





# CONCEPTUAL APPROACHES TO THE COMPLEX OF RESTORATION OF THE AFFECTED TERRITORIES AS A RESULT OF MILITARY ACTIONS IN UKRAINE

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## ABSTRACT

### Aim of the study

The purpose of the study is to substantiate the conceptual approaches of the complex and to consider its main components regarding the restoration of territories affected by the war in Ukraine, with an emphasis on the incompleteness of current legal acts. It is therefore essential to develop new legal mechanisms that will ensure the procedure for removing contaminated lands into state ownership for their long-term restoration, with appropriate compensation to landowners for the period of time that the contaminated land remains in state ownership.

### Material and methods

The theoretical basis consists of academic research by domestic and international scientists in the field of land management and environmental protection, legislative and regulatory acts, methodological and instructional materials, statistical and analytical data of ministries and departments of Ukraine, as well as public organizations regarding the use of land resources and socio-economic development of the regions of Ukraine. Methods used include: monographic analysis; synthesis method; structural and logical method; systemic approach; dialectical principle of connection /interaction.

### Results and conclusions

The land relations during the reconstruction of Ukraine should be based on the following principles and approaches: openness of the public cadastral map of Ukraine; simplification of permit procedures; assessment of land and soil quality, inventory; continuation of the trend of decreasing arable land; conservation of lands, the use of which could harm human life and health as well as the state of the environment; expropriation of land from tenants who are connected to Russia or Belarus; soil conservation in the context of war; introduction of the state system for the control of land resources and the responsibility of land users.

**Keywords:** components of the restoration complex, scientific aspects of land management, environment, soils, military actions

## INTRODUCTION

Since the full-scale military invasion by the Russian Federation began, the agricultural sector of Ukraine has suffered \$4.3 billion in damage. Agricultural lands were the most affected. Losses from the occupation, contamination by mines and unexploded ammunition, and direct physical damage amount to \$2.1 billion. Agricultural machinery of almost \$1 billion worth was damaged. \$273 million is the value of losses from the destruction of granaries. Also the Kyiv Centre for Food and Land Use Research School of Economics (KSE) calculated losses of the already produced products at \$613 million, damages in livestock – at \$136 million, losses of fertilizers and fuel due to looting and physical damage – at \$120 million (Overview of war damage in agriculture, 2024). 174 thousand square kilometres of Ukrainian land are potentially polluted. The longer the hostilities continue, the more damage is done to the environment, and especially to the soil. At the same time, the government is determined to return 80% of the polluted territories to economic use within 10 years (Plan of demining activities, 2023). Obviously, the restoration of territories is impossible without a previous survey thereof, combined with demining, if necessary, as well as developing a land inventory, which falls within the field of land management.

Thus, *the demining of Ukrainian lands* is the fundamental basis for the recovery of Ukraine. Experts estimate that nearly 2,500 cases of environmental damage caused by hostilities have been recorded since the start of the full-scale war. The total damage caused to the lands of Ukraine is estimated at 52 billion euros. In Ukraine, during the period of martial law, the Ministry of Defense is responsible for the coordination, management, and interaction between authorities on the issues of territorial restoration policy, including demining.

The volume of arable land in the world has not changed since the 1990s, but the consumption of agricultural products, on the contrary, has increased significantly. The global economy faces a very important task: to regulate food consumption, which has increased by 60%. After all, it is not possible to increase the area of arable land, due to the fact that the level of ploughed land in Ukraine is already too high. The restoration of territories, the key role in which is played

by land management, is an urgent issue that will regulate not only the area of ploughed land, but also environmental pollution of the territories as a result of military actions.

*Analysis of recent research and publications.* Scientists who deal with complex issues of land use in Ukraine, as well as issues of post-war reconstruction, emphasize a significant number of problems in the outlined issue (Gunko, 2022; Dubnytska et al., 2023; Tretyak et al., 2023). In this context, it is important to increase the role of land management as a system of measures for the rational organization of various territories (Tretyak et al., 2023). In our opinion, the scientific role of the system approach in the development of the recovery complex and its components should be considered as a tool for such integration.

## FORMULATION OF THE PROBLEM

*Demining* is a new reality for Ukraine. As of today, certified state institutions and non-governmental operators carry out technical and non-technical surveys of territories in order to find out where the territory is really polluted, and where the land can be returned to economic exploitation (Plan of demining activities, 2023). A quick solution to the current situation with the contamination of territories as a result of Russia's war against Ukraine at various levels of management is only possible if an essential condition is met, namely: that effective regulatory and legal acts and institutions are developed and applied, as a *legal component of the complex process of restoration of Ukraine*.

At the time of this writing, the state of the legal framework in the specified sphere of legal regulation is as follows: the Constitution of Ukraine; Civil Protection Code of Ukraine; Law “On Mine Action in Ukraine”; Law “On Adoption of the Protocol on the Prohibition or Restriction of the Use of Mines, Mine Traps and Other Devices as Amended on May 3, 1996, attached to the Convention on the Prohibition or Restriction of the Use of Specific types of conventional weapons that can be considered to cause excessive damage or have an indiscriminate effect” No. 1084-XIV dated September 21, 1999.

In addition, already during the legal regime of martial law, *a Plan of demining measures* was developed to specify regulatory and legal framework (Plan

of demining activities, 2023) for agricultural lands. The *Plan* is designed for four years, and provides for the return to economic exploitation of more than 470 thousand hectares of the most valuable agricultural lands. According to the criteria specified in the aforementioned Plan, the density of contamination, which affects the time required for surveying and cleaning the areas, is divided into categories:

1. low – territories where no combat operations were conducted, but there is a possibility of detecting explosive objects;
2. medium – de-occupied territories that fell into the zone of constant shelling, where military formations carried out their activities and where there is a high probability of detecting explosive objects;
3. high – territories near the line of combat contact, in relation to which there is information about installed minefields and the use of remote demining means.

To demonstrate the level of contamination by explosive objects, we offer an example of satellite images of arable land before the start of active hostilities and during them in the southeast of the city of Izyum, Kharkiv region (Fig. 1).

The pictures show a 1 sq. km area of fields sown with winter crops. Experts from the Ukrainian environmental protection group counted 480 funnels from 82-millimeter shells, 547 funnels from 120-millimeter shells, and 1,025 – from 152-millimeter shells. Environmentalists conclude that here, on one square kilometre of the field, 50 tons of iron, 1 ton of sul-

phur compounds, and 2.35 tons of copper had gotten into the soil. The explosions overturned 90,000 tons of soil. This small example makes it possible to try to understand the probable scale of the damage caused by the war to the Ukrainian land (Inflicted damage. Land resources, 2024)

Current information on agricultural land by pollution density and categories of economic feasibility is prepared by territorial communities and submitted to the regional military administration. In practice, the approach declared by the Government of Ukraine – that demining of agricultural lands, forests, and water bodies should be carried out by non-governmental operators – is partially implemented. Instead, state institutions should focus on demining infrastructure and housing, ensuring the safety of the population.

For civilians, demining is divided into two types: operational and humanitarian. *Operational demining* involves clearing by sappers of the State Emergency Service, the National Guard of Ukraine or the Armed Forces of Ukraine of areas where explosive objects were found. Such demining is suitable for emergencies. *Humanitarian demining* denotes examination of all potentially dangerous areas according to international standards, destruction of explosive objects and quality control. Humanitarian demining of a square meter of land can cost 3–4 US dollars, unfortunately, not every business is able to finance such works. The state does not yet allocate money for humanitarian demining, that is, the business carries it out either with its own funds or with the funds of foreign donors.



**Fig. 1.** Satellite images of arable land before the start of active hostilities (May 2021) and during them (May 2022) southeast of the city of Izyum, Kharkiv region (photo by MAXar, May 2022, Inflicted damage. Land resources, 2024)

Objectively, the set of measures for humanitarian demining is not available to Ukrainian businesses, as the State lacks the technical, material and human resources to implement these measures. Priorities for humanitarian demining are determined taking into account the instructions of the National Authority for Mine Action and the proposal of local authorities.

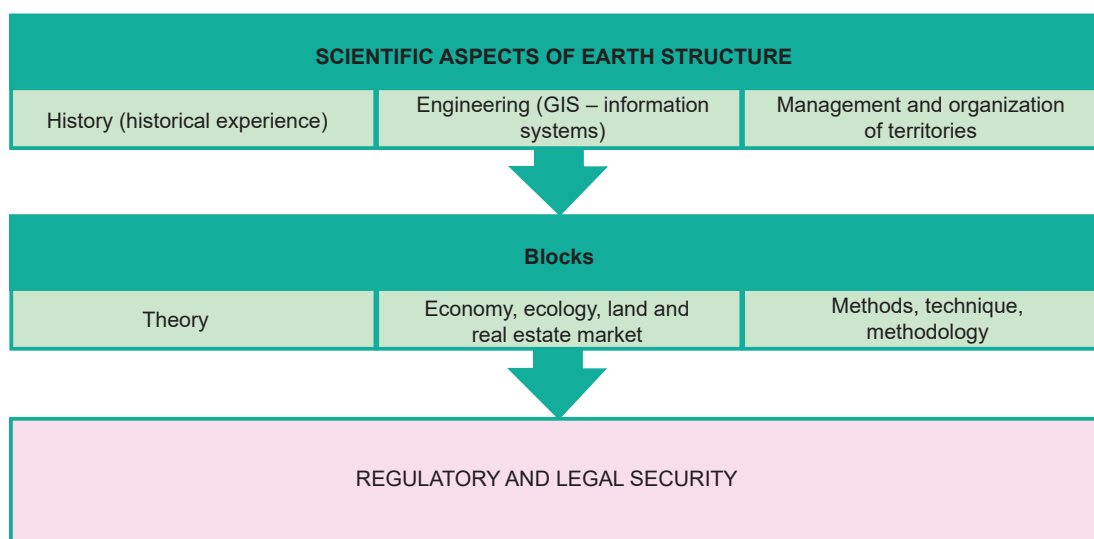
It is urgent to develop and adopt of the kind of a regulatory and legal framework that would allow business representatives and owners of contaminated land plots to accumulate financial resources, for example, to pay for humanitarian demining services by non-governmental operators due to exemption from paying land tax and environmental tax for a certain period.. In part, such legal mechanism in the form of a law is indirectly applied in practice by the business community. Yes, owners of businesses (farms, etc.) whose lands are either contaminated with explosives, or are occupied, or hostilities are taking place therein, will not pay land tax provided there are certain documented circumstances and the implementation of tax accounting and reporting actions (Ukraine, VR, 2022a, 2022b, 2023), and this is *an economic component of overcoming the consequences of the war in Ukraine*.

Unfortunately, demining does not guarantee returning to work on cleared lands. The surface still needs to be levelled and recultivated in order to restore

soil fertility. In June 2023, the Kyiv School of Economics (KSE) estimated the total cost of such works at \$40 million (Overview of war damage in agriculture, 2024). During the demining of territories, the humus horizon is destroyed, the physio-chemical properties of the soil are lost, and the granulometric and aggregate qualities changes. All this affects the potential fertility and water-holding capacity of the soil. The installation of mines in itself predicts soil turbulence in the future. Detonation contaminates the ground with metal fragments and explosive remnants. Operations to clear the territory of explosive objects and debris are often complex and expensive, therefore in developing countries these consequences can be interpreted as an absolute loss of soil resources.

In this context, the key task of land management is to provide information on the legal, economic, ecological and urban planning mechanism for regulating land relations at the national, regional, local, and economic levels by developing proposals for establishing a special regime and conditions for land use, as *a practical component of the restoration of Ukraine*. The diagrammatic model presents scientific aspects of land management, which are highlighted and applied at present (Fig. 2).

According to the model, it can be concluded that the components we present and consider above (both



**Fig. 2.** Diagrammatic model – aspects of scientific land management in Ukraine (source: Authors' own elaboration)

legal and economic) are part of the scientific aspects of land management. Therefore, we consider land management as a practical component of the complex of restoration of Ukraine. However, in the conditions of wartime and a sharp drop in the gross domestic product (GDP), the state needs new key approaches that will enable rapid growth of the national economy.

Also, research on land management reveals the possibilities of using various methods, in particular the method of experimental design, when the achievements of science and best practices are tested on real-life objects of land management. Thanks to this, the obtained results provide an opportunity to draw conclusions about the ways of changes for the development of other objects, which forms the foundation for tracing spatial-consequential relationships regarding the processes and phenomena.

In our opinion, the monographic method, which studies individual typical and resonant objects of land management, phenomena, processes, etc., also plays an important role. Based on studying these, scientific conclusions and proposals are made. During the implementation of the monographic method, the impact that the organization of the territory has on the efficiency of land use and production of agricultural products is also evaluated, and the most effective methods, technologies and techniques of land management are explored.

We propose to consider *three main directions (provisions)* regarding the admissibility of the application of scientific methods (Fig. 3), which in turn will correspond to the scientific aspects of land management to restore the territory of Ukraine (Fig. 4).

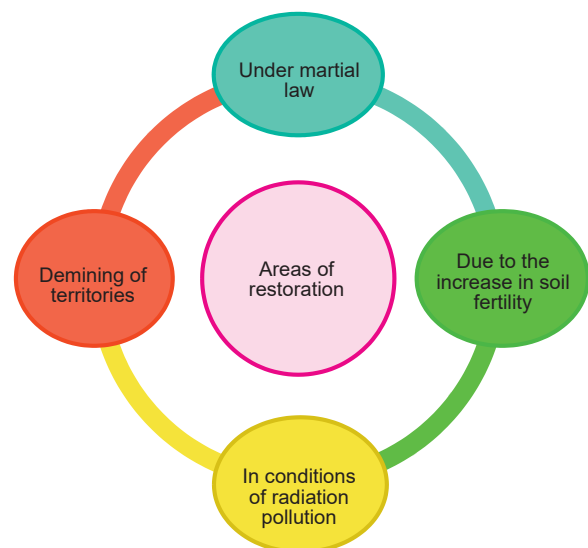
*Provisions for the restoration of lands under martial law* are oriented towards the adoption of laws by the Verkhovna Rada of Ukraine to support the agrarian sector. These adopted laws can facilitate activities in the condition of hostilities. Key points:

1. under the conditions of martial law, the creation of a register of property rights is limited, therefore, instead of state registration, temporary recording of land use contracts was introduced;
2. local communities have the opportunity to enter into lease agreements for agricultural plots of land without auctions;
3. under martial law, legal prerequisites are created to provide citizens having business entities with

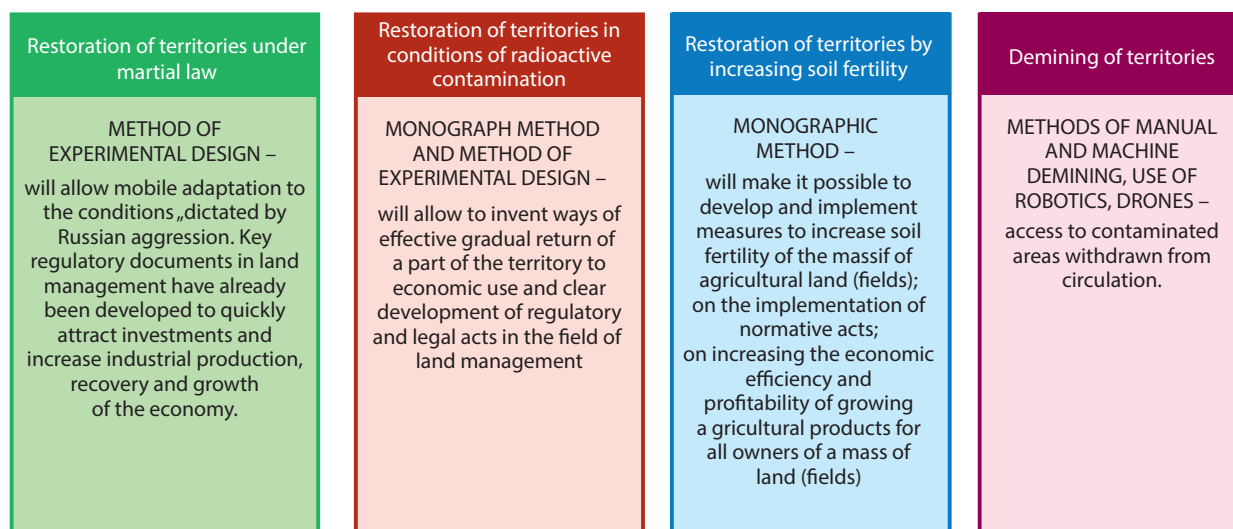
services for drafting land management documentation, topographic-geodetic and cartographic works, property valuation, expert monetary valuation of land plots, which is critical for the functioning of land-legal relations;

4. during the period of martial law (to ensure the safety of conditions), the provision of special permits for topographical and geodetic surveys is introduced;
5. the transfer (grant) of land plots and lands of state and communal ownership is simplified, in the absence of approved urban planning documentation at the local level, for the purposes of locating the production facilities of enterprises displaced (evacuated or relocated) from the combat zone and locating facilities for temporary stay of internally displaced persons.

*Provisions for the restoration of land affected by radioactive contamination.* In Ukraine, a concept for the comprehensive restoration and development of the territories of the exclusion zone and the zone of unconditional (mandatory) resettlement, which suffered radioactive contamination as a result of the Chernobyl disaster, has been developed for the years 2021–2070 (The concept of comprehensive restoration and development of the territories of the exclusion zone and the



**Fig. 3.** Diagrammatic model of areas restoration directions (source: Authors' own elaboration)



**Fig. 4.** Areas of restoration (source: Authors' own elaboration)

zone of unconditional (mandatory) resettlement, which were exposed to radioactive contamination as a result of the Chernobyl disaster for the years 2021–2070, 2021). This concept envisages a key strategic task – restoration and maintenance of the barrier function for radiation-ecological protection of the population and provision of socio-economic and ecological development of the area. Within the territory of the Chornobyl Exclusion Zone (CHEZ) there are radiation-hazardous objects present: the so-called “shelters”, or radioactive waste storage facilities, more than 800 points of temporary location of radioactive waste, and a partially drained reservoir – cooler with the presence of various forms of radioactive elements and materials. In the future, it is planned that a part of the area will gradually return to economic use, and a zone of special industrial use will be created on permanently polluted territories, which will be based on the use of a closed production cycle, obtaining products with a high added value.

There is an urgent need for changes in land management regarding the approaches to assessing the status of the Chernobyl exclusion zone, as well as reviewing and amending the boundaries of the zone, which is due to the possibility of returning part of the area to economic operation, using experimental design methods. To date, there are no legal acts regulating the procedure of obtaining permits for planning, construction, reconstruction, and repair of facilities in the Chernobyl

exclusion zone, nor is there a procedure for developing town planning and land management documentation, in other words, the powers of the Cabinet of Ministers of Ukraine and the State Agency of Ukraine regarding the management of the exclusion zone.

*Provisions for the restoration of land in terms of increasing soil fertility.* The lands of territories affected by hostilities are land plots that have been damaged or destroyed as a result of hostilities. The concept of “*damage*” to lands means any changes in their condition that lead to a decrease in their fertility, suitability for use, or value. The concept of “*destruction*” of lands means such changes in their condition that make them unfit for use. The land of the territories affected by hostilities can be divided into the following types:

1. Land in need of restoration encompasses land plots on which vegetation has been damaged or destroyed, but their structure and properties have not been disturbed. These land plots can be restored by carrying out appropriate measures, such as sowing or planting agricultural plants, seeding with grass, etc.
2. Land in need of reclamation is land where the structure and properties have been damaged or destroyed. These lands require a set of measures aimed at restoring their fertility and suitability for use. Land reclamation is a complex and time-consuming process that can take several years.

3. Unusable land is land on which damage or destruction is so significant that restoration or reclamation is impossible or economically unprofitable. These land plots can be used for other purposes, such as construction, placement of industrial enterprises, etc.

The main reasons for damaging the soil cover and reducing the fertility of agricultural land in the context of hostilities include:

1. A large amount of destroyed military equipment that remains on the surface of the soil. It causes soil pollution due to the leakage of fuel and lubricant materials and the spread of metal oxidation products.
2. Shell explosions. Ammunition is made from a cast iron alloy, to which carbon, copper and sulphur are added. As a result of the explosion, these substances fall into the soil and eventually begin to oxidize. Then they begin to enter the cycle of environmental substances and enter food chains, which leads to the destruction of plants and organic substances in the soil. Also, as a result of the explosion, toxic gases (nitrogen oxide, sulphur oxide, carbon monoxide) are released into the atmosphere, which later return to the ground through acid rain, which, in turn, causes burns to plants.
3. The bodies of the dead, which remain on the open ground for a long time and pollute the ground water with corpse poison and cause the spread of disease-causing microorganisms.
4. Soil compaction occurs during the movement of military equipment and troops, the construction of protective structures, and bombardment. Equipment weighing 10 tons compacts the soil to a depth of 60 cm, and the weight of just one tank is about 40 tons. Soil compaction with damage to the humus layer has direct negative consequences, such as a violation of the water balance of the soil. Also, it causes the development of wind and water erosion, and leads to a decrease in plant productivity by 40-60%. There are also significant changes to ecosystems, which will take years to recover.
5. Demining usually leads to consequences similar to the explosion of ammunition. The chemical effect of ammunition changes the natural physical and chemical parameters of the soil cover, primarily

pH, cation exchange and humus content. Also, as the concentration of toxic and chemical substances increases, various local landscape and geochemical anomalies may form. Therefore, these areas cannot be used in the long term. It follows that after demining, it is necessary to additionally clean the land from the remains of chemical substances that remain within it. The vibrational, radioactive, and thermal effects of detonation lead to the loss of the soil's buffering capacity for recovery, a decrease in the humus content, and, as a result, the natural fertility of the soil.

As a rule, the following measures are taken to increase soil fertility: crop rotation; proper soil treatment; introduction of organic and mineral fertilizers according to the needs of the culture; reclamation; sowing of perennial siderate grasses; fight against excessive soil moisture (drainage).

In our opinion, there is a significant obstacle to increasing soil fertility in Ukraine. Although current legal acts provide for measures to increase soil fertility for individual land users and individual land plots, yet in reality, many landowners may be present on one field, and land management does not provide for regulatory legal acts that would regulate this issue. Therefore, there is an urgent need to develop such legislation.

In general, the following recommendations are relevant for restoring soil fertility:

1. Optimizing soil cultivation technologies, switching to more economical ones, reducing the frequency of passing machinery (strip-till, no-till, introduction from drones, routing of machinery, use of wide-grip units, practising direct seeding technologies, etc.);
2. Planning crop rotation;
3. The use of evidence-based biological preparations capable of restoring biological diversity;
4. Using siderates and perennial herbs;
5. Working with plant residues (returning organic matter to the soil, using soil conditioners that can suppress the development of phytopathogens);
6. Applying manure composts;
7. Restoring field protection forest strips.

For soils exposed to military impact, in addition to the recommendations indicated above, it is worth considering additional steps related to bioremediation

to reduce the amount of heavy metals, restoration of microbiota, combating soil compaction, work with oil pollution.

*Provisions for the restoration of land due to demining.* Landmines pose a serious challenge for many countries that have experienced wars. Landmines remain a threat decades after wars end, creating obstacles to development and threatening the security of local populations. Accordingly, demining is an important element of recovery. In accordance with the Plan for implementing humanitarian demining measures in the liberated territories for the corresponding year, and taking into account the implementation of priority tasks, demining is carried out in conditional stages. Thus, *the first stage* is an operational response after artillery, missile and air strikes, after incidents with explosive objects, with the aim of finding and destroying unexploded ammunition and their remains, ensuring procedural actions of law enforcement agencies. *The second stage* is an operational response aimed at finding, identifying, destroying (or disposing of) explosive objects in the liberated territories to unblock the functioning of life support facilities, transport infrastructure facilities and population access to social facilities and housing stock. *The third stage* is ensuring the safety of agricultural work. This refers to the operational search for explosive objects in designated agricultural areas within the framework of ensuring the food security of the state. *Fourth stage* is non-technical examination within the implementation of the land release algorithm in accordance with national and international standards of mine action. The main purpose is the identification of allegedly contaminated areas that could potentially contain risks from explosive objects. Mine action operators are involved at this stage. *The fifth stage* is humanitarian demining as part of the land release algorithm. This includes the procedure for verifying and reducing the size of the land during a technical survey, followed by the complete clearing of the land by demining or clearing the area of hostilities. This stage is performed by mine action operators under the monitoring of the National Mine Action Authority. *The sixth stage* is external quality control of demining by accredited inspection bodies. After successful external quality control, the mine action operator transfers responsibility for the territory to local authorities (Ukraine, VR 2022b).

## DISCUSSION ISSUES

Based on the results of the study, a number of issues have been identified that are causing debate among the society, namely, the simplification of licensing procedures in the field of land use, which currently apply to the entire territory of Ukraine, but in the current realities, different parts of Ukraine are affected differently, and by varying kinds of military operations. Therefore, in our opinion, it is more appropriate to retain simplification of permit procedures in the field of land relations for the territories and regions where state and local governments cannot properly perform their functions in the field of land relations.

Another current issue in Ukraine is the continuing trend of reducing arable land at the expense of mined or contaminated land. This is due to the fact that the cleanup and remediation of such sites will require significant funding and cost in terms of resources, which always leads to additional public discussions. Therefore, for the safety of citizens, some areas should be left to nature for restoration and not used in agricultural production. This trend contributes to combating climate change and is actively welcomed in European countries.

Soils are the basis for biodiversity conservation and agricultural development, so reconstruction efforts should pay attention to preserving soil cover and preventing the use of particularly valuable lands in terms of soil quality for construction. A mandatory inventory and assessment of the quality of lands and soils directly affected by hostilities should be introduced in terms of pollution, the presence or destruction of green spaces, mines, etc. before making decisions on the future of these lands and their disposal. It is important that the results of such activities are reflected in the public cadastral map. In this context, it is advisable to introduce additional layers describing the safety of the land plot (still mined, demining is underway, demining has been carried out, no data). A layer denoting soil quality could also be added: heavily contaminated, moderately contaminated, no data available. To do this, the legal acts regulating the functioning of the State Land Cadastre should be amended.

It is important to conserve lands whose use may cause harm to human life and health, and to the environment of mined areas, if their demining is impossi-



ble or delayed, which restricts public access to such lands due to safety requirements. The lands subject to conservation are technogenically contaminated land plots (i.e. contaminated with oil products, chemicals, military waste), etc. Such conservation should be carried out together with the subsequent development of a plan to restore these lands to a safe condition, an estimate of such work, and the search for funding for the restoration plan. Soil quality data available before the Russian invasion should also be taken into account, especially when making decisions on further development, and the analysis of soil quality after the invasion for contamination as a result of bombing, fuel and lubricant spills, and military operations on the land should be used to decide whether these lands can be used for agriculture. Local authorities should take into account information on contamination, the presence or destruction of green spaces, mines, etc. when making decisions on the use of land for the post-war reconstruction of Ukraine.

At the request of society, for objective reasons, to prevent further use of Ukraine's natural resources by the aggressor countries, these lands should be withdrawn from the use of Belarusian and Russian tenants. The land thus withdrawn should be leased to Ukrainian farmers for cultivation and growing crops, i.e., land should be seized from tenants associated with Russia or Belarus, which requires additional public discussion and a strong legal justification (Dubnytska et al., 2023). According to analysts, about 110 thousand hectares of Ukrainian arable land are leased by Russian and Belarusian companies.

Ensuring compliance with the regime of coastal protection zones requires special attention in terms of water security, conservation of biodiversity and ecosystems, and prevention of water pollution. Unfortunately, violations of this regime have become widespread and systemic. The need to quickly rebuild the economy and infrastructure of the state does not justify the intention to develop land within coastal protection zones and floodplains, as these lands are necessary to prevent water pollution, ensure the provision of ecosystem services by water bodies, serve as a barrier to the ingress of mineral fertilizers into water, accumulate moisture, preserve biodiversity and habitats, etc. The war in Ukraine and the use of rivers as sources of water supply, defence lines, and

obstacles to enemy actions have proven the importance of preserving natural rivers for the purposes of state defence. In this regard, there is an urgent need to improve the situation in this area: increase penalties for violation of the coastal protection zones regime; strengthen control over compliance with the statutory regime of protection of coastal protection zones; simplify decision-making procedures for demolishing illegally constructed buildings and structures, restoring the damaged areas to their previous condition and compensating for the damage caused; legislative expansion of coastal protection zones in accordance with the boundaries of floodplains on rivers.

## CONCLUSIONS

Based on the results of the study, we believe that land relations during the reconstruction of Ukraine should be based on the following principles and approaches: openness of the public cadastral map of Ukraine and other registers; soil conservation in the context of war; introduction of a state system of land control and responsibility of land users; ensuring water security, preservation of biological diversity and ecosystems.

The closure of registries and other official information resources of the state during martial law is due to possible attempts by the enemy to steal the information they need or use it to the detriment of Ukraine, and therefore is considered acceptable. However, in the post-war period, the closure of such information is out of the question, as the secrecy of information on the cadastral number of a land plot, its boundaries, area, form of ownership, intended use, according to the classifier, and existing restrictions on its use will facilitate abuse by business and government authorities and will not allow the public to control the reconstruction process.

Of course, it is also necessary to introduce a state system of land control and liability of land users, which will be based on monitoring the data and will include not only control over land use in terms of area, purpose of land, etc., but also control over the implementation of environmental measures, including soil protection, instruments, and liability for irrational use of soil (reduction of fertility, pollution with agrochemicals, use of cultivation methods that cause erosion, etc.).

In our opinion, control over the use of land affected by hostilities should include the following measures: supervision over compliance with land legislation; inspections of land use; and proposals for eliminating violations. To successfully address these tasks, it is necessary to: ensure adequate funding for land restoration measures; develop and launch effective mechanisms for implementing land restoration measures; and promote public awareness of the importance of rational land use and protection. Land monitoring is also an integral part of good land management. It is necessary to create a state system for continuous monitoring of the condition of land resources, which will act as an independent body and provide data on the state, dynamics, structure, level of pollution, forecasts for land resources, etc. in Ukraine. It is the responsibility of all land users to provide data on the condition of land resources for the state monitoring of land resources, as well as provide access to land plots to collect the necessary data.

## REFERENCES

- Dubnytska, M.L., Datsenko, L., Titova, S. (2023). Land and Legal Relations Reconstruction in the De-Occupied Territories of Ukraine. Presented at: GeoTerrace-2023, Lviv, Ukraine, October 2–5. DOI: 10.3997/2214-4609.2023510115
- Environmental Consequences of Russia's War in Ukraine. Review for March (2024). UWEC, 29 March. <https://uwecworkgroup.info/uk/> (accessed: April 15, 2024).
- Gunko, L.A. (2022). Formation of sustainable (balanced) land use – the basic basis for the development of the economy of land management in Ukraine. *Agrosvit*, 9–10, 51–61.
- Inflicted damage. Land resources (2024). Official resource of the Ministry of Environmental Protection and Natural Resources of Ukraine. <https://ecozagroza.gov.ua/> (accessed: April 15, 2024).
- Overview of war damage in agriculture (2024). Kyiv School of Economics. <https://kse.ua/agricultural-war-damages-review/> (accessed: April 15, 2024).
- Plan of demining activities (2023). Government portal, March 20. <https://www.kmu.gov.ua/news/skhvaleno-plan-humanitarnoho-rozminuvannia-silhospszemel-u-9-rehionakh-ukrainy> (accessed: April 15, 2024).
- The concept of comprehensive restoration and development of the territories of the exclusion zone and the zone of unconditional (mandatory) resettlement, which were exposed to radioactive contamination as a result of the Chernobyl disaster for the years 2021–2070 (2021). Eco-business Group, 19 March. <https://ecolog-ua.com/news/koncepciya-kompleksnogo-vidnovlennya-i-rozvytku-terytoriy-zony-vidchuzhennya-i-zony-bezumovnogo> (accessed: April 15, 2024).
- Tretyak, V.M., Sklyar, Yu, L., Kapinos, N.O. (2023). Sustainable land use as a factor in the development of rural areas in Ukraine in the post-war period. Presented at: International scientific and practical conference “Food and environmental security in conditions of war and post-war reconstruction: challenges for Ukraine and the world, (May 25, 2023) dedicated to the 125th anniversary of the founding of the National University of Bioresources and Nature Management of Ukraine, Kyiv, Ukraine, May 25. Kyiv: National University of Bioresources and Nature Management.
- Ukraine. VR (2022a). On the introduction of changes to some legislative acts of Ukraine regarding the peculiarities of the regulation of land relations in the conditions of martial law: Law of Ukraine. Law of Ukraine 2247-IX. <https://zakon.rada.gov.ua/laws/show/2247-20#n6> (accessed: April 15, 2024).
- Ukraine. VR (2022b). On the introduction of changes to some legislative acts of Ukraine regarding the creation of conditions for ensuring food security in the conditions of martial law. Law of Ukraine 2145-IX. <https://zakon.rada.gov.ua/laws/show/2145-20#Text> (accessed: April 15, 2024).
- Ukraine. VR (2023). “On amendments to the Tax Code of Ukraine and other legislative acts of Ukraine regarding exemption from payment of environmental tax, land fee and tax on immovable property, other than a land plot, for destroyed or damaged immovable property. Law of Ukraine 3050-IX. <https://zakon.rada.gov.ua/laws/show/3050-20#Text> (accessed: April 15, 2024).

## KONCEPCYJNE PODEJŚCIE DO KOMPLEKSOWEGO ODNOWIENIA GRUNTÓW NA TERENACH DOTKNIĘTYCH SKUTKAMI DZIAŁAŃ WOJENNYCH W UKRAINIE

### ABSTRAKT

#### Cel pracy

Celem opracowania jest uzasadnienie założeń koncepcyjnych kompleksu działań, a także rozważenie jego głównych elementów, dotyczących regeneracji obszarów dotkniętych wojną w Ukrainie, ze szczególnym uwzględnieniem niekompletności obowiązujących aktów prawnych oraz znaczenia opracowania nowych mechanizmów prawnych, które uprawomocnią procedury przeniesienia skażonych gruntów na własność państwa w celu ich długoterminowej rekultywacji, za odpowiednią rekompensatą dla właścicieli gruntów za okres, w którym skażone grunty będą pozostawały we władaniu państwa.

#### Materiał i metody

Podstawę teoretyczną stanowią badania naukowe, prowadzone przez krajowych i zagranicznych badaczy w dziedzinie gospodarki gruntami i ochrony środowiska, a także akty prawne i przepisy regulacyjne, materiały metodologiczne i instruktażowe, dane statystyczne i analityczne ministerstw i departamentów Ukrainy oraz organizacji społecznych, dotyczące wykorzystania zasobów gruntowych i rozwoju społeczno-gospodarczego regionów Ukrainy. Zastosowano następujące metody: analizę monograficzną; metodę syntezy; metodę strukturalną i logiczną; podejście systemowe; dialektyczną zasadę integracji/interakcji.

#### Wyniki i wnioski

Służebności gruntowe podczas odbudowy Ukrainy powinny opierać się na następujących zasadach i podejściach: otwartość publicznej mapy katastralnej Ukrainy; uproszczenie procedur wydawania zezwoleń; ocena jakości gruntów i gleb oraz ich inwentaryzacja; kontynuacja trendu zmniejszania udziału gruntów ornych; zabezpieczenie gruntów, których użytkowanie mogłoby zagrozić życiu i zdrowiu ludzi oraz zagrozić środowisku; wywłaszczanie gruntów od dzierżawców powiązanych z Rosją lub z Białorusią; ochrona gleby w kontekście wojny; wprowadzenie państwowego systemu kontroli zasobów gruntowych oraz zasady odpowiedzialności użytkowników gruntów.

**Słowa kluczowe:** elementy kompleksu renaturyzacyjnego (odnowienia gruntów), naukowe aspekty zagospodarowania przestrzennego, środowisko, gleby, działania wojenne