapped research on war-related agricultural and environmental damage, while the case study examined empirical evidence of Ukraine's agricultural and ecological losses. The consequences of agriecocide were defined as direct and indirect harms, encompassing material, ecological, scientific, social, territorial, logistical and long-term socio-environmental dimensions. The article compares international legal frameworks addressing agricultural destruction in terms of the protected interests and material elements they address and identifies structural limitations in existing doctrines. It demonstrates that agricultural harm is regulated only indirectly and fragmentarily, without recognising agricultural systems as integrated socio-ecological infrastructures. On this basis, this paper proposes to define agriecocide as a distinct legal category to address this gap. In addition, legal analysis identifies shortcomings in national regulatory frameworks, while normative legal drafting proposes concrete legislative amendments to strengthen Ukraine's legal response to the large-scale agricultural damage. These include: (i) reforms to land legislation to support soil restoration, demining, and bioremediation; (ii) financial mechanisms to provide state support, preferential regimes, and insurance for agricultural producers; (iii) and amendments to criminalisation of agriecocide by introducing Article 441-1 ("Agriecocide") into the Criminal Code of Ukraine, complementing the existing provision on ecocide. The paper aims to initiate scholarly and legal debate on agriecocide, emphasising its role in strengthening preventive legal mechanisms and in holding accountable those responsible for large-scale agricultural and environmental harm.

Keywords: agriecocide; ecocide; Ukraine; agrarian law; agriculture; Russia-Ukraine war; war impact; food security

1. Introduction

Russia's invasion of Ukraine has resulted in a severe humanitarian and environmental crisis, with far-reaching regional and global implications. Although calculating war-related destruction remains highly challenging during the ongoing conflict [1], existing data highlights the threat war poses to environmental sustainability in Europe, reducing numerous countries' capacities to achieve the United Nations SDGs [2]. Among the most pressing issues

emerging from Russia's war is the degradation of Ukraine's agricultural lands, with profound implications for local and global food security. The war triggered a tsunami of events that dramatically affected the world's food security [2], further exacerbating pre-existing supply chain strains [3]. In addition, Ukraine, as one of the world's leading agricultural producers and exporters, plays a critical role in supplying oilseeds and grains to the global market, according to data from the U.S. Department of Agriculture. The country has highly fertile soils by global standards, including *Chernozem* [4]. However, in the present scenario, several studies indicate that 30% of Ukrainian territory is contaminated with landmines and unexploded ordnance [5], further degrading *Chernozems*. The heavy metal content in soils in the shelled areas increased compared to the non-shelled areas [6]. Military actions, improper drainage, or inundation of agricultural lands have negatively affected soil heavy metal content [7]. Ukraine, the world's second-largest exporter of barley, fourth-largest exporter of corn, and fifth-largest exporter of wheat, experienced a 29% decline in grain production in the 2022/2023 crop year, according to the Ministry of Agrarian Policy and Food of Ukraine.

Although the international reaction to Russia's invasion of Ukraine highlights how the environment is still being undervalued, rooted in a utilitarian perspective on nature [8], scholars are actively seeking the best ways for Ukraine to hold Russia accountable for the environmental damage [9]. Existing laws on environmental protection and war crimes do not adequately capture the intent or impact of military actions on agriculture, failing to address these issues comprehensively at both national and global levels. Available data on global armed conflicts frequently lack comprehensive coverage of food-related destruction—an aspect that is rarely highlighted or thoroughly examined [10]. Furthermore, wartime environmental damage is cumulative [11], resulting in prolonged food insecurity and environmental degradation—issues that existing legal concepts struggle to address comprehensively.

Prior to the war, the Ukrainian agricultural sector could produce enough food to feed approximately 400 million people worldwide. As agricultural production highly depends on ecosystem components [12], such as soil structure and fertility [13], the current war-related degradation demonstrates the need to propose a legal framework to address war-related agricultural destruction.

Unlike conflicts where damage primarily affected urban infrastructure or non-arable land, the Russian invasion of Ukraine has severely impacted fertile agricultural regions, including Chernozem soils. In comparison, during the Gulf War, large-scale oil spills and fires devastated desert and urban regions rather than fertile farmland, with environmental damage primarily industrial in nature [14]. Similarly, in the Bosnian War (1992–1995), destruction was concentrated to industrial and urban zones [15], leading to the new term of "urbicide", meaning the killing of a city [16]. In the Vietnam War (1955–1975), the use of Agent Orange and other defoliants destroyed forests and rural vegetation, giving rise to the term "ecocide", voiced internationally by Swedish Prime Minister Olof Palme at the Stockholm Conference 1972 as 'immense destruction brought about by indiscriminate bombing, by large scale use of bulldozers and herbicides' [17]. Therefore, in contrast, Ukraine serves as a critical case, rendering visible forms of agricultural harm that may be less apparent in contexts with lower baseline productivity but are nonetheless legally and ecologically significant.

The large-scale destruction of agricultural systems during armed conflict presents a profound, yet under-theorised, challenge for international and national legal frameworks. This gap raises a core question: how can large-scale agricultural destruction be conceptualised and whether it can be legally recognised as "*agriecocide*" to address deficiencies in existing international and national legal frameworks? By introducing the concept of agriecocide, this article seeks to provide both a theoretical foundation and a normative pathway for the emerging category of environmental harm in the agricultural domain, drawing on the environmental consequences of the Russian invasion of Ukraine as a case study.

2. Materials and Methods

The need for the new concepts and legal terminology is context-dependent, facilitating a more accurate understanding of complex phenomena. Feeling uncertain about the war's impacts [2], it is crucial to initiate an academic discussion of the concept of agriecocide. This legal framework intersects with environmental degradation and agriculture. To this end, the study employs a multidisciplinary approach to introduce and substantiate the concept of *agriecocide* as a distinct category. The methodology combines bibliometric analyses, case study research, and several normative legal methods.

For the literature mapping, we used bibliographic databases: Google Scholar and Scopus. A bibliometric analysis was conducted using VOSviewer to map existing research on war-related environmental destruction, agricultural losses, and the related concepts of ecocide and genocide. Data were collected from the Scopus database, including titles, abstracts and keywords, to identify the current state of the art. Keyword co-occurrence

and citation network analyses were used to identify research trends, thematic clusters, and existing gaps using the search queries TITLE-ABS-KEY (agriculture AND War), (agriculture AND genocide), and (agriculture AND ecocide).

Targeted searches were conducted across grey literature sources using Google Advanced Search with the terms "agriecocide" and "agricultural ecocide" (site:.edu, site:.org, site:.int, site:.gov).

The case study analysis provides a detailed examination of agriecocide and its consequences, with particular focus on the Russian invasion of Ukraine. It is acknowledged that one of the main reasons for the failure of environmental claims is "a lack of sufficient baseline information and evidence of causality to determine the extent of damage attributable to the alleged illegal acts" [11]. However, Russia's war against Ukraine has produced the evidence necessary to address these gaps, illustrating the scale of environmental degradation caused by military activities. This case enables the classification of consequences into direct and indirect harm, with further specific subdivisions. Quantitative statistical data, such as governmental reports on the environmental impacts of war by the Ministry of Environmental Protection and Natural Resources of Ukraine, helped assess the impact of Russia's military actions and empirically support the classification of agriecocide consequences. The Ukrainian EcoZagroza platform served as a centralised resource for collecting and recording real-time data on environmental threats. It uses standardised forms and geographic referencing to ensure accurate and timely monitoring of ecological risks across the country.

This study employs a doctrinal legal research methodology grounded in systematic analysis of statutory provisions and international legal instruments. It focuses on identifying how agricultural destruction is conceptualised within existing legal frameworks—international and Ukrainian law and whether agricultural systems are recognised as distinct protected legal objects.

Further, the article continues with a comprehensive review of existing national Ukrainian legal frameworks to identify gaps in the current legal system. Legislative texts and their amendments were accessed using the Ukrainian legal information system "LIGA: ZAKON". A legal analysis was conducted to propose legal amendments and identify a feasible path for integrating agriecocide. A wide selection of legal acts of Ukraine were examined to trace the changes introduced during martial law and to determine proposals for legislative improvement and inclusion of the concept of 'agriecocide'. The legal document analysis was based on several primary legal sources, in particular: The Land Code of Ukraine, The Penal Code of Ukraine; Laws of Ukraine "On Amendments to Certain Legislative Acts of Ukraine Regarding the Creation of Conditions to Ensure Food Security in Martial Law" dated 24 March 2022, "On Amendments to Certain Laws of Ukraine Regarding Uninterrupted Production and Supply of Agricultural Products During Martial Law" dated 12 May 2022, etc.; Law of Ukraine "On Land Protection" dated 19 June 2003; Law of Ukraine "On State Support of Agriculture of Ukraine" dated 24 June 2004. Tax code of Ukraine; Resolution of the Cabinet of Ministers of Ukraine "On approval of the Procedure for determining damage and losses caused to Ukraine as a result of the armed aggression of the Russian Federation" dated 20 March 2022.

Normative legal drafting was employed to develop concrete proposals for amending national legislation to criminalise agricultural destruction. This includes drafting a proposal to amend Article 441-1 ("Agriecocide") of the Criminal Code of Ukraine, complementing existing provisions on ecocide, and identifying necessary amendments to other relevant legal frameworks to address legal gaps.

The case study is not intended to establish definitive causal relationships between military action and specific agricultural outcomes, but to illustrate how war-related environmental damage can cause distinct agricultural destruction with long-term implications. By combining these methods, the study provides a structured, legally grounded framework for understanding and addressing agriecocide, demonstrating both the practical consequences of war on agriculture and the necessary legislative measures that must be enacted.

3. Conceptual Framing of 'Agriecocide'

3.1. Introduction of the Term 'Agriecocide': Review of Scholarly Literature and Terminological Proposal

While language is a dynamic construct, constantly evolving to meet societal needs, every linguistic transformation is driven by new experiences that require new terminology for clear reference. The Russian invasion of Ukraine has caused significant agricultural losses, underscoring the need to initiate a discussion on new terminology that can fully capture this type of damage. In this section, we explain the rationale behind the proposed term agriecocide. We acknowledge that this concept and its definition are not yet comprehensive; rather, this paper serves as an initial step in introducing and framing the discussion around agriecocide within academic and legal discourse.

The prefix "agri" (derived from Latin *agrarius*, meaning "land") adds a specific meaning to the term, relating to land, land ownership, land use, and agricultural production. The suffix "-cide", from Latin *caedere* (to kill), indicates destruction of land and agricultural resources. Therefore, one might consider "agricide" as a potential

alternative to the proposed term "agriecocide", following the logic of terms like "ecocide" and "genocide". However, it is important to note that the term "agricide" already exists in a different context, referring to a man-made pesticide, specifically one of the trade names of Lindane, which has been widely used to control insect pests in agriculture, public health, and medicinal applications [18,19]. Being increasingly relevant for the agrarian legal doctrine, agriecocide, however, has received limited attention in scholarly literature, both in Ukraine and internationally. A search of the Elsevier database for "agricide" (specifically agricides) and "agrocide" returned four publications each, and a search for "agricide" (specifically agricides) and "agrocide" (specifically agricides) returned four publications each. However, none of these publications addressed the consequences of illegal actions in the agricultural sphere; they focused exclusively on insecticides and pesticides. To avoid potential confusion with the existing trade name "Agricide" and to ensure legal and conceptual clarity, we recommend adopting the distinct term "agriecocide" in future academic research and legislative contexts.

A targeted search of Google Scholar titles and abstracts yielded no results for the term "agriecocide" and only four results for "agroecocide." All four publications originate from Ukraine. One corresponds to a prior publication co-authored by a member of the present author team [20]. Two other publications employ the term only tangentially, citing Kurman's work [21,22]. The fourth result does not engage with the concept and appears to be unrelated. This demonstrates that "agroecocide" lacks conceptual consolidation and coherent usage in academic literature, while the more precise term "agriecocide" is not currently established as a recognised analytical or legal category. This highlights the term's novelty and the need for further theoretical and legal exploration.

Given its legal nature, agriecocide can be considered both a type of ecocide and a form of genocide. Although ecocide shares the closest conceptual nexus with agriecocide, these two terms are not synonymous. While ecocide literally means "killing of the environment", agriecocide encompasses more than just environmental destruction and is a more human-centric concept. It also involves the destruction of resources and food products essential for human survival, thereby incorporating elements of genocide. Its physical elements are the following five actions, enumerated in the *Convention on the Prevention and Punishment of the Crime of Genocide (1948)*: (1) killing members of the group, (2) causing serious bodily or mental harm to members of the group, (3) deliberately inflicting on the group conditions of life calculated to bring about its physical destruction in whole or in part, (4) imposing measures intended to prevent births within the group, (5) forcibly transferring children of the group to another group. Consequently, we propose that agriecocide encompasses both ecocide and genocide elements, as it destroys nature and can cause a food disaster, or even famine, thereby posing a potential threat of complete or partial destruction of population groups, nations, a specific region, state, or the world, causing damage to objects and agricultural resources. However, unlike ecocide or genocide, agriecocide does not encompass general environmental harm or social consequences *per se*; these are treated as derivative effects rather than constitutive elements. In this regard, the concept of agriecocide should also be considered as a legal category and defined as:

> *"a deliberate mass destruction, poisoning or contamination of objects and resources of the agricultural sphere (soils, water bodies, forests, crops, plantations of agricultural plants, livestock and other agricultural assets), as well as any other conduct likely to cause serious damage to agro-ecological systems or to food security."*

In defining "agriecocide", it is neither practical nor necessary to enumerate every agricultural object that could be destroyed or damaged, as such a list would be too extensive. Legal provisions cannot realistically cover all possible objects within the agricultural sphere or every conceivable scenario of environmental harm. In legal drafting, specifying every component of a legal category is not always required; a "common sense" approach can often suffice. Ukrainian legislation frequently employs open-ended lists using phrases such as "and others" when defining legal concepts, which allows for flexibility and broader interpretation. For example, the Law of Ukraine on Aquaculture and the Law of Ukraine on Fisheries, Industrial Fishing, and Protection of Aquatic Biological Resources (8 July 2011) illustrate this approach. These laws provide detailed examples of relevant objects and processes while maintaining flexibility through open-ended definitions, ensuring that the legal framework can encompass a wide range of elements within their respective fields.

This definition establishes the foundation for understanding agriecological disasters and food crises as consequences of agriecocide. While the proposal may spark debate about the necessity of introducing a new term, it aligns with the view that 'law takes shape through societal acceptance' [23]. Such societal acceptance, however, cannot exist without the linguistic framing of the novel concept. In 2016, George Susan introduced the term "geocide", expanding upon the concept of ecocide by addressing limitations related to specific environments or geographic locations. This aligns with Susan's argument on the need for new terminology: "Without a name, we

have no concept, and without a concept, we cannot combat it. This is why we searched for a new word." [24]. In light of this, we advocate introducing a new term to designate agricultural damage: agriecocide.

3.2. Tracing the Use of 'Agriecocide' Beyond Peer-Reviewed Literature

To explore how the concept of agriecocide circulates beyond peer-reviewed academic literature, we conducted a targeted mapping of grey literature using Google Advanced Search. Grey literature was broadly understood to include institutional websites, NGO publications, online talks, digital repositories, and non-indexed academic outputs.

The search was conducted in several stages. First, we searched for the exact term "agriecocide". This query yielded minimal results, suggesting that the term is not widely adopted in public or institutional discourse. We then expanded the search to include alternative written forms, most notably "agri-ecocide", to capture stylistic or editorial variations. Finally, we broadened the search to the more descriptive term "agricultural ecocide", resulting in a modest increase in both the number and diversity of sources.

To assess the institutional contexts in which the term appears, we applied domain-specific filters, covering academic (site:.edu), organisational (site:.org), governmental (site:.gov), and international (site:.int) domains.

The search for "agriecocide" returned only two webpages, all linked to earlier presentations by the authors of this study, suggesting that the term has not yet been widely adopted. Using the hyphenated form "agri-ecocide" yielded four results: three webpages hosted on Common Ecologies and one YouTube video referencing the same NGO. In the Transforming Agriculture compendium from Common Ecologies [25], agri-ecocide is described as the environmental destruction caused by industrial, extractive, and capitalist agriculture, framed not only as harm to ecosystems but also as violence against both human and non-human life. These findings suggest that Common Ecologies is essentially the only platform where the term is currently visible and circulated.

In the organisational domain (site:.org), five sources were found. These included NGO and advocacy platforms such as *Local Futures* and *Resilience.org* (blog posts by Chris Smaje), where the term '*agricultural ecocide*' is not formally defined but is used within a critique of industrial agriculture and environmental harm. The third one was a museum website about the Finnish Forest Museum Lusto, which used the term rhetorically in a question about soil and forest management. Other sources included a JSTOR review of the book *Ecocide in the USSR* by Feshbach and Friendly (1992) [26], and a Cambridge Core article by Sharipova (2019) citing the same book on the "worst single instance of agricultural ecocide in the Soviet Union" [27]. In these sources, *agricultural ecocide* appears embedded in broader discussions or rhetorical framing rather than as a consistently defined concept.

In the academic domain (site:.edu), only one result appeared: Gloria Wang's Plan II Honours Thesis (2024) on environmental and climate consequences of the Russo-Ukrainian War, which references *agricultural ecocide* in connection with the destruction of the Aral Sea, again drawing on Feshbach and Friendly's *Ecocide in the USSR* (1992)

In the governmental and international domains, no results were found for either site (.gov or .int). This absence suggests that the term "agricultural ecocide" has not been adopted within governmental, intergovernmental, or formal policy-oriented discourse.

This mapping exercise has several limitations that should be acknowledged. First, the search relied primarily on Google Advanced Search; as a result, some relevant materials may not have been retrieved. Second, the analysis was term-dependent. The searches focused on specific keywords ("agriecocide", "agri-ecocide", and "agricultural ecocide"), so related discussions using different vocabularies were not captured. Consequently, the mapping reflects the circulation of the term rather than the full extent of the phenomenon it seeks to describe. Third, the search was conducted exclusively in English, which significantly limits the scope of the findings. Despite these limitations, the mapping remains valuable as an exploratory exercise. These results show that the term currently circulates in a limited set of contexts and has not yet been widely adopted in mainstream academic or policy literature, and highlight both the term's novelty and the discursive gap.

3.3. Visualising the Scientific Landscape with VOSviewer: Agriculture and War, Genocide and Ecocide—Mapping Existing Interconnections

This section presents a bibliometric analysis aimed at visualising the scientific landscape surrounding agriculture in relation to war, ecocide, and genocide. The purpose of this analysis is to identify patterns of research, highlight key themes and interconnections, and explore how these topics are represented and linked in peer-reviewed literature. Using VOSviewer, co-occurrence networks of keywords were mapped to reveal clusters of related research topics, providing a structured overview of the scientific discourse in this area.

The bibliometric network analysis was performed using VOSviewer for visualising scientific landscapes. The documents for analysis were collected from Elsevier (Scopus), a scientific database of peer-reviewed academic publications, by searching for the words war, ecocide and genocide in the article title, abstract or keywords

categories, using the search queries TITLE-ABS-KEY (agriculture AND war), (agriculture AND genocide), (agriculture AND ecocide).

The search query TITLE-ABS-KEY = ("agriculture" AND "war") yielded 4139 papers containing 16,305 keywords. When applying a threshold of a minimum of 20 keyword occurrences, 274 keywords met the criterion. For each of these keywords, the total strength of co-occurrence links with other keywords was calculated, and those with the highest total link strengths were identified. Further refinement using a minimum occurrence threshold of 50 reduced the set to 85 keywords. These keywords were subsequently grouped into four clusters (for more details, see Figure 1).

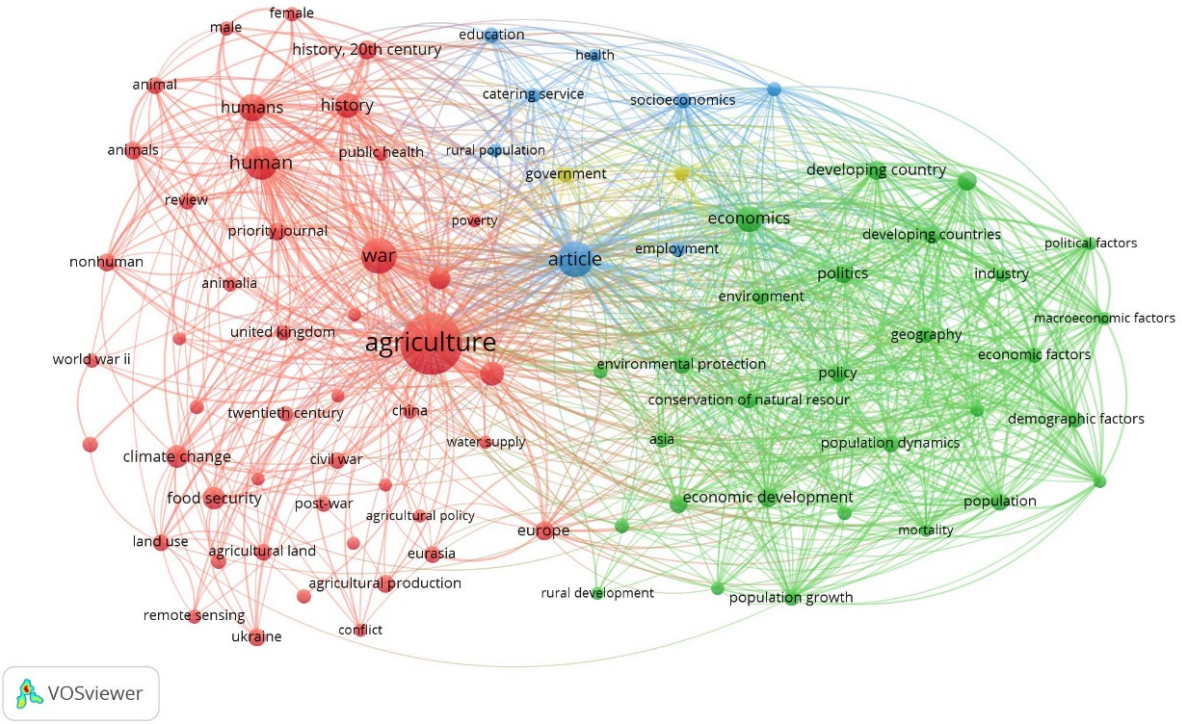

Figure 1. Bibliometric network analysis by search TITLE-ABS-KEY = ("agriculture" AND "war").

Cluster 1 (coloured red) is of particular interest to the paper, as it includes the keyword "Ukraine" among others. This keyword shows strong co-occurrence with seven key terms: agriculture, war, human, article, climate change, food security, and food supply. This finding supports the assertion that Ukraine serves as a prominent case in research on the intersection of agriculture and war, particularly in discussions of food security and climate impacts (see Figure 2).

The search query TITLE-ABS-KEY = ("agriculture" AND "genocide") yielded 54 papers, totalling 352 keywords. When applying a minimum occurrence threshold of two, 30 keywords met the criterion. These were further analysed for their co-occurrence relationships. Within this network, Ukraine appeared as a keyword with strong co-occurrence with the terms genocide, colonialism, famine, and population dynamics (cluster coloured in yellow; Figure 3). This indicates that research at the intersection of agriculture and genocide frequently references Ukraine, particularly in the context of historical famines and colonial dynamics—which may relate to its colonial legacy and the Soviet-imposed famine known as the Holodomor of 1932–1933.

The search query TITLE-ABS-KEY = ("agriculture" AND "ecocide") yielded 15 articles containing 245 keywords. Since no minimum occurrence threshold could be applied, all 245 keywords were included in the analysis. Some of these keywords were not interconnected in the co-occurrence network; however, Ukraine emerged as a relevant term, appearing in association with 'dam destruction' and the 'Kakhovka Reservoir'. This suggests that recent discussions on agriculture and ecocide increasingly focus on the ongoing Russian invasion.

Overall, the bibliometric analysis highlights Ukraine as a case where agriculture is profoundly affected by conflict and war, historical atrocities, and environmental destruction. These patterns underscore the need for a conceptual framework capable of capturing the systematic destruction of agricultural systems, supporting the introduction of the term "agriecocide" and positioning Ukraine as a key case. Emerging from Russia's war against Ukraine, the following subsection examines the implications of agriecocide and explores its legislative prospects, advocating for a unified and coherent conceptualisation of the term.

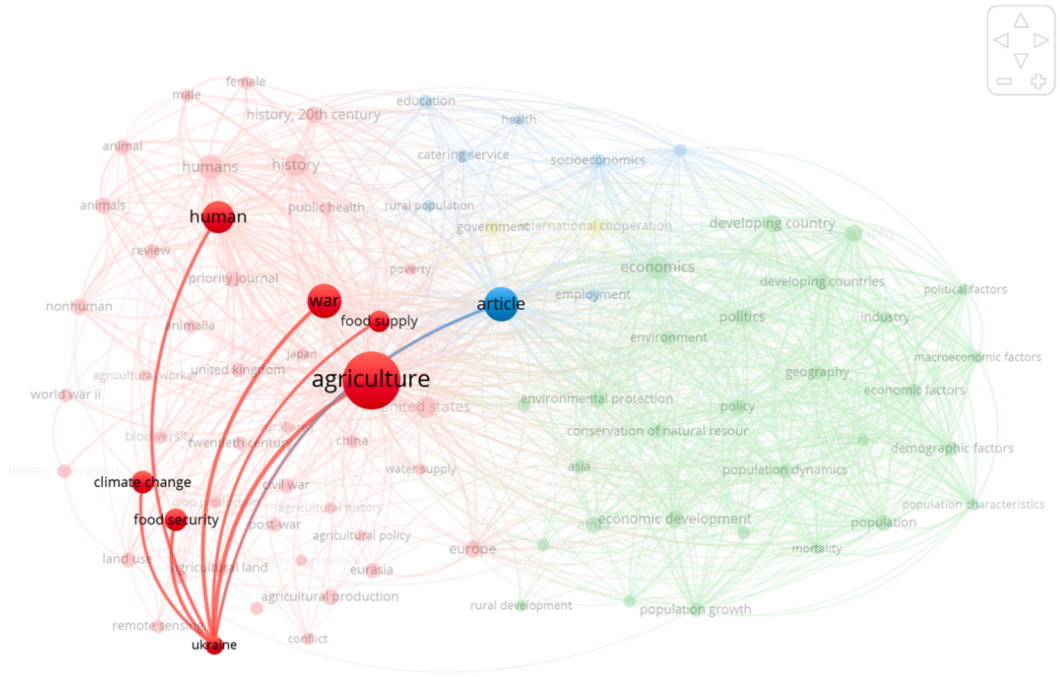

Figure 2. Co-occurrence links by search TITLE-ABS-KEY = ("agriculture" AND "war") with the keyword "Ukraine".

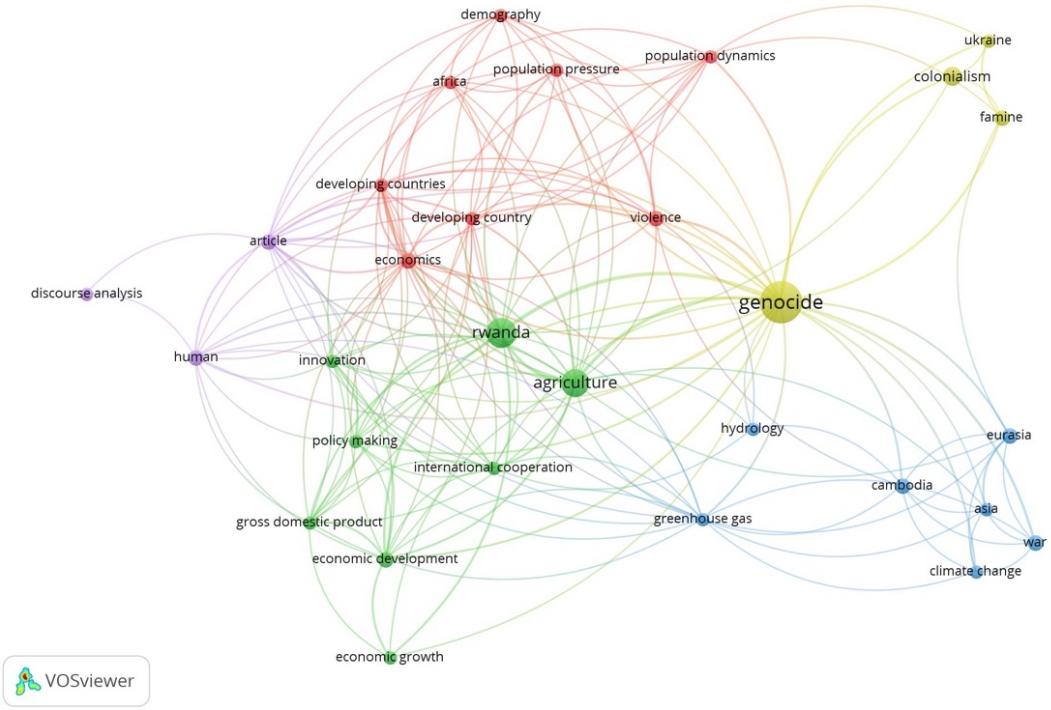

Figure 3. Bibliometric network analysis by search TITLE-ABS-KEY = ("agriculture" AND "genocide").

4. Towards a Better Understanding of Agriecocide: Implications of the Russian Invasion of Ukraine

The agrarian sector in Ukraine is currently a direct victim of the war, since soil resources are considered the primary factor of production and the basis of Ukraine's economy [28,29]. According to the Ukrainian portal of agricultural business, direct losses of agricultural assets alone amounted to USD 8.7 billion [30] as of June 2023. These include: (i) damage caused to soils; (ii) damage caused to assets used in agriculture (as agricultural machinery, granaries and other objects of agricultural infrastructure, livestock, perennial plantations, production premises, and manufactured products). Military activities significantly impact soil properties [31], disrupt their geomorphological structure, and cause disturbances, which can be broadly categorised into three types: physical, chemical, and biological [32]. In total, this contributes significantly to the global loss of productive soils and landscapes [33,34]. The United Nations Environment Programme's screening of environmental threats recognised

the war as toxic [35], destroying the natural environment, the means of livelihood for the population, and its health, as well as the air, water, and food systems [36]. Military operations lead to a range of hazardous consequences for agricultural land, including mining, debris from missile warheads, pollution by heavy metals and their compounds from shelling, and soil compaction from heavy military equipment [37]. In addition, the construction of trenches, dugouts, and various other military infrastructure damages the soil. Studies highlight that approximately 50 tonnes of iron, 1 tonne of sulfur compounds, and 2.35 tonnes of copper can infiltrate the soil due to shelling in just one square kilometre [38]. This is known as "military soil degradation"—a consequence of military actions that degrade agricultural lands, rendering them economically unprofitable [39]. Due to the Russian Federation's military aggression, colossal damage was caused to Ukraine's agricultural lands, with long-term negative consequences. In general, soil formation is a slow process, occurring at approximately 0.06 mm per year [40]. In addition, the economic factor is that soils affected by military activities are extremely expensive to restore [2]. Therefore, the damage inflicted by the Russian Federation on Ukraine's agricultural sector and environment will have repercussions lasting for several generations, which highlights the urgent need for protection.

Land degradation is a widespread global phenomenon resulting from climate change and unsustainable land-use practices, which poses a significant challenge to humanity. The war in Ukraine has exacerbated this problem, as the country contains one-fourth of the world's chernozems—the most fertile soils, with high agricultural productivity—critical to ensuring food security. Consequently, a substantial and comprehensive update of existing legislation is necessary, both to regulate land restoration and to establish an effective legal regime for soils [41,42], which form the foundation of state food security. While the undeniable impact of military actions on the agricultural sector is recognised, it is important to highlight additional specific consequences related to agriecocide. Within the context of Russian aggression, these consequences can be categorised into direct and indirect impacts, as illustrated in Table 1.

Table 1. Direct and indirect impacts of Russian aggression on Ukraine's agricultural sector.

Category	Subcategory	Specific Consequences in Russia's War Against Ukraine
Direct impact	Ecological	• Destruction of landscape and contamination of natural habitats by military actions [43]; • Large-scale disaster due to the explosion of the Kakhovska Hydro Power Plant (HPP), resulting in widespread flooding [44].
	Material/Financial	• Destruction of agricultural resources (crops); • The destruction of grain storage facilities has a significant impact on global food security.
	Scientific	• Destruction of the National Centre of Plant Genetic Resources in Kharkiv [45], which impacts agricultural research and selective breeding; • Damage to Askania Nova [46].
	Territorial	• The military occupation of key agricultural regions, where production is primarily concentrated in the eastern and southeastern parts of the country [47], renders land usage unfeasible; • Mined territories [48].
Indirect impact	Social	• Forced migration leading to a shortage of skilled labour in agriculture [49]; • Gender imbalance in the agricultural sphere [50].
	Logistics	• Disruption of logistics chains, increased transportation costs, sea ports and roads blockade, exacerbating logistical challenges [51]
	Other Expenses	• Relocation expenses for agribusinesses are due to the challenges of finding suitable agricultural land in the western part of Ukraine.
	Long-term socio-ecological consequences	• Loss of biodiversity due to disrupted agroecosystems [52]; • Increased individual-level food insecurity [53]; • Potential intergenerational psychological distress linked to wartime food insecurity and the collective memory of the Holodomor.

To complement Table 1, we provide a more detailed explanation of the impacts of Russian aggression on Ukraine's agricultural sector, beginning with the examination of the *direct harms of agriecocide* in the Ukrainian context.

(1) Ecological Impact

(i) *Destruction of natural resources:*

Military actions have caused extensive damage to land and other natural resources. As of April 2024, approximately 8096 square kilometres of Ukrainian territory had been affected by fires resulting from hostilities [40]. Of this area, 1047 km² of forestland was burned [54]

(ii) *Destruction of the Kakhovska Hydroelectric Power Plant:*

The destruction of the Kakhovska Hydroelectric Power Plant (HPP) constitutes a major ecological and material disaster. This large-scale event has affected urban areas, agricultural lands, forests, wetlands, and grassland ecosystems. Agricultural activities have been particularly impacted, with the loss of cropland and productive territory, posing substantial challenges for future farming in the region [55]. Therefore, agriecocide encompasses not only direct attacks on crops and farmland but also the deliberate disruption of critical water systems that sustain agriculture. Hussam Hussein's correspondence in *Nature* [56] highlights how attacks on irrigation systems, reservoirs, and other water infrastructure in Ukraine have magnified the impact of agricultural destruction, demonstrating that control over water is a key vector of wartime food insecurity. Therefore, recognising water infrastructure as an integral component of agricultural systems strengthens the conceptual framework and reinforces the need for legal mechanisms that prevent and penalise such indirect but strategically significant harms.

(iii) *Damage to protected ecosystems:*

Another notable ecological loss is the damage sustained by the Askania Nova Biosphere Reserve in Kherson Oblast [57]. Established in 1898, Askania Nova is Ukraine's first nature reserve and contains the largest area of virgin steppe in the country, representing a unique and irreplaceable ecosystem. Due to military activity, three fires occurred in the reserve in 2022, burning almost 1400 hectares [54].

The Black Sea Biosphere Reserve, another critical ecological area, has also been occupied by Russian forces [58]. This territory is included in the international Ramsar Convention list, encompassing Yahorlytska Bay—a wetland located in the northern Black Sea coastal region between the Kinburn and Yahorlyk Kut peninsulas [59]. The peninsula also forms part of an important bird migration corridor (Carpathian Convention) [60]. The long-term ecological consequences of such destruction remain difficult to assess but pose significant threats to regional ecosystems and biodiversity.

(2) Material Losses

(i) *Destruction of agricultural resources:*

Agricultural resources—including soils, water bodies, forests, crops, plantations, livestock, and other agricultural assets—have been extensively damaged or destroyed as a direct consequence of hostilities.

(ii) *Destruction of agricultural storage facilities:*

Russian attacks have targeted grain storage infrastructure owned by both international and Ukrainian companies, including Kernel, Viterra, and the CMA CGM Group. The reservoirs and berths of the Odesa port were also damaged. In a single attack in July 2023, 60,000 tonnes of grain were destroyed in the port of Chornomorsk. Between July and September 2023, Russian missiles and UAVs destroyed an estimated 280,000 tonnes of grain [61]. These assaults have had severe consequences for Ukraine's trade capacity and its ability to ensure national and global food security [62]. According to the Fourth Rapid Damage and Needs Assessment [63], Ukraine's agricultural sector has sustained $83.9 billion in damages and losses since the war began, with an additional $1.6 billion in losses in the irrigation sector as of December 2024.

(3) Scientific Losses

(i) *Destruction of genetic resources:*

One of the ten largest gene banks in the world—the National Centre of Plant Genetic Resources of Ukraine, part of the Institute of Plant Breeding, was destroyed. This institution preserved 151,300 samples representing 544 crop species and 1802 plant species [62]. In 2023, the FAO and the European Union supported the relocation of Ukraine's national seed collection to a secure site to protect these irreplaceable resources [64].

(4) Territorial Impact

(i) *Occupation of territories:*

The occupation of cities such as Mariupol and agricultural regions including Donetsk, Luhansk, Zaporizhzhia, Mykolaiv, and Kherson has severely limited the use of agricultural lands, directly reducing

agricultural output. In addition, territories near the front line remain difficult to cultivate due to landmines and ongoing hostilities, resulting in missed planting and harvesting periods [65].

Moving further to the *indirect harm* of Russian aggression on the Ukrainian agriculture sector, the following should be mentioned:

(1) Social Impact

According to the FAO report "Ukraine: Impact of the War on Agricultural Enterprises" (2023) [66], the war has led to a significant reduction in the cultivation areas of grain and oil crops, along with a sharp rise in production costs. Over 90% of crop producers and around 60% of livestock producers report financial distress, resulting in an estimated $3.85 billion in economic losses. However, this figure does not account for the indirect impacts of the war, such as (1) forced migration and (2) military mobilisation. The mobilisation led to a relative shortage of male labour in the agricultural sector, prompting a higher proportion of women to take on physically demanding agricultural tasks and operate complex machinery [50]. Consequently, the war induced a gender imbalance in farm labour, with women assuming roles traditionally performed by men.

As of June 26, 2023, the Office of the United Nations High Commissioner for Refugees reported that approximately 5.98 million Ukrainian migrants were residing in Europe, and an additional 362,000 were outside Europe. Nearly 40% of these—about 2 million—are located in Germany and Poland [67]. This demographic shift has created severe labour shortages across multiple economic sectors, with agriculture among the most affected. According to the study *"Assessment of the Labour Market in Ukraine 2024–2025"* by Helvetas Ukraine & State Employment Service of Ukraine (2025) [68], the highest demand for skilled workers (40.7%) is observed in the agricultural sector. As returning veterans and newly trained women enter agricultural roles, the gap continues to widen. Small and medium-sized enterprises in particular have been hardest hit [50]. In some cases, up to 100 employers compete for a single qualified applicant. The agribusiness sector faces a critical deficit of key professionals, including engineers, tractor operators, harvesters, agronomists, electricians, mechanics, truck drivers, and elevator operators.

According to the Poltava Regional State Administration, approximately 64% of agricultural enterprises report shortages within specific divisions, and 14% indicate a complete lack of staff. Yur Gazeta (2024) notes that although agricultural companies are permitted to reserve up to 50% of their workforce, the combined effects of mobilisation and public scepticism toward formal employment have significantly constrained the recruitment of qualified personnel [69].

(2) Logistics Impact

(i) *Disruption of logistics chains:*

The disruption of agricultural logistics has led to increased transportation and shipping costs, while domestic commodity prices have plummeted, resulting in additional losses of approximately $18.5 billion [70]. Targeting infrastructure that facilitates food exports to the rest of the world threatens the livelihoods of millions of people [50].

(3) Other Expenses

The relocation of agribusinesses from the Eastern and Southern regions of Ukraine to the West [71].

(4) Long-term socio-ecological consequences

Beyond immediate and medium-term damages, agriecocide also entails profound long-term socio-ecological consequences. In addition to biodiversity loss caused by disrupted agricultural ecosystems, where war-related pollution from heavy metals and industrial chemicals has degraded previously fertile agricultural environments [52], these impacts also manifest in increased individual-level food insecurity during wartime [53]. Conditions of food insecurity, particularly in the Ukrainian context, may also exacerbate potential intergenerational psychological distress linked to collective memory shaped by the Holodomor, the famine of 1932–1933. The Holodomor is widely seen as an intergenerational trauma among Ukrainians [72] and a national collective symbol of suffering with which Ukrainians identify today [73]. In this sense, agriecocide emerges not only as an environmental crime but as a persistent socio-ecological harm.

Agriecocide Beyond Ukraine: Global Food Security

Moving from the consequences of agriecocide committed during the Russian war against Ukraine to a broader perspective, it is important to note contemporary threats to food security, particularly the "weaponisation" of food. Recent studies have highlighted that the war could compromise the resilience and capacity of food systems [74]. This includes disruptions to food supply chains and the use of food as a tool of geopolitical influence. According to Kemmerling et al. (2022), hunger, as a "weapon of war" [75], is one of the strategies that directly undermine

food security. Consequently, the Russian War in Ukraine constitutes a significant threat to global food security (SDG 2).

The Kyiv School of Economics review indicates that an additional USD 56.3 billion will be required for reconstruction and recovery in the agricultural sector [76]. Despite Ukraine achieving a record grain and oilseed harvest of 106 million tonnes in 2021 (State Statistics Service of Ukraine), the Global Food Security Index ranked Ukraine only 58th globally, reflecting moderate indicators of accessibility, quality, and safety [77]. With the War ongoing, Ukraine's rank fell to 71st out of 113 countries in 2022, with a score of 57.9 points. Food security has further deteriorated due to the destruction of agricultural infrastructure, including targeted artillery shelling of granaries, disruptions to sea routes for agricultural exports, and violations of the Grain Agreement. These developments pose a direct and tangible threat to both domestic and global food security, constituting agriecocide. Zhang et al. (2023) report that 279 countries and territories were affected to varying degrees by food supply disruptions resulting from the Russia–Ukraine war, with Georgia, Armenia, Kazakhstan, Azerbaijan, and Mongolia identified as highly vulnerable, and the Democratic Republic of Congo, Ethiopia, Egypt, and Pakistan considered highly vulnerable [78].

According to recent World Bank data, the global food crisis has been further exacerbated by trade restrictions on food and fertilisers. As of 22 April 2024, 16 countries implemented 22 food export bans, and 8 countries imposed 15 export-limiting measures [63].

While Ukraine constitutes the primary empirical case for this study, the phenomenon of agriecocide is not unique to the Russia–Ukraine War. Comparative analysis reveals that the intentional or systematic destruction of agricultural systems has been employed across multiple conflict settings.

Elements consistent with agriecocide have also been observed in other contemporary armed conflicts. In Syria, for instance, prolonged military operations and explosive remnants of war have contributed to the destruction and degradation of agricultural land, including widespread contamination by unexploded ordnance that prevents access to arable fields and damages irrigation systems [79–81]. Conflict-related attacks on farmland and infrastructure have disrupted crop production and degraded soil quality, reducing agricultural productivity and contributing to food insecurity [82]. The International Security & Development Center (2024) notes that the combined impact of damaged irrigation infrastructure from the conflict has further constrained food production, exacerbating long-term ecological harm and food insecurity in the region. As of January 2025, "only 56% of the planned irrigated land had been planted" [83], significantly hindering food production. This comparative perspective underscores the transferability of agriecocide as a conceptual and legal category.

Recognising these enduring impacts emphasises the systemic nature of agriecocide and underscores the necessity of legal frameworks that capture these cumulative and intergenerational impacts. Given the scale of consequences, there is an urgent need to strengthen the legal framework to ensure effective environmental protection, accountability for war-related ecological damage, and sustainable recovery of the agricultural sector. Therefore, the following section addresses the existing legislative landscape and provides recommendations for necessary legal reforms in Ukraine.

5. Agriecocide: Limits of Existing Legal Frameworks

To determine whether "agriecocide" represents a necessary doctrinal refinement rather than mere terminological duplication, this article systematically examines existing legal categories through the lens of their protected interests and material elements. This section employs a doctrinal legal research methodology grounded in analysis of provisions and international legal instruments. First, it analyses applicable international legal frameworks, including core international crimes and emerging proposals for environmental crime, by identifying their protected interests and material elements. Second, it examines several relevant Ukrainian laws, including environmental crimes, war crimes, and property-related offences, using the same analytical criteria. The key question is whether current national (Ukrainian) and international frameworks recognise agricultural systems as distinct protected legal objects, or whether agricultural harm remains conceptually absorbed within broader legal categories. The comparative data below identify structural limitations in existing doctrines, first within international legal frameworks (Table 2) and subsequently Ukrainian law (Table 3).

Table 2. Scope of existing international legal frameworks in relation to agricultural destruction.

Concept	Legal Source	Protected Interest	Material Elements	Doctrinal Limitation in Relation to Agricultural Systems
Ecocide	Independent Expert Panel for the Legal Definition of Ecocide (proposed definition, 2021)	Environment as such	Severe, widespread or long-term environmental damage	Does not isolate agricultural systems as socio-ecological infrastructures
Genocide	Rome Statute of the International Criminal Court, Art 6; Article II (Genocide Convention, 1948)	Protected groups (national, ethnic, racial, or religious groups)	Specific intent to destroy a group (dolus specialis)	Agricultural destruction is only relevant if the specific intent to destroy a protected group can be proven
War crime	Rome Statute of the International Criminal Court, Art 8(2), Additional Protocol I to the Geneva Conventions, 1977, Art 54(1)-(2)	Civilian objects (objects indispensable to civilian survival)	Intentional attack for starvation	Fragmented protection; addresses specific acts, not systemic dismantling of agricultural systems
Weaponisation of food	Policy discourse	Food access as a tactic or method of warfare	Strategic use	Not a legal crime category; lacks doctrinal elements and accountability mechanism

Table 3. Scope of Ukrainian law in relation to agricultural destruction.

Provision	Legal Source	Protected Interest	Material Element	Doctrinal Limitation in Relation to Agricultural Systems
Ecocide	Criminal Code of Ukraine (Art. 441)	Environment	Mass destruction of flora/fauna, poisoning of the atmosphere/water, other actions causing ecological catastrophe	Not include agricultural ecosystems essential to food production
Violation of laws and customs of war	Criminal Code of Ukraine (Art. 438)	IHL-protected persons and objects	Unlawful destruction	Agricultural harm addressed only insofar as it constitutes unlawful destruction
Pollution or Damage to Land	Criminal Code of Ukraine (Art. 239)	Land use and regulatory compliance	pollution or damage caused by substances, waste, or other materials	Limited to land pollution and degradation
Destruction of property	Criminal Code provisions on property crimes	Property	Damage or destruction of property	Individualised property harm; does not capture systemic agricultural collapse or food security consequences

The comparative analysis demonstrates a consistent structural pattern in both Ukrainian and international law: agricultural destruction is regulated, but only indirectly and through dispersed legal categories. Within the Criminal Code of Ukraine, environmental provisions (Art. 441; Art. 239), war crimes (Art. 438), and property offences address specific dimensions of agricultural harm—ecological damage, unlawful destruction, and individual property loss. Yet, none conceptualises agricultural systems as distinct protected objects (see Section 6.4 for a more detailed analysis).

A similar fragmentation occurs at the international level within the framework. Agricultural destruction is captured only insofar as it constitutes environmental damage, starvation of civilians, or an element of genocide. The integrated character of agricultural systems within combined ecological, economic, security, and social functions—remains unarticulated. Recognising this gap provides the analytical basis for defining agriecocide as a distinct category aimed at doctrinal integration rather than expansion.

At the same time, any proposal introducing new category must be situated within the institutional structure of international criminal law. The architecture of the International Criminal Court reflects a deliberate narrowness in the definition and interpretation of core crimes, requiring that crimes be precisely defined and strictly construed. Moreover, international criminalisation is politically negotiated, as amendments to the Rome Statute require broad state support. In addition, the over-proliferation of crime categories risks fragmenting accountability and weakening prosecutorial focus. Accordingly, this *article does not propose agriecocide as an amendment to the Rome Statute*. Rather, the concept of agriecocide is conceived as a national legal refinement, designed to address structural agricultural destruction in contexts of armed conflict and occupation. The feasibility and doctrinal consolidation of the concept within the international law, if pursued in the future, will depend on further scholarly development and the evolution of debates surrounding international criminalization of ecocide.

On this basis, the subsequent sections propose targeted improvements to the Ukrainian national legal framework.

6. Legislation Related to Agricultural Destructions in Ukraine: Current State and Recommendations

6.1. Legal Frameworks for Safeguarding Food Security

While Ukraine possesses a developed body of environmental and agricultural legislation, existing laws were not designed to address wartime agriecocide, large-scale environmental degradation, or cross-sectoral recovery challenges. The ongoing war has significantly exacerbated environmental degradation in agricultural areas. Despite repeated appeals from the scientific community for the adoption of a unified legal framework [84–87] and several attempts to introduce a dedicated law on food security over the past two decades, none of these legislative initiatives have been enacted. Scholars have consistently highlighted the absence of an effective legal mechanism to guarantee food security in Ukraine [88,89].

Drawing on international experience, two notable models can serve as references: the European Union's Common Agricultural Policy (CAP) and the United States' legislative approach to food security. The United States demonstrated a proactive stance in the latter half of the 20th century through the adoption of the Food Security Act of 1985, followed by the Food Security Improvements Act of 1986 and the Food, Agriculture, Conservation, and Trade (FACT) Act. Together, these acts established a comprehensive legal framework addressing both domestic and international aspects of food security [90].

In this context, the adoption of a dedicated Ukrainian law on food security is imperative. Such a law should provide clear definitions of key terms—including food security, food crisis, food aid, and food bank—particularly relevant under conditions of martial law. It should also establish formulas for calculating food security indicators, define criteria for each, and create an effective system to guarantee the right to food, supported by monitoring, prevention, and response mechanisms to address existing and potential threats.

At present, Ukraine's mechanism for assessing food security does not fully align with international standards, particularly those of the Global Food Security Index (GFSI). Currently, food security in Ukraine is evaluated under the Cabinet of Ministers Resolution of 5 December 2007, "Some Issues of Food Security", which employs only seven indicators: daily caloric intake; availability of key food products; adequacy of state grain reserves; economic accessibility of food; food cost variations across social groups; stability and capacity of the domestic market; and food independence. In contrast, the GFSI applies a comprehensive, quantitative, and qualitative model comprising 28 unique indicators across 113 countries, including both developed and developing nations. It assesses food security through four dimensions—Economic Affordability, Physical Availability, Quality and Safety, and Resources and Sustainability—each encompassing several detailed sub-indicators. This broader and more sophisticated framework offers a holistic global perspective, compared to the more limited set of criteria used in Ukraine, that could inform and strengthen Ukraine's approach to food security policy and legislation.

The first draft of the Law of Ukraine "On Food Security of Ukraine" was registered on 7 September 2005, under No. 8098. However, it failed to obtain the required number of votes in the Verkhovna Rada (Ukrainian Parliament), receiving only 130 votes in favour out of the 226 needed for adoption. A second attempt to establish a legal framework for food security was made in 2011, when two draft laws were submitted almost simultaneously: "On the Basics of Food Security of Ukraine" (8 April 2011, No. 8370) and "On Food Security of Ukraine" (28 April 2011, No. 8370-1). On 17 May 2011, the Verkhovna Rada Committee on Agrarian Policy and Land Relations reviewed both drafts and decided to support the latter and submit it for parliamentary consideration. Nevertheless, the bill was ultimately vetoed by the President of Ukraine due to a series of terminological and largely formal remarks and suggestions. A further attempt was made through the government-submitted draft law "On Food Security of Ukraine" (24 October 2012, No. 11378), which was later withdrawn on 24 December 2012, and subsequently removed from the legislative agenda. Thus, all four legislative attempts [91] failed to advance, each for various procedural or political reasons.

The onset of the full-scale war has brought the issue of food security back to the centre of Ukraine's policy discourse, prompting a series of urgent legislative measures to mitigate the war's impact on the agricultural sector and ensure food security. Among these were the Law of Ukraine "On Amendments to Certain Legislative Acts of Ukraine Regarding the Creation of Conditions for Ensuring Food Security in Martial Law" (24 March 2022); the Cabinet of Ministers Resolution "On Amendments to Appendices 1 and 5 of Resolution No. 1424 of 29 December 2021" (5 March 2022), which imposed restrictions on the export of specific food products and expanded export licensing requirements; and the Law of Ukraine "On Amendments to Some Laws of Ukraine Regarding Uninterrupted Production and Supply of Agricultural Products During Martial Law" (12 May 2022). Further initiatives included the Law of Ukraine "On Amendments to Certain Laws of Ukraine Regarding Improvement of State Regulation of Food Safety and Livestock Development" (27 July 2023); the Cabinet of Ministers Resolution "Some Issues of Granting Business Grants" (21 June 2022); and the Resolution "On Approval of the Procedure for Determining Damage and Losses Inflicted on Ukraine as a Result of the Armed Aggression of the Russian

Federation" (20 March 2022). On 22 July 2022, Ukraine, the Republic of Turkey, the Russian Federation, and the United Nations also signed the Black Sea Grain Initiative, facilitating the safe export of grain and food products from Ukrainian ports.

These legislative amendments were adopted under emergency conditions, with the primary goal of adapting Ukraine's legal framework to wartime realities and preventing a potential food disaster. However, as scholars have noted, these measures were reactive and lacked a scientifically grounded, systematic approach [89]. They did not sufficiently account for Ukraine's European integration commitments or the need for a long-term mechanism to prevent food crises under martial law. The Law of Ukraine "On Amendments to Certain Legislative Acts of Ukraine Regarding the Creation of Conditions for Ensuring Food Security in the Conditions of Martial Law" [92] primarily aimed to facilitate a successful sowing campaign in 2022 and expedite the use of agricultural land for production. A closer examination of this law's provisions reveals that the amendments were primarily limited to land legislation—specifically, to the procedures for the formation and renewal of lease agreements, as well as the suspension of the State Land Cadaster and electronic land auctions. In response to the cadaster's suspension and the need to protect land data from potential cyberattacks, the law introduced a temporary paper Book of Registration of Land Ownership and Land Use. However, despite these pragmatic steps, the legislation did not establish a comprehensive legal mechanism to ensure food security, particularly under martial law.

6.2. Land Legislation

The current situation in Ukraine requires a comprehensive review and modernisation of land-related legislation, including the Law of Ukraine "On the Protection of Lands". At present, this law lacks specific provisions for restoring soils and protecting land degraded by military operations. The existing land legislation framework was not designed to regulate land relations under conditions of martial law and active hostilities. Traditional instruments, such as reclamation or land conservation, are insufficient and cannot ensure the effective rehabilitation of war-affected territories.

Therefore, the introduction of specialised, non-traditional measures to address land cleaning, humanitarian demining, and soil bioremediation is urgently needed. The incorporation of advanced technologies for land and soil restoration should be prioritised to ensure that the rehabilitated territories can be safely and sustainably used in the future [93]. Such an approach fully aligns with the principles of sustainable development and post-war environmental recovery.

In response to the significant agrarian and ecological impacts of the War, it is recommended to amend the Land Code of Ukraine by introducing the following provisions:

(1) Extension of Chapter 26 (Soil Protection):

Article 168, paragraph 4 (on the protection of soils from contamination), should be expanded to include a specific clause addressing contamination and degradation caused by active hostilities. This new provision should establish a system of targeted measures for soil protection and restoration, including:

(i) removal of pollutants and unexploded ordnance, demining,
(ii) soil bioremediation and detoxification, and
(iii) other actions aimed at restoring the ecological integrity and productivity of soils degraded due to warfare.

(2) Amendment of Chapter 27 (Use of Technogenically Polluted Lands):

Part 1 of Article 169 should be revised as follows:

> *"Technogenically polluted lands are lands polluted as a result of human economic activity or as a consequence of hostilities that have led to land degradation and have caused adverse effects on the environment and human health."*

This amendment would formally recognise war-damaged lands as a category of technogenically polluted territories, enabling the application of specific rehabilitation measures, state support programmes, and environmental safeguards to protect and restore them.

6.3. Financial Legislation

The ongoing war in Ukraine has inflicted colossal damage on the country's agricultural sector and ecological systems: losses for which agricultural producers, territorial communities, or the state cannot be compensated under the current conditions of martial law [94]. This situation underscores the urgent need to develop and adopt legislation that operationalises Article 41 of the Constitution of Ukraine, which stipulates that "the use of property

shall not cause harm to the rights, freedoms, and dignity of citizens, the interests of society, or aggravate the ecological situation and the natural qualities of land" [95].

Issues related to compensation for damage caused by Russian aggression, genocide, and ecocide against the Ukrainian people and environment must be comprehensively addressed across land, agricultural, natural resource, environmental, civil, and financial legislation. The material and economic consequences of agriecocide committed by the Russian Federation equally require legal regulation, alongside mechanisms for financial recovery and stabilisation of the agricultural sector. In this regard, several legal and financial improvements are proposed:

(i) Amendment to the Law "On the Foundations of State Agrarian Policy and State Policy on Rural Development" (2004).

It is recommended to introduce a new Article 13-2, "Financial Support of Agricultural Entities under Martial Law and in De-Occupied Territories", with corresponding amendments to the Tax Code of Ukraine. This would establish a framework for targeted state financial assistance to farmers and other agricultural producers, forming the basis for social stability and sustainable rural development during and after wartime.

(ii) Introduction of a special preferential regime in the de-occupied territories.

A special fiscal and credit regime should be established in the de-occupied areas to facilitate agricultural recovery. Such measures may include tax relief, expanded access to credit, and increased state support. Given the destruction of material and technical infrastructure, the disrupted logistics routes and the need for large-scale demining, producers in these regions face significant competitive disadvantages compared to those in other parts of Ukraine. The current tax burden, including the minimum tax liability, is unsustainable, while accumulated tax debts hinder access to credit.

To address these challenges, it is proposed to introduce a temporary "special preferential regime" for agricultural producers operating in de-occupied territories for at least two years during the recovery period. This regime could take the form of "inviolability zones", modelled on free economic zones, that would ensure protection from mass bankruptcies and support local economic revitalisation. Furthermore, peasants who own land plots in the de-occupied territories should be exempted from land tax payments during this period.

(iii) Revitalisation of the agricultural insurance market.

Restoring and expanding agricultural insurance in wartime conditions is crucial for mitigating risk for Ukrainian farmers. In January 2024, the Ministry of Economy of Ukraine reported a significant increase in physical export volumes—12 million tonnes of products exported, nearly reaching pre-war levels [96]. A notable development was the UNITY ship insurance programme, a collaborative initiative between the Government of Ukraine, Marsh McLennan, and an insurance consortium led by ASCOT, which successfully insured the first ship against war risks [97]. This programme aims to reduce the cost of maritime insurance for the transportation of grain and other essential food products within Ukraine's territorial waters, thereby increasing export volumes and strengthening global food supply stability. Estimates suggest that the programme could reduce insurance costs by an average of 2.5% of the total insurance tariff, generating up to UAH 4 billion in benefits for agricultural producers.

In 2024, the First Deputy Prime Minister and Minister of Economy, Yulia Svyridenko, emphasised that the normalisation of the insurance market is a cornerstone of Ukraine's trade recovery and the export of value-added agricultural products [98]. To institutionalise this progress, establishing a dedicated legislative framework for agricultural and war-risk insurance is essential.

6.4. Criminal Legislation

Environmental crimes causing substantial harm have become increasingly significant in modern criminal law [99]. Among these, the crime most closely related to agriecocide is ecocide. In Ukraine, ecocide is codified under Chapter XX of the Criminal Code [100], titled "Criminal Offences Against Peace, Human Security, and International Legal Order". Article 441 defines ecocide as the mass destruction of flora or fauna, the pollution of the atmosphere or water resources, or other acts capable of causing an ecological disaster, and is punishable by imprisonment for a term of eight to fifteen years. Ecocide differs from other environmental offenses, such as violations of environmental safety rules (Art. 236), pollution or damage to land (Art. 239), violations of subsurface protection rules (Art. 240), atmospheric pollution (Art. 241), violations of water protection rules (Art. 242), marine pollution (Art. 243), destruction of forest areas (Art. 245), and operation of infrastructure without environmental safeguards (Art. 253). The distinguishing feature of ecocide lies in its objective and subjective elements: the offender's intent must be direct, both in relation to the act and its consequences. It is essential to differentiate agriecocide from Article 239 ("Pollution or Damage to Land"), which criminalises pollution or damage caused by substances, waste, or other materials harmful to life, human health, or the environment, committed in violation of

special rules. Actions under Article 239 carry penalties, including fines or deprivation of certain professional rights, for up to three years. Agriecocide, however, is distinct in several ways:

(1) Agriecocide is not limited to violations of land-use regulations.
(2) The *mens rea* for agriecocide should encompass direct intent, encompassing both the act and its consequences. In contrast, actions under Article 239 may be committed intentionally or negligently, with the harmful consequences always treated as negligent.
(3) Agriecocide encompasses mass destruction or poisoning across the agricultural sphere—including soils, water bodies, forests, crops, plantations, and livestock—whereas Article 239 is limited to land pollution and degradation.
(4) The primary objective of introducing legal provisions on agriecocide is to protect agriecological resources and food security, whereas Article 239 protects land use and regulatory compliance.
(5) Agriecocide entails heightened social danger due to its scale and consequences, justifying its classification as a more severe crime.

While Article 441 provides a conceptual framework for ecocide, identifying its constituent elements as: (i) mass destruction of plant life, (ii) mass destruction of animal life, (iii) atmospheric poisoning, (iv) water resource poisoning, and (v) other acts capable of causing environmental disasters, this enumeration does not explicitly include mass pollution or poisoning of land resources, particularly agricultural land, which constitutes approximately 70% of Ukraine's land fund and serves as the primary basis for agricultural production. This omission is notable, as the Constitution of Ukraine recognises land as a principal national resource under the state's special protection (Art. 14).

To address this gap, we propose the inclusion of this offence into Ukrainian Law, *complementing Article 441 through a new paragraph, Article 441-1, titled "Agriecocide",* as a distinct subcategory of environmental harm, targeting the large-scale, systematic destruction of agricultural ecosystems essential to food production. This provision would criminalise the deliberate mass destruction or poisoning of agricultural resources—including soils, water bodies, forests, crops, plantations, and livestock—as well as any other acts capable of causing an agri-ecological or food disaster. With the proposed legislation, perpetrators of agriecocide would face imprisonment for a term of ten to fifteen years, ensuring the legal recognition and protection of agricultural and food security interests under Ukrainian criminal law.

7. Conclusions

The Russian war against Ukraine has generated profound and multifaceted impacts on the country's environment, agricultural sector, and food security, leading to the new category of agriecocide. The comparative analysis of the existing legal frameworks demonstrates a consistent structural pattern in both Ukrainian and international law: agricultural destruction is regulated, but only indirectly and through dispersed legal categories. The introduction of the term 'agriecocide' provides a precise conceptual and legal tool to identify and address the intentional destruction of agricultural systems. Aligning with the concept of 'ecocide' and avoiding potential confusion with pesticide-related 'agricide', agriecocide ecompasses both the environmental and food security dimensions of large-scale agricultural harm.

Military actions in Ukraine have led to extensive ecological degradation, soil contamination, and damage to critical protected areas, including the Askania Nova and Black Sea Biosphere Reserves. The destruction of infrastructure, such as the Kakhovska Hydroelectric Power Plant, has further disrupted ecosystems, wetlands, and agricultural lands. Territorial occupation and ongoing hostilities have limited the use of agricultural land and exacerbated logistical disruptions and labour shortages, leading to substantial social and economic consequences. These consequences distinguish the Ukrainian case from more generalised environmental degradation and underscore the relevance of "agriecocide" as a distinct analytical category. Existing frameworks addressing harm in armed conflict, including ecocide and genocide, do not adequately reflect the specificities of damage to agricultural ecosystems and productive land.

Taken together, the results of the bibliometric analysis and web search indicate that agriecocide is an emerging, highly marginal concept across both peer-reviewed and grey literature. Its usage is largely concentrated on a small number of activist-research platforms, particularly Common Ecologies. It remains largely absent from governmental, international, and policy-oriented sources, highlighting a notable discursive gap. Bibliometric findings further show that recent discussions increasingly focus on Ukraine, where conflict and environmental destruction have profoundly affected agriculture. Keywords such as *Ukraine*, *dam destruction*, and *Kakhovka Reservoir* suggest that the ongoing Russian invasion is shaping scholarly attention within the agricultural domain.

However, the comparative cases demonstrate that agriecocide is not geographically specific but emerges wherever warfare targets the ecological, infrastructural, and socio-economic foundations of agriculture.

To address the discussion on agriecocide, a set of targeted legal reforms is essential. In the land sector, amendments to the Land Code and the Law on the Protection of Lands should establish mechanisms for post-war restoration, including soil bioremediation, demining, detoxification, and other protective measures for lands damaged by hostilities. In the financial sector, reforms should prioritise ensuring state support for agricultural producers, particularly in formerly occupied territories. This includes introducing a preferential fiscal and credit regime, temporary tax exemptions, and "inviolability zones" modelled on free economic zones to protect producers from bankruptcy. In the criminal law sphere, the existing ecocide provisions (Article 441 of the Criminal Code) should be complemented by a new offence, Article 441-1, "Agriecocide". This would ensure accountability for acts that threaten national food security and agriecological systems, reflecting their increased social and environmental risks.

Adopting the proposed legislative reforms would not only address Ukraine's immediate post-war recovery needs but also strengthen the country's long-term resilience. While we recognise that "agriecocide" is a neologism and may not immediately gain traction in legal or public discourse, its specificity and alignment with legal terminology provide a foundation for further precise conceptualisation and legislative incorporation, fostering dialogue on effective mechanisms to safeguard agriecological systems and ensure food security.

Author Contributions

R.K: conceptualisation, methodology, visualization, writing—original draft; P.P.: supervision, writing—reviewing and editing; T.K.: conceptualisation, formal legal analysis, writing—reviewing and editing. All authors have read and agreed to the published version of the manuscript.

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References

1. Petrushka, K.; Malovanyy, M.; Skrzypczak, D.; et al. Risks of Soil Pollution with Toxic Elements During Military Actions in Lviv. *J. Ecol. Eng.* **2024**, *25*, 195–208. https://doi.org/10.12911/22998993/175136.
2. Pereira, P.; Bašić, F.; Bogunovic, I.; et al. Russian-Ukrainian War Impacts the Total Environment. *Sci. Total Environ.* **2022**, *837*, 155865. https://doi.org/10.1016/j.scitotenv.2022.155865.
3. Hussein, H.; Knol, M. The Ukraine War, Food Trade and the Network of Global Crises. *Int. Spect.* **2023**, *58*, 74–95. https://doi.org/10.1080/03932729.2023.2211894.

4. Kryzhanivsky, S.A.; Zasenko, O.E.; Makuch, A.; et al. Ukraine. Encyclopedia Britannica. 21 August 2024. Available online: https://www.britannica.com/place/Ukraine (accessed on 16 August 2025).
5. Hryhorczuk, D.; Levy, B.S.; Prodanchuk, M.; et al. The Environmental Health Impacts of Russia's War on Ukraine. *J. Occup. Med. Toxicol.* **2024**, *19*, 1. https://doi.org/10.1186/s12995-023-00398-y.
6. Solokha, M.; Pereira, P.; Symochko, L.; et al. Russian-Ukrainian War Impacts on the Environment: Evidence from the Field on Soil Properties and Remote Sensing. *Sci. Total Environ.* **2023**, *902*, 166122. https://doi.org/10.1016/j.scitotenv.2023.166122.
7. Liubchych, A.; Savchuk, O.; Vrublevska-Misiuna, K.; et al. Review of Public Environmental Interests in Ukrainian Contexts. *Grassroots J. Nat. Resour.* **2023**, *6*, 4–18. https://doi.org/10.33002/nr2581.6853.060202.
8. Palarczyk, D. Ecocide before the International Criminal Court: Simplicity Is Better than an Elaborate Embellishment. *Crim. Law Forum* **2023**, *34*, 147–207. https://doi.org/10.1007/s10609-023-09453-z.
9. Albakjaji, M. The Responsibility for Environmental Damages during Armed Conflicts: The Case of the War between Russia and Ukraine. *Access Justice East. Eur.* **2022**, *4*, 82–101. https://doi.org/10.33327/AJEE-18-5.4-a000444.
10. Treves, T.; Pineschi, L.; Tanzi, A.; et al. The Eritrea–Ethiopia Armed Conflict and Its Aftermath in International Legal Perspective. Geneva Academy of International Humanitarian Law and Human Rights. 2009. Available online: https://www.geneva-academy.ch/joomlatools-files/docman-files/The%20Eritrea%E2%80%93Ethiopia%20Armed%20Conflict.pdf (accessed on 6 October 2025).
11. Kong, L.; Zhao, Y. Remedying the Environmental Impacts of War: Challenges and Perspectives for Full Reparation. *Int. Rev. Red Cross* **2023**, *105*, 1441–1462. https://doi.org/10.1017/S1816383123000280.
12. Liu, Q.; Sun, X.; Wu, W.; et al. Agroecosystem Services: A Review of Concepts, Indicators, Assessment Methods, and Future Research Perspectives. *Ecol. Indic.* **2022**, *142*, 109218. https://doi.org/10.1016/j.ecolind.2022.109218.
13. Power, A.G. Ecosystem Services and Agriculture: Tradeoffs and Synergies. *Philos. Trans. R. Soc. B Biol. Sci.* **2010**, *365*, 2959–2971. https://doi.org/10.1098/rstb.2010.0143.
14. Linden, O.; Jerneloev, A.; Egerup, J. *The Environmental Impacts of the Gulf War 1991*; IIASA Interim Report IR-04-019; IIASA: Laxenburg, Austria, 2004.
15. Pilav, A. Before the War, War, After the War: Urban Imageries for Urban Resilience. *Int. J. Disaster Risk Sci.* **2012**, *3*, 23–37. https://doi.org/10.1007/s13753-012-0004-4.
16. Coward, M. Urbicide: The Politics of Urban Destruction by Martin Coward. *Glob. Discourse* **2010**, *1*, 186–189. https://doi.org/10.1080/23269995.2010.10707864.
17. Palme, O. Statement by Prime Minister Olof Palme in the Plenary Meeting. United Nations Conference on the Human Environment. 6 June 1972. Available online: https://olofpalme.arbark.se/en/documents-in-various-languages/ (accessed on 15 September 2025).
18. Ibrahim, A. The Efficacy of Curcumin to Ameliorate Induced Histopathological Changes in the Heart of Rats Treated with an Insecticide. *Egypt. J. Med. Sci.* **2009**, *30*, 837–849.
19. Cecchine, G.; Golomb, B.A.; Hilborne, L.H.; et al. *A Review of the Scientific Literature as It Pertains to Gulf War Illnesses, Volume 8: Pesticides*; MR-1018/8-OSD; RAND Corporation: Santa Monica, CA, USA, 2000.
20. Kurman, T.V. Current Issues of Legal Support for Food Security in the Context of Agroecocide. *Anal. Comp. Jurisprud.* **2023**, 293–297. https://doi.org/10.24144/2788-6018.2023.05.52.
21. Prikhnich, D.H. The Concept and Essence of Legal Regulation of Food Security in Ukraine. *Law Soc.* **2025**, *1*, 218–224. https://doi.org/10.32842/2078-3736/2025.3.1.32.
22. Basysta, I., Drozdov, O., Drozdova, O., Kovtun, V., & Shulhin, S. Social and legal consequences of Ukraine's ratification of the Rome Statute of the International Criminal Court. *Soc. Leg. Studios* **2025**, *8*, 262–275. https://doi.org/10.32518/sals2.2025.262.
23. Škop, M. Narratives as the Cultural Context of Law. *Int. J. Semiot. Law* **2020**, *33*, 101–111. https://doi.org/10.1007/s11196-019-09665-w.
24. George, S. Committing Geocide: Climate Change and Corporate Capture. Transnational Institute. 2016. Available online: https://www.tni.org/en/article/committing-geocide-climate-change-and-corporate-capture (accessed on 6 October 2025).
25. Common Ecologies. Transforming Agriculture & Beyond. Common Ecologies. 2023. Available online: https://commonecologies.net/wp-content/uploads/2023/10/Transforming-Agriculture.pdf (accessed on 3 November 2025).
26. Feshbach, M.; Friendly, A., Jr. *Ecocide in the USSR: Health and Nature Under Siege*; Basic Books: New York, NY, USA, 1992.
27. Sharipova, D. The Decolonization of the Environment in Kazakhstan: The Novel *Final Respects* by Abdi-Jamil Nurpeisov. *Nationalities Papers*, **2019**, *47*, 296–309. https://doi.org/10.1017/nps.2018.24.
28. Albaladejo Román, A. Ukrainian Agriculture: From Russian Invasion to EU Integration. EPRS Briefing No. PE 760.432; European Parliamentary Research Service, 2024. Available online: https://www.europarl.europa.eu/RegData/etudes/BRIE/2024/760432/EPRS_BRI%282024%29760432_EN.pdf (accessed on 6 October 2025).

29. Organisation for Economic Co-Operation and Development (OECD). Ukraine: Agricultural Policy Monitoring and Evaluation 2025. OECD. 2025. Available online: https://www.oecd.org/en/publications/2025/10/agricultural-policy-monitoring-and-evaluation-2025_354e7040/full-report/ukraine_0e71d61e.html (accessed on 12 December 2025).
30. Kil'kist Ukraintsiv ta Yikh Mihratsiia za Kordon Cherez Viinu [Number of Ukrainians and Their Migration Abroad Due to the War]. Ukrinform. 6 July 2023. Available online: https://www.ukrinform.ua/rubric-ato/3732355-kilkist-ukrainciv-ta-ih-migracia-za-kordon-cerez-vijnu.html (accessed on 6 October 2025).
31. Broomandi, P.; Guney, M.; Kim, J.R.; et al. Soil Contamination in Areas Impacted by Military Activities: A Critical Review. *Sustainability* **2020**, *12*, 9002. https://doi.org/10.3390/su12219002.
32. Certini, G.; Scalenghe, R.; Woods, W.I. The Impact of Warfare on the Soil Environment. *Earth-Sci. Rev.* **2013**, *127*, 1–15. https://doi.org/10.1016/j.earscirev.2013.08.009.
33. Kassim, T.A.; Barceló, D. (Eds.) *Environmental Consequences of War and Aftermath*; Springer: Berlin/Heidelberg, Germany, 2009. https://doi.org/10.1007/978-3-540-87963-3_2.
34. Koniuszewski, A. Land Degradation from Military Toxics: Public Health Considerations and Possible Solution Paths. In *Land Restoration*; Chabay, I., Frick, M., Helgeson, J., Eds.; Academic Press: London, UK, 2016; pp. 119–131. https://doi.org/10.1016/B978-0-12-801231-4.00013-6.
35. United Nations Environment Programme. The toxic legacy of the Ukraine war. 22 February 2023. Available online: https://www.unep.org/news-and-stories/story/toxic-legacy-ukraine-war (accessed on 6 October 2025).
36. Bakai, Y.Y.; Putria, K.S. Ahroekotsyd yak riznovyd ekotsydu [Agriecocide as a Form of Ecocide]. In *Ahrobiznes v Umovakh Ahroekotsydu: Suchasni Vyklyky, Problemy Vidpovidalnosti ta Uroky Stalosti*; Kurman, T.V., Stanislavskyi, V.P., Eds.; Yurait: Kharkiv, Ukraine, 2023; pp. 11–15.
37. Müller, C.; Pedron, F.; Wardzinski Barbosa, B.; et al. Soil Degradation After the Traffic of a Military Combat Vehicle Leopard 1A5BR. *Ciência E Nat.* **2022**, *43*, e87. https://doi.org/10.5902/2179460X62685.
38. Vasyliuk, O.; Kolodezhna, V. Yakoiu mae buty dolia poshkodzhenykh vybukhamy ukrainskykh terytorii? [What Should Be the Fate of Ukrainian Territories Damaged by Explosions?]. Ukrainian Nature Conservation Group. 10 June 2022. Available online: https://uncg.org.ua/iakoiu-maie-buty-dolia-poshkodzhenykh-vybukhamy-ukrainskykh-terytorij/ (accessed on 6 October 2025).
39. Havrysh, N.S. Pravovi Aspekty Voiennoi Dehradasii Hruntiv v Ukraini [Legal Aspects of Wartime Soil Degradation in Ukraine]. In *Prodovolcha ta Ekolohichna Bezpeka u Voiennyi i Pislia Voiennoho Chasu: Pravovi Vyklyky dlia Ukrainy ta Svitu*; FOP Yamchynskyi O. V.: Kyiv, Ukraine, 2022.
40. Vasyliuk, O.; Kolomitsev, H.; Parkhomenko, V. Flames of War: How Ukraine Lost Over 1,000 Square Kilometers of Forest. Ukraine War Environmental Consequences Work Group. 15 August 2023. Available online: https://uwecworkgroup.info/flames-of-war-how-ukraine-lost-over-1000-square-kilometers-of-forest/ (accessed on 6 October 2025).
41. Havrysh, N.S. *Vykorystannia, Vidtvorennia ta Okhorona Gruntiv v Ukraini: Teoretyko-Pravovi Aspekty [Use, Reproduction, and Protection of Soils in Ukraine: Theoretical and Legal Aspects]*; Yurydychna Literatura: Odesa, Ukraine, 2016.
42. Lisova, T.V. *Pravove Zabezpechennia Vidnovlennia Zemel: Teoretychni i Praktychni Problemy* [Legal Support for Land Restoration: Theoretical and Practical Problems]; Yurait: Kharkiv, Ukraine, 2020.
43. Leal Filho, W.; Fedoruk, M.; Eustachio, J.H.P.P.; et al. The Environment as the First Victim: The Impacts of the War on the Preservation Areas in Ukraine. *J. Environ. Manag.* **2024**, *364*, 120847. https://doi.org/10.1016/j.jenvman.2024.120847.
44. Kazak, R.; Linnér, B.-O.; Carlsen, H. Sprängningen av Kachovka Ska Ses som Krigsförbrytelse [The Kakhovka Explosion Should Be Considered a War Crime]. Dagens Nyheter. 11 June 2023. Available online: https://www.dn.se/debatt/sprangningen-av-kachovka-ska-ses-som-krigsforbrytelse/ (accessed on 12 July 2024).
45. The Odessa Journal. The Invaders Destroyed the National Gene Bank of Plants of Ukraine. The Odessa Journal. 16 May 2022. Available online: https://odessa-journal.com/public/the-invaders-destroyed-the-national-gene-bank-of-plants-of-ukraine (accessed on 14 October 2025).
46. Ukrainian World Congress. Russians Devastate Askania Nova Reserve in Ongoing Ecocide. 19 August 2024. Available online: https://www.ukrainianworldcongress.org/russians-devastate-askania-nova-reserve-in-ongoing-ecocide/ (accessed on 16 June 2025).
47. U.S. Department of Agriculture. Ukraine: Agricultural Production and Trade. April 2022. Available online: https://fas.usda.gov/sites/default/files/2022-04/Ukraine-Factsheet-April2022.pdf (accessed on 16 June 2025).
48. United Nations Office at Geneva. Ukraine: Mine Contamination Is Lethal Legacy of Russia's Invasion. April 2025. Available online: https://www.ungeneva.org/en/news-media/news/2025/04/105133/ukraine-mine-contamination-lethal-legacy-russias-invasion (accessed on 6 October 2025).
49. Ukraine faces a 30% labor shortage in agriculture. Media Center Ukraine. 15 July 2025 Available online: https://mediacenter.org.ua/ukraine-faces-a-30-labor-shortage-in-agriculture/ (accessed on 6 October 2025).

50. Ukrainsku Ahrarnu Sferu Spitkav Kadrovyi Holod [The Ukrainian Agricultural Sector Faced a Labor Shortage]. BusinessUA. 1 August 2024. Available online: https://businessua.com/robota/98494ukrainsku-agrarnu-sferu-spitkav-kadrovii-golod.html (accessed on 6 October 2025).
51. United Nations. Attacks on Odesa Port, Grain-Storage Facilities Latest Victims in Moscow's 'Senseless' War Against Ukraine, Senior Official Tells Security Council. UN Press. 21 July 2023. Available online: https://press.un.org/en/2023/sc15367.doc.htm (accessed on 6 October 2025).
52. Pandito, T. When War and Nature Collide in Ukraine. Oxford Political Review. 25 April 2025. Available online: https://oxfordpoliticalreview.com/2025/04/25/when-war-and-nature-collide-in-ukraine/ (accessed on 6 October 2025).
53. Rudolfsen, I.; Bartusevičius, H.; van Leeuwen, F.; et al. War and Food Insecurity in Ukraine. *World Dev.* **2024**, *180*, 106647. https://doi.org/10.1016/j.worlddev.2024.106647.
54. UWEC 2023 Ukrainian War Environmental Consequences Work Group. Askania-Nova Biosphere Reserve Captured by Invaders. 22 March 2022. Available online: https://uwecworkgroup.info/askania-nova-biosphere-reserve-captured-by-invaders/ (accessed on 6 October 2025).
55. Shevchenko, O.Y. Pidryv Kakhovskoi HES yak Zahroza Prodovolchii Bezpetsi [The Destruction of Kakhovka HPP. as a Threat to Food Security]. In *Teoretyko-Pravovi Zasady Uchasti Advokata v Ahrarnykh, Zemelnykh ta Ekolohichnykh Sporakh*; Kurman, T.V., Bakai, Y.Y., Suyetnov, E.P.; et al., Eds.; Pravo: Kharkiv, Ukraine, 2023; pp. 230–232.
56. Hussein, H. Russia is Weaponising Water in Its Invasion of Ukraine. *Nature* **2022**, *603*, 793. https://doi.org/10.1038/d41586-022-00865-2.
57. Kazak, R. Ecocidio en el Contexto de la Invasión Rusa de Ucrania: Patrones Bibliométricos y Casos de Estudio de Daño Ambiental [Review Article]. Ecología Política. Cuadernos de Debate Internacional. 22 December 2025. Available online: https://www.ecologiapolitica.info/breves-kazak/ (accessed on 10 January 2026).
58. Hubareva, V. Conservationists in Captivity and "Titans" of Deciphering: How the Black Sea Biosphere Reserve Lives During the War. Rubryka. April 2024. Available online: https://rubryka.com/en/article/chornomorskyj-biosfernyj-rezervat/ (accessed on 6 October 2025).
59. Ramsar Convention Secretariat. Yagorlytska Bay. Ramsar Sites Information Service. August 2022. Available online: https://rsis.ramsar.org/RISapp/files/RISrep/UA116RIS_2208_en.pdf (accessed on 6 October 2025).
60. Carpathian Convention. Impact of War on the Natural Environment in the Carpathians in Ukraine. February 2023. Available online: http://www.carpathianconvention.org/tl_files/carpathiancon/Downloads/00%20NEWS/2402Impact%20of%20war%20on%20natural%20envCarpathians%20in%20Ukraine.pdf (accessed on 6 October 2025).
61. Vedmedenko, I. Ne khlibom yedynym: Yak ahrarii provely druhyi rik velykoi viiny [Not by Bread Alone: How Farmers Endured the Second Year of the Great War]. UNIAN Information Agency. 2023. Available online: https://www.unian.ua/economics/agro/ne-hlibom-yedinim-yak-agrariji-proveli-drugiy-rik-velikoji-viyni-12497745.html (accessed on 6 October 2025).
62. Pashchenko, O.M. Problemy Pravovoho Zabezpechennia Prodovolchoi Bezpeky v Umovakh Voiennoho Stanu [Problems of Legal Support for Food Security Under Martial Law]. *Pivdennoukrainskyi Pravnychyi Chasopys* **2022**, *1–2*, 284–291.
63. World Bank Group. Food Security: Rising Food Insecurity. 29 April 2024. Available online: https://www.worldbank.org/en/topic/agriculture/brief/food-security-update (accessed on 6 October 2025).
64. FAO. FAO and the EU Support Relocation of Ukraine's National Seed Collection to a Secure Site. United Nations in Ukraine, 28 April 2023. Available online: https://ukraine.un.org/en/229333-fao-and-eu-support-relocation-ukraine%E2%80%99s-national-seed-collection-secure-site (accessed on 6 October 2025).
65. United Nations. Frontline Ukrainian Families Face Perilous Task of Farming Mined Fields. UN News. 2 June 2025. Available online: https://news.un.org/en/story/2025/06/1163921 (accessed on 6 October 2025).
66. FAO. *Ukraine: Impact of the War on Agricultural Enterprises—Findings of a Nationwide Survey of Agricultural Enterprises with Land up to 250 Hectares*;FAO: Rome, Italy, 2023. https://doi.org/10.4060/cc5755en.
67. Ukrainske Silske Hospodarstvo Zaznalo 40,2 Miliarda Dolariv Zbytkiv Cherez Viinu [Ukrainian Agriculture Suffered $40.2 Billion in Losses Due to the War]. Ukrinform. 17 May 2023. Available online: https://www.ukrinform.ua/rubric-economy/3712702-ukrainske-silske-gospodarstva-zaznalo-402-milarda-zbitkiv-cerez-vijnu-kse.html (accessed on 6 October 2025).
68. Helvetas Ukraine & State Employment Service of Ukraine. Labor Market Assessment 2024–2025: Business Demand, Challenges, Strategy for Impact. 2025. Available online: https://www.helvetas.org/Publications-PDFs/Eastern-Europe-Caucasus/Ukraine/Downloads/Labor%20Market%20Assessment%202024-2025%20Business%20Demand,%20Challenges,%20Strategy%20For%20Impact-ENG.pdf (accessed on 9 December 2025).
69. Yur Gazeta. Labor Shortage in Ukraine: Jooble Experts Discuss Sectors with Severe Staff Deficits. Yur Gazeta. 27 August 2024. Available online: https://yur-gazeta.com/publications/practice/inshe/kadroviy-golod-v-ukrayini-eksperti-jooble-rozpovili-pro-sferi-z-gostrim-deficitom-pracivnikiv.html (accessed on 6 October 2025).

70. Center for Strategic and International Studies. Russia, Ukraine, and global food security: A one-year assessment. 24 February 2023. Available online: https://www.csis.org/analysis/russia-ukraine-and-global-food-security-one-year-assessment (accessed on 6 October 2025).
71. Mamonova, N.; Borodina, O.; Kuns, B. Ukrainian Agriculture in Wartime: Resilience, Reforms and Markets. Transnational Institute. 9 November 2023. Available online: https://www.ksla.se/wp-content/uploads/2023/12/Mamonova-N.-Borodina-O.-Kuns-B.-2023-Ukrainian-agriculture-in-wartime_resilience-reforms-and-markets.pdf (accessed on 6 October 2025).
72. Bezo, B.; Maggi, S. Living in "Survival Mode:" Intergenerational Transmission of Trauma from the Holodomor Genocide of 1932–1933 in Ukraine. *Soc. Sci. Med.* **2015**, *134*, 87–94. https://doi.org/10.1016/j.socscimed.2015.04.031.
73. Klymenko, L. The Holodomor Law and National Trauma Construction in Ukraine. *Can. Slavon. Pap.* **2016**, *58*, 341–361. https://doi.org/10.1080/00085006.2016.1234588.
74. Leal Filho, W.; Fedoruk, M.; Paulino Pires Eustachio, J.H.; et al. How the War in Ukraine Affects Food Security. *Foods* **2023**, *12*, 3996. https://doi.org/10.3390/foods12213996.
75. Kemmerling, B.; Schetter, C.; Wirkus, L. The Logics of War and Food (In)security. *Glob. Food Secur.* **2022**, *33*, 100634. https://doi.org/10.1016/j.gfs.2022.100634.
76. Neyter, R.; Zorya, S.; Muliar, O. Agricultural War Damages, Losses, and Needs Review. Kyiv School of Economics. 2024. Available online: https://kse.ua/wp-content/uploads/2024/02/RDNA3_eng.pdf (accessed on 6 October 2025).
77. Economist Impact. Global Food Security Index. 2022. Available online: https://impact.economist.com/sustainability/project/food-security-index/Index (accessed on 3 November 2025).
78. Zhang, Z.; Abdullah, M.J.; Xu, G.; et al. Countries' Vulnerability to Food Supply Disruptions Caused by the Russia-Ukraine War from a Trade Dependency Perspective. *Sci. Rep.* **2023**, *13*, 16591. https://doi.org/10.1038/s41598-023-43883-4.
79. Carter Center. Unexploded Ordnance Threatens Food Security in Syria. The Carter Center, 2023. Available online: https://www.cartercenter.org/wp-content/uploads/2023/09/link-between-uxo-presence-and-food-security-in-syria-091423.pdf (accessed on 6 October 2025).
80. European Union Agency for Asylum. Conflict-Related Infrastructure Damage and Explosive Remnants of War in Syria in COI Report—Syria: Country Focus, July 2025. Available online: https://www.euaa.europa.eu/coi/syria/2025/country-focus/5-security-situation/57-conflict-related-infrastructure-damage-and-explosive-remnants-war (accessed on 6 October 2025).
81. United Nations Office for the Coordination of Humanitarian Affairs. Syrian Arab Republic: Humanitarian Situation Report No. 6, as of 27 May 2025. UNOCHA. 2 June 2025. Available online: https://www.unocha.org/publications/report/syrian-arab-republic/syrian-arab-republic-humanitarian-situation-report-no-6-27-may-2025 (accessed on 6 October 2025).
82. Insecurity Insight. The Links Between Conflict and Hunger in Syria: Conflict, Hunger and Aid Access (Report). April 2023. Available online: https://insecurityinsight.org/wp-content/uploads/2023/04/Syria-Conflict-and-Hunger-March-2023.pdf (accessed on 6 October 2025).
83. Food Security Cluster. Syria Food Security Sector Monthly Update—Issue #4. 2025. Available online: https://fscluster.org/document/syria-food-security-sector-monthly (accessed on 6 October 2025).
84. Yermolenko, V.M. Aktualni Pytannia Systematyzatsii Zakonodavstva pro Prodovolchu Bezpeku [Current Issues of Systematisation of Food Security Legislation]. In *Suchasni Problemy Systematyzatsii Ekolohichnoho, Zemelnoho ta Ahrarnoho Zakonodavstva Ukrainy*; VHL "Obrii": Kyiv, Ukraine, 2011; pp. 113–119.
85. Kurman, T.V. Pravove Zabezpechennia Prodovolchoi Bezpeky v Ukraini: Natsionalnyi ta Mizhnarodnyi Aspekt [Legal Support of Food Security in Ukraine: National and International Aspects]. In *Aktualni Pytannia Ahrarnoho Prava Ukrainy: Teoriia i Praktyka*; Stativka, A.M., Ed.; FINN: Kharkiv, Ukraine, 2010; pp. 82–101.
86. Kurman, T.V. *Stalyi Rozvytok Silskoho Hospodarstva: Problemy Pravovoho Zabezpechennia* [Sustainable Development of Agricultural Production: Legal Support Challenges]; Yuraist: Kharkiv, Ukraine, 2018.
87. Kurman, T.V. Prodovolcha Bezpeka: Problemy Pravovoho Zabezpechennia v Umovakh Hlobalizatsii i Voiennoho Stanu [Food Security: Legal Support Issues Under Globalization and Martial Law]. In *Prodovolcha Bezpeka v Umovakh Suchasnykh Vyklykiv: Natsionalno-Pravovyi ta Mizhnarodnyi Aspekty*; Kurman, T.V., Stanislavskyi, V.P., Eds.; Yuraist: Kharkiv, Ukraine, 2022; pp. 64–68.
88. Kovalenko, T.O. Poniattia, Oznaky ta Kryteri Prodovolchoi Bezpeky za Zakonodavstvom Ukrainy ta Inshykh Derzhav [Concepts, Features, and Criteria of Food Security Under Ukrainian and Foreign Legislation]. *Adm. Pravo I Protses* **2018**, *1*, 30–41.
89. Kurman, T.V. Ahrobiznes ta Prodovolcha Bezpeka: Zahrozy ta Problemy Pravovoho Zabezpechennia v Umovakh Voiennoho Stanu [Agribusiness and Food Security: Threats and Legal Support Challenges Under Martial Law]. *Anal. Comp. Jurisprud.* **2022**, *3*, 122–126. Available online: http://app-journal.in.ua/wp-content/uploads/2022/09/23.pdf (accessed on 2 September 2025).

90. Kurman, T.V.; Tueva, O.M. *Pravo Prodovolchoi Bezpeky: Navch. Posib.*; Yuraist: Kharkiv, Ukraine, 2021.
91. Propozytsii do Zakonu Ukrainy “Pro Prodovolchu Bezpeku Ukrainy” [Proposals to the Law of Ukraine “On Food Security of Ukraine”]. Available online: https://ips.ligazakon.net/document/view/bf6gi01o?an=3&ed=2012_01_10 (accessed on 6 October 2025).
92. Verkhovna Rada of Ukraine. Pro Vnesennia Zmin do Deiakykh Zakonodavchykh Aktiv Ukrainy Shchodo Stvorennia umov dlia Zabezpechennia Prodovolchoi Bezpeky v Umovakh Voiennoho Stanu [Law on Amendments to Certain Legislative Acts Regarding Food Security Under Martial Law]. 2022. Available online: https://zakon.rada.gov.ua/laws/show/2145-20#Text (accessed on 6 October 2025).
93. Havrysh, N.S.; Slepnova, K.V. Pravovi Aspekty Vidshkoduvannia Shkody, Zapodiianoi Zemli, Hruntam Vnaslidok Nadzvychainykh Sytuatsii ta Zbroinoi Ahresii Pid Chas Voiennoho Stanu v Ukraini [Legal Aspects of Compensation for Soil Damage During Emergencies and Armed Aggression]. In *Ekolohho-Pravova Bezpeka Suverennoi Derzhavy v Umovakh Voiennoho Stanu*; Hetman, A.P., Ed.; Pravo: Kharkiv, Ukraine, 2022; pp. 35–39.
94. Nosik, V.V. Zakonodavche Zabezpechennia Prava na Dostup do Vykorystannia Silskohospodarskykh Zemel v Umovakh Voiennoho Stanu yak Peredumovy Prodovolchoi Bezpeky [Legislative Support of Access to Agricultural Land Under Martial Law as a Precondition for Food Security]. In *Prodovolcha ta Ekolohichna Bezpeka u Voiennyi i Pislia Voiennoho Chasu*; FOP Yamchynskyi O. V.: Kyiv, Ukraine, 2022; pp. 31–34.
95. Konstytutsiia Ukrainy vid 28.06.1996 r. [Constitution of Ukraine of 28 June 1996]. Available online: https://zakon.rada.gov.ua/laws/show/254%D0%BA/96-%D0%B2%D1%80#Text (accessed on 12 October 2025).
96. Ukrinform. Economy Ministry: Ukraine’s physical export volumes close to pre-war levels. 6 February 2024. Available online: https://www.ukrinform.net/rubric-economy/3823038-economy-ministry-ukraines-physical-export-volumes-close-to-prewar-levels.html (accessed on 25 June 2025).
97. Marsh McLennan. Unity Insurance Facility Expanded to Cover All Shipping to and from Ukrainian Ports. March 2024. Available online: https://www.marshmclennan.com/news-events/2024/march/unity-insurance-facility-expanded-to-cover-all-shipping-to-and-from-Ukrainian-ports.html (accessed on 15 December 2025).
98. Uriadovyi Portal. U sichni Ukraina Postavyla Rekord Eksportu pid chas Viiny—Yuliia Svyrydenko [In January, Ukraine Set an Export Record During the War—Yuliia Svyrydenko]. 5 February 2024. Available online: https://www.kmu.gov.ua/news/u-sichni-ukraina-postavyla-rekord-eksportu-pid-chas-viiny-iuliia-svyrydenko (accessed on 15 June 2025).
99. Kharytonov, S.O.; Orlovskyi, R.S.; Olha, V.; et al. Criminal Legal Protection of the Environment: National Realities and International Standards. *Eur. Energy Environ. Law Rev.* **2023**, *32*, 283–292. https://doi.org/10.54648/eelr2023018.
100. Kryminalnyi kodeks Ukrainy vid 05.04.2001 r. [Criminal Code of Ukraine of 5 April 2001]. Available online: https://zakon.rada.gov.ua/laws/show/2341-14#Text (accessed on 12 October 2025).