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TRANSFORMATION OF THE LAND PROTECTION SYSTEM OF UKRAINE UNDER THE IMPACT OF WAR CONSEQUENCES AND POST- WAR RECOVERY

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Abstract. *The relevance of the study is driven by the need to transform Ukraine's land protection system amidst large-scale military and technogenic disturbances of the land and soil cover and the shaping of tasks for post-war recovery. The purpose of the study is the theoretical and methodological substantiation of the directions of transformation of Ukraine's land protection system, taking into account security, environmental, land management, monitoring, and European integration requirements. The methodological basis includes systemic, structural-functional, and comparative-legal methods, content analysis of regulatory acts and scientific sources, as well as logical modeling. It is substantiated that the post-war land protection system should combine information on explosive contamination, the actual state of soils, cadastral and legal characteristics, land management decisions, financing mechanisms for recovery, and subsequent monitoring. Institutional-legal, ecological-*

economic, land management-planning, monitoring, and war-recovery approaches have been systematized. It is proposed to supplement the principles of state policy in the field of land protection with the principles of environmental safety of post-war land use, safe return of land to use, approximation to EU law, ensuring soil health, ecosystem integrity, and climate-resilient land use. The scientific novelty lies in the formation of a holistic vision of land protection as a management system for the safety, condition, and recovery of land resources. The practical significance of the results lies in the possibility of using them to improve regulatory and legal frameworks, land management support, and monitoring of post-war land recovery.

Keywords: *land protection, land restoration, land management, land monitoring, soil health, land resource management, post-war recovery.*

Relevance. In modern conditions, Ukraine's land resources simultaneously perform production, spatial, ecological, social, and security functions. The full-scale war has significantly altered the nature of negative impacts on the land: alongside erosion, dehumidification, compaction, pollution, violation of the land use structure, and other traditional processes, specific war-induced forms of disturbance have emerged - mining, contamination with explosive objects, mechanical destruction of the soil profile, formation of craters, mixing of genetic horizons, pollution by detonation products, equipment debris, and fuels and lubricants, as well as damage to hydraulic and reclamation infrastructure. Accordingly, today this change is interpreted as a transition to understanding land not only as a means of production and an object of property relations, but as an ecological, economic, social, and security value.

The Law of Ukraine "On Land Protection" lays down the basic system of legal, organizational, economic, and technological measures aimed at the rational use of land, preservation and reproduction of soil fertility, and prevention of negative anthropogenic impacts [1]. At the same time, the consequences of the war create a managerial situation in which the legal affiliation of a land plot to a certain category

and the presence of an established designated purpose are no longer sufficient prerequisites for its actual restoration and use. Data on explosive contamination, the physical state of land and soils, chemical pollution, the state of infrastructure, and the possibility of safely carrying out the relevant type of activity are acquiring significant importance.

Individual elements of a new information and management architecture have already been formed in Ukraine. By Resolution of the Cabinet of Ministers of Ukraine No. 740, the regulatory framework for the Register of Territories Contaminated (Likely Contaminated) with Explosive Objects was created [2]. The Register provides for the accumulation of results of non-technical surveys, remote research, and territory clearance measures. Resolution No. 848 approved the new Procedure for Conducting Land and Soil Monitoring [3]. Consequently, the scientific problem lies not only in the absence of individual tools, but primarily in the functional gap between information on danger, soil condition data, cadastral and legal characteristics of a land plot, land management decisions, recovery financing, and subsequent monitoring. Overcoming this very gap should be one of the methodological tasks of the modern land protection system.

Analysis of recent research and publications. For Ukraine, land protection is a strategic direction of state policy and a guarantee of the state's sustainable development, since land in Ukraine acts not only as a spatial basis for economic activity, but also as the main national wealth, the basis of food security, ecological stability, and post-war recovery.

Land protection and use are interrelated components of a single system of land relations. Land use without protection leads to exhaustion, degradation, and loss of ecological functions of the soil cover, whereas land protection without rational use does not ensure full socio-economic development of territories.

The official definition of land protection is enshrined in Article 162 of the Land Code of Ukraine, where land protection is a system of legal, organizational, economic, and other measures aimed at the rational use of land, prevention of unjustified withdrawal of agricultural and forestry lands, protection against harmful

anthropogenic impacts, restoration and enhancement of soil fertility, increase in the productivity of forestry lands, and ensuring a special regime of use for nature conservation, health improvement, recreational, and historical-cultural lands [4].

The Law of Ukraine "On Land Protection" details this concept and emphasizes that land protection includes legal, economic, and social foundations, and its purpose is to ensure the rational use of land, reproduction and enhancement of soil fertility, preservation of the ecological functions of the soil cover, and environmental protection [1].

In scientific research, the problem of land protection is considered as a complex task combining ecological, agro-production, legal, spatial, and security aspects. A significant theoretical basis for understanding these processes is the work by O. I. Furdychko, O. I. Drebot, O. S. Demianiuk, Ye. D. Tkach, and A. A. Bunas "Ecology of the Agrosphere" (2022), in which the agrosphere is considered as a complex natural-economic system. The authors focus on the need for greening agricultural production, preserving the soil cover, maintaining the ecological balance of agrolandscapes, and forming balanced land use [5].

The practical orientation of the land protection problem is revealed in the scientific and methodological recommendations by V. F. Kaminskyi, L. P. Kolomiiets, I. P. Shevchenko, V. M. Povydalo, V. M. Shtakalo, and M. I. Shkvyr regarding the conservation of degraded, low-productive, and technogenically contaminated arable lands. This work substantiates the need to withdraw from intensive cultivation lands that have lost their productive potential or pose an environmental hazard. Special attention is paid to preventing soil exhaustion, restoring their ecological functions, and transitioning to safer models of using degraded lands [6].

Further development of this direction can be traced in the work by L. P. Kolomiiets, I. P. Shevchenko, V. M. Povydalo, M. I. Shkvyr, Yu. P. Blyzniuk, and O. M. Tereshchenko dedicated to functional models of soil-protective ecologically balanced agrolandscapes in the Forest-Steppe zone. The authors consider land protection not only as a system of restrictive measures, but as a spatially

organized farming model that must simultaneously ensure productivity, anti-erosion protection, water regime preservation, and ecological stability of agrolandscapes [7].

Ecological aspects of rational land use and protection are studied by N. M. Bavrovska, who focuses on the need to take into account degradation, pollution, loss of fertility, disruption of ecological balance, and the impact of military operations on the state of land resources. In this context, land protection appears not only as a legal obligation of landowners and land users, but as an element of the state's ecological security. A similar approach is observed in the work by S. A. Baliuk, V. V. Khareba, and A. V. Kucher, who consider sustainable soil management as the basis of food security. The authors prove that the preservation of soil cover, fertility, and ecosystem functions of land is a strategic condition for the sustainable development of the agricultural sector and national security [8; 9].

After the start of the full-scale war in Ukraine, the scientific discourse regarding land protection expanded significantly. Y. M. Dorosh, A. V. Barvinskyi, O. S. Dorosh, and L. A. Svyrydova study the challenges of land management in the agrosphere caused by military aggression and substantiate the need for a differentiated approach to land restoration depending on the type of damage, level of pollution, mechanical destruction, and the possibility of returning lands to economic use. The authors emphasize that traditional land management documentation must be supplemented with tools for assessing military damage, conservation, reclamation, and safe restoration of land use [10].

By I. O. Kostiasnkin and O. V. Lutsiuk, land protection is considered through the prism of sustainable development. The authors believe that land protection implies their rational use, which should be determined not only by economic effect, but also by non-exhaustion, ecological soundness, and the ability to preserve natural resources for future generations [11].

In the works of V. Teremetskyi, H. Shust, V. Nezhevelo, O. Piddubnyi, and O. Mykhailovska, land protection is considered through the system of state administration, public governance, control, public participation, and responsibility of authorities. This approach shows that land protection cannot be assigned solely to the

landowner or land user. An effective management system is needed that combines state control, local self-government, cadastral information, environmental monitoring, economic incentives, and public participation [12; 13; 14].

The ecological and economic approach to land protection is explored in the scientific works of M. Stupen, M. Bohira, O. Stupen, Z. Ryzhok, and T. O. Stepanenko. Its essence lies in the fact that land protection should be considered not as an obstacle to economic development, but as a condition for the long-term productivity of the agrarian sector. M. Stupen and co-authors emphasize that the use of agricultural land must be based on environmental priorities rather than solely on production efficiency. They emphasize that land should be perceived as an element of the environment, and not just as a means of production [15; 16].

T. Stepanenko develops this approach under wartime conditions: the author shows that degradation, pollution, mining, and land damage have not only ecological but also direct economic consequences — a decrease in productivity, investment attractiveness, and stability of the agrarian sector [16].

O. V. Hafurova's views are also noteworthy; in her article on agrochemical certification, the author shows that without quality data on soil conditions, land protection remains declarative. Agrochemical certification makes it possible to record the level of fertility, supply of nutrients, pollution by toxic substances, and radionuclides. For Ukraine, this approach is of particular importance, since quantitative accounting of land plots often prevails in management practice, while the qualitative state of soils is insufficiently taken into account. That is why land and soil monitoring should not be an additional element, but the basis of the entire land protection system [17].

In general, land protection is considered as a complex interdisciplinary institution combining land law, environmental law, land management, soil science, agro-ecology, environmental economics, and spatial planning.

Purpose of the study. The purpose of the article is the theoretical and methodological substantiation of directions for transforming approaches to Ukraine's land protection system.

Materials and methods of the study. The information basis of the study included the provisions of the land legislation of Ukraine, regulatory acts on land and soil monitoring and accounting of territories contaminated or likely contaminated with explosive objects, provisions of Directive (EU) 2025/2360, as well as the results of contemporary Ukrainian research in the field of military soil degradation, classification of disturbed lands, monitoring, and institutional transformation of land management. Systemic, structural-functional, and comparative-legal methods were also applied.

Results of the study and discussion. In modern conditions, land protection and use in Ukraine are acquiring new meaning, as the full-scale war has significantly altered the nature of threats to land resources. While before the war the main attention was paid to the problems of erosion, soil exhaustion, agrochemical pollution, excessive plowing, irrational land use structure, and violation of land use regimes, today they are supplemented by specific military-technogenic factors: territory mining, contamination with explosive objects, mechanical destruction of the soil cover, formation of craters from ammunition, littering of lands with military equipment debris, pollution by fuels and lubricants, heavy metals, and explosion products.

According to official data, as of March 2026, over 12,000 cases of environmental damage were recorded in Ukraine, and damages from soil pollution and littering of land resources due to missile and bomb strikes are estimated at over UAH 1.34 trillion [19].

In this context, post-war land restoration cannot be reduced solely to returning land plots to economic turnover. It must provide for a comprehensive system of actions aimed at establishing the actual state of lands, assessing their safety level, clearing them of explosive objects, determining the degree of soil contamination, reclamation, restoring fertility and ecological functions, and forming new models of sustainable land use.

This conclusion correlates with the studies of a number of scientists; for instance, S. A. Baliuk and co-authors substantiate that the war significantly changes

approaches to land resource management. The authors emphasize the need to assess the actual state of soils, identify war-induced degradation, and form a monitoring system and scientific support for land restoration. Importantly, the authors associate land restoration not only with returning them to economic turnover, but also with assessing environmental safety and restoring the productive functions of soils [20].

Therefore, land protection in the modern scientific understanding should be considered as an integral system of land resource condition management, which encompasses legal regulation, land management, economic incentives, monitoring, damage assessment, restoration of damaged lands, and the formation of sustainable land use models; accordingly, this provides grounds to distinguish several main scientific approaches to land protection.

Institutional-legal approach. Its essence is that land protection is impossible without a high-quality legislative framework, clear rules for land use, cadastral information, and institutional responsibility. Land protection is considered through the development of land management, the implementation of EU law, the improvement of land legislation, the classification of land designated purposes, and regulatory restrictions.

Ecological-economic approach. Its content lies in the fact that land has not only market but also ecological and restoration value; at the same time, land protection should be considered not as an obstacle to economic development, but as a condition for the long-term productivity of the agrarian sector.

Land management and planning approach. This approach proves that land protection must be implemented through spatial organization of the territory, planning of land use regimes, restrictions, zoning, and land management.

Monitoring approach. Without reliable data on the state of land and soils, it is impossible to effectively implement land protection measures. Based on monitoring data, the assessment of anthropogenic impact and the environmental welfare index are determined.

War-recovery approach. Its emergence is associated with the full-scale war and new types of damage to land resources: mining, contamination with explosives,

petroleum products, ammunition debris, mechanical destruction of the soil cover, fires, and damage to reclamation infrastructure. This approach includes the inventory of affected lands, damage assessment, post-war recovery, digital continuity of GIS, and methodological support for the reclamation and restoration of territories.

Given the foregoing, it is worth noting that today there is a clear change in the scientific paradigm: land is not considered solely as a means of production or a market object; it is analyzed as an ecological, social, economic, and security value, and a new direction is actively forming - the protection and restoration of lands damaged by war.

In this regard, the definition of land protection principles acquires special significance, since principles form the methodological basis of the entire system of legal regulation, public administration, land management, monitoring, economic incentives, and land restoration. They reflect the basic scientific, moral-legal, and managerial guidelines according to which the use, preservation, reproduction, and restoration of land resources should be carried out. Therefore, further analysis of land protection should be carried out through the disclosure of its fundamental principles, which ensure the integrity, consistency, and practical orientation of this activity.

In accordance with the Law of Ukraine "On Land Protection", the object of special state protection is all lands within the territory of Ukraine, and the basic principles of state policy in this area are enshrined in Article 3 of the Law [1].

The principle of ensuring land protection as the main national wealth of the Ukrainian People. Its essence is that land resources cannot be regarded solely as an object of ownership, purchase and sale, or lease. They are a national wealth, therefore their use must be subordinated to the long-term interests of society [1].

The principle of priority of environmental safety requirements in the use of land as a spatial basis, a natural resource, and the main means of production. Its content lies in the fact that any economic activity on land must be carried out taking into account environmental restrictions. Economic profit should not be achieved by exhausting soils, polluting lands, destroying landscapes, disrupting the water regime, destroying shelterbelts, or deteriorating the state of the environment [1].

The principle of compensation for damage caused by violations of the legislation of Ukraine on land protection. The essence of the principle is that a person who has worsened the state of lands, contaminated soils, allowed erosion, arbitrarily occupied a land plot, or violated the established land use regime must compensate for the damage caused. This principle determines not only punitive but also preventive significance. It forms an economic safeguard against negligent or predatory land use. If the violator knows that the damage will be assessed and compensated, this encourages compliance with environmental requirements [1].

The principle of rationing and planned limitation of the impact of economic activity on land resources implies that economic activity should be carried out within the limits of scientifically grounded ecological, sanitary, agrotechnical, and technological standards [1].

The principle of combining economic incentive measures and legal liability in the field of land protection. This principle is one of the most important for the practical implementation of land protection. Its essence lies in the fact that the state must not only punish for violations of land legislation, but also encourage landowners and land users to behave in an environmentally responsible manner [1].

Publicity in resolving issues of land protection, use of funds of the State Budget of Ukraine and local budgets for land protection. The content of the principle is that issues of land protection should not be resolved behind closed doors or exclusively by administrative means. Society, territorial communities, landowners, land users, scientists, and the public must be involved in discussing land protection programs, spatial planning, distribution of budget funds, establishment of restrictions on land use, and control over the implementation of environmental measures [1].

Therefore, we consider land protection principles as the rules according to which state policy in this area is formed and implemented, and in this context, it is also worth highlighting the principle of systematicity of land protection measures. Although this principle is not formulated in Article 3 of the Law of Ukraine "On Land Protection" as a separate item, it follows from the content of the Law. Land protection is implemented through a system of measures, among which are the state

comprehensive observation system, land use and protection programs, land management documentation, creation of an ecological network, natural-agricultural, ecological-economic and anti-erosion zoning, economic incentives, and rationing. This principle means that land protection cannot be a one-time action. It must cover the full management cycle: problem identification, monitoring, land condition assessment, planning, development of land management documentation, implementation of measures, control, outcome evaluation, and policy adjustment [1].

Scientific research by domestic scientists confirms that the current principles formulated in the Law of Ukraine "On Land Protection" are an important basis for state policy in this area, but in modern conditions they need to be expanded. This acquires special relevance in the conditions of full-scale war, when land resources have suffered new types of negative impacts. In such conditions, land protection principles acquire not only theoretical but also applied significance, as they determine what state policy regarding land should be during the post-war recovery period [8; 10; 20].

Also, taking into account the Ukraine-EU Association Agreement and the current policy of the European Union in the field of soil protection, nature, water, climate, and agricultural production, it is advisable to additionally formulate a number of European integration principles to the principles already enshrined in the Law of Ukraine "On Land Protection" [21; 22; 23]..

Principles of state policy in the field of land protection, which are advisable to supplement Article 3 of the Law of Ukraine "On Land Protection":

The principle of environmental safety of post-war land use – provides for ensuring the environmental safety of land use in territories affected by military operations by preventing the use of lands whose state poses a threat to the environment, the life and health of the population, the quality of agricultural products, and the state's food security. This principle operationalizes the principle of priority of environmental safety already present in the Law, but adapts it to the conditions of war and post-war recovery. It means that the economic need for the

rapid return of land to cultivation should not prevail over human safety, soil quality, and the long-term ecological stability of territories.

The principle of safe return of land to economic use. Ensuring the safe return of land damaged or contaminated as a result of military operations to economic, environmental, recreational, or other use only after conducting necessary surveys, demining, assessing the environmental condition, and determining the suitability of such lands for use. This principle will mean that a land plot after hostilities cannot automatically be considered suitable for use solely due to the presence of a cadastral number, ownership right, or previous designated purpose. Its further use must depend on the actual state: the presence of mine danger, pollution, mechanical destruction of soils, damage to infrastructure, and risks to human life and health.

The principle of approximating land protection to EU law and policy. Its essence is that land protection in Ukraine should develop not in isolation, but taking into account European environmental legislation. For Ukraine, the implementation of this principle is important because European integration requires a transition from formal control over land use to comprehensive management of land resources, soils, water, biodiversity, climate risks, and ecosystem services.

The principle of ensuring soil health as the basis of food security, ecological balance, climate resilience, and long-term productivity of land resources. The EU increasingly uses the concept of "soil health". It means that soil is assessed not only by fertility, but also by its ability to perform natural functions: store organic carbon, retain moisture, support biodiversity, filter pollutants, ensure food production, and climate resilience. The EU Soil Strategy for 2030 envisages that by 2050 all EU soil ecosystems must be "healthy" and resilient, and the protection, sustainable use, and restoration of soils must become a common standard [22; 23].

The principle of ecosystem integrity, according to which land protection is carried out taking into account the relationship between soils, water, vegetation cover, biodiversity, climate, and the landscape structure of territories. The European approach views land not in isolation, but as part of an ecosystem: soil, water, vegetation, biodiversity, climate, and economic activity are interconnected.

Therefore, land protection must include the preservation of natural habitats, ecological networks, wetlands, shelterbelts, riparian protective strips, meadows, pastures, and natural landscapes.

The principle of climate-resilient land use, which provides for the preservation of organic carbon in soils, an increase in water-retention capacity, combating erosion, adaptation of agrolandscapes to climate change, and reduction of emissions from land use. In the EU, land resources are considered an important component of climate policy. Soils can be both a source of greenhouse gas emissions and a carbon sink. Therefore, land protection must include the preservation of organic matter, protection of peatlands, restoration of shelterbelts, agroforestry, minimal tillage, cover crops, and climate-adapted crop rotations.

The proposed principles do not contradict the current provisions of Article 3 of the Law of Ukraine "On Land Protection", but develop them in accordance with new social, environmental, security, and European integration conditions. Their enshrinement would make it possible to move from the traditional model of land protection, focused mainly on control, rationing, and responsibility, to a modern model combining safety, restoration, monitoring, soil "health", the ecosystem approach, spatial planning, and sustainable development of territories.

In the military and post-war period, it is relevant to enshrine at the legislative level the classification of lands according to the level of safety and suitability for return to use and to develop appropriate criteria. Such a classification will allow determining recovery priorities, planning budget expenditures, attracting international assistance, and ensuring the return of land to economic turnover. The classification of lands by the type of military disturbance proposed by Y. Dorosh and co-authors is an important diagnostic basis [18]. At the same time, the type of disturbance and the readiness of the territory for use are different characteristics. Two plots classified into the same group of contaminated lands may have a fundamentally different level of risk, complexity of restoration, and permissible use regime.

Therefore, as a supplement to the classification by type of disturbance, a functional classification by management readiness is proposed (Table 1).

Table 1.**Classification of lands according to readiness to return to use**

Class	Characteristics	Basic management decision
I — suitable for immediate return	critical hazards eliminated or unconfirmed; qualitative state meets requirements; functional restrictions are absent	restoration of use with planned monitoring
II — conditionally suitable	use is possible under defined restrictions, technological conditions, or increased control frequency	use with a special regime and monitoring
III — temporarily unsuitable	existing disturbances that can be eliminated through clearance, reclamation, remediation, or infrastructure restoration	restoration measures with subsequent reassessment
IV — unsuitable for the previous type of use	restoration to the previous function is ecologically, safely, or technically inappropriate under defined conditions	conservation, renaturalization, or consideration of another functional scenario

Source: formed by the author based on [18] .

Conclusions and prospects for further research. The conducted analysis indicates that the full-scale war has caused a qualitative change in the content of land protection in Ukraine: alongside traditional tasks of rational use, prevention of degradation, and reproduction of fertility, the safety of territories, assessment of war-induced damage, restoration of soil cover functions, and information interaction between monitoring, cadastre, land management, and mine action systems are becoming decisive. It has been established that the modern land protection system should be formed as an integrated management mechanism combining institutional-legal, ecological-economic, land management-planning, monitoring, and war-recovery approaches. The expediency of developing the current principles of state policy by supplementing them with the principles of environmental safety of post-war land use, safe return of land to use, approximation of land protection to EU law and

policy, ensuring soil health, ecosystem integrity, and climate-resilient land use has been substantiated. An important condition for the practical implementation of such a model is the transition from a formal consideration of the category and designated purpose of a land plot to assessing its actual state, safety, degree of degradation, environmental restrictions, and the need for restoration. Prospects for further research are associated with the development of criteria and indicators for classifying lands according to the level of safety and suitability for return to use, the formation of an integrated geoinformation model of restoration priority, as well as methodological support for monitoring the effectiveness of reclamation and restoration measures.

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ТРАНСФОРМАЦІЯ СИСТЕМИ ОХОРОНИ ЗЕМЕЛЬ УКРАЇНИ В УМОВАХ ВПЛИВУ ВОЄННИХ НАСЛІДКІВ І ПОВОЄННОГО ВІДНОВЛЕННЯ

***Анотація.** Актуальність дослідження зумовлена необхідністю трансформації системи охорони земель України в умовах масштабних воєнно-техногенних порушень земельного та ґрунтового покриву і формування завдань повоєнного відновлення. Метою дослідження є теоретико-методологічне обґрунтування напрямів трансформації системи охорони земель України з урахуванням безпекових, екологічних, землевпорядних, моніторингових та євроінтеграційних вимог. Методичною основою стали системний, структурно-функціональний, порівняльно-правовий методи, контент-аналіз нормативно-правових актів і наукових джерел, а також логічне моделювання. Обґрунтовано, що повоєнна система охорони земель має поєднувати інформацію про вибухонебезпечне забруднення, фактичний стан ґрунтів, кадастрово-правові характеристики, землевпорядні рішення, механізми фінансування відновлення та подальший моніторинг. Систематизовано інституційно-правовий, еколого-економічний, землевпорядно-планувальний, моніторинговий і воєнно-відновлювальний підходи. Запропоновано доповнення принципів державної політики у сфері охорони земель принципами екологічної безпеки повоєнного землекористування, безпечного повернення земель у використання, наближення до права ЄС, забезпечення здоров'я ґрунтів, екосистемної цілісності та кліматично стійкого землекористування. Наукова новизна полягає у формуванні цілісного бачення охорони земель як системи управління безпечністю, станом і відновленням земельних ресурсів. Практичне значення результатів полягає у можливості їх використання для*

вдосконалення нормативно-правових засад, землевпорядного забезпечення та моніторингу повоєнного відновлення земель.

Ключові слова: *охорона земель, відновлення земель, землеустрій, моніторинг земель, здоров'я ґрунтів, управління земельними ресурсами, повоєнне відновлення.*