

THE CURRENT STATE, PROBLEMS AND PROSPECTS OF THE USE OF LAND RESOURCES OF UKRAINE IN CONDITIONS OF WAR

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Abstract

The pre-war state of land resources in most of Ukraine was characterized as strained, and sometimes critical, with a tendency to deteriorate, which significantly complicated the socio-economic development of Ukraine and its regions and negatively affected the landscape and biological diversity, health and living conditions of the population. The article examines topical issues of problems and prospects for the use of land resources of Ukraine in the conditions of martial law and post-war reconstruction. As a result of Russia's military aggression, Ukraine faced mass shelling, missile strikes, radiation contamination, air pollution, littering of territories, unburied or chaotically buried bodies of the dead, mining and other challenges. This has led to aggravation of economic, environmental and social challenges of food supply both in Ukraine and in the world. In connection with military actions, the land resources of Ukraine are subjected to large-scale destruction, deterioration of the soil quality, degradation processes are intensified, land resources are damaged, owners and land users suffer material losses. Agricultural lands suffered two significant types of damage – mine contamination, both on the frontline and in occupied (or formerly occupied) territories, and direct physical damage, from contamination by mines and unexploded ordnance. As of March 20, 2022, the area of damaged soil cover was 6,582.0 hectares, out of 1,655,845.3 hectares of surveyed arable land. For rational use and protection of land, restoration of soils and improvement of their fertility, preservation of productive, ecological and social functions of soil cover, the following important measures should be implemented: actualization of scientific research on the restoration of degraded soils, in particular in the direction of studying the impact of armed aggression of the Russian Federation on the soil cover of Ukraine; determination of the current state of soil health; improvement of the methodology for determining the amount of damage and losses to land and soil resources caused by armed aggression; development and pilot implementation of rehabilitation technologies for war-damaged soils.

Keywords: land protection, mine pollution, dangerous areas, damage to soils and land

Introduction

Ukraine has significant strategic advantages due to the natural resources, geographical position and quality of human capital, which in general can become the basis for rapid economic growth of the state. Instead, a number of obstacles are a hindrance to realising its potential. Ukraine should strengthen its position on the international and regional arena, which will contribute to increasing the level of well-being of the population - the main goal of state policy.

The pre-war state of land resources in most of Ukraine was characterized as strained, and sometimes critical, with a tendency to deteriorate, which significantly complicated the socio-economic development of Ukraine and its regions and negatively affected the landscape and biological diversity, health and living conditions of the population (Bavrovskaya, 2022).

The main reason for this situation is the irrational use of the land and resource potential of the state, the deterioration of its quality and the decrease in the productivity of land, the misregulated changes in the nature of the functioning of land as a means of production in the market conditions, the absence of a unified state system of land protection (Про Основні засади ..., 2019).

As a result of Russia's military aggression, Ukraine faced mass shelling, missile strikes, radiation contamination, air pollution, littering of territories, unburied or chaotically buried bodies of the dead, mining and other challenges (Балюк et.al, 2022). This has led to aggravation of economic, environmental and social challenges of food supply both in Ukraine and in the world. In connection with military actions, the land resources of Ukraine are subjected to large-scale destruction, deterioration of the soil quality, degradation processes are intensified, land resources are damaged, owners and land users suffer material losses (Голубцов et.al, 2023).

Methodology of research and materials

During the study, the following approaches were used: abstract-logical (to substantiate the theoretical generalization of the goal, conclusions and analysis of the results of the study); economic and statistical (to analyze the current state of land use); analysis and synthesis (to analyze the influence of individual factors on the efficiency of agricultural land use), monographic and scientific generalization.

Table 1.

Composition of land resources of Ukraine and some European countries¹
(Source: compiled by the authors using Worldbank data)

	Ukraine		Austria		France		Germany		Netherlands		Poland		Republic of Moldova	
	thousand ha	%	thousand ha	%	thousand ha	%	thousand has	%	thousand ha	%	thousand ha	%	thousand ha	%
Agriculture	41892,00	69,41	2646,76	31,55	28553,75	52,00	18314,00	51,22	1814,45	43,68	14682,00	46,95	2285,50	67,52
Agricultural land	41311,00	68,45	2646,76	31,55	28553,75	52,00	16595,00	46,41	1814,45	43,68	14461,00	46,24	2264,60	66,90
Cropland	33777,00	55,96	1387,95	16,55	18970,54	34,55	11862,00	33,17	1042,04	25,09	11271,00	36,04	1927,00	56,93
Arable land	32924,00	54,55	1321,08	15,75	17956,56	32,70	11664,00	32,62	1004,83	24,19	10921,00	34,92	1699,80	50,22
Land under temporary meadows and pastures	869,00	1,44	154,89	1,85	3157,45	5,75	3093,00	8,65	205,13	4,94	0,00	0,00	0,00	0,00
Land with temporary fallow	167,00	0,28	50,40	0,60	503,81	0,92	358,00	1,00	8,86	0,21	179,00	0,57	20,60	0,61
Land under permanent crops	853,00	1,41	66,87	0,80	1013,98	1,85	198,00	0,55	37,21	0,90	350,00	1,12	227,20	6,71
Land under perm. meadows and pastures	7534,00	12,48	1258,81	15,01	9583,21	17,45	4730,00	13,23	772,41	18,59	3190,00	10,20	337,60	9,97
Forest land	9690,00	16,06	3899,15	46,49	17253,00	31,42	11419,00	31,93	369,50	8,90	9483,00	30,33	386,50	11,42
Other land	6358,00	10,53	1706,09	20,34	8948,95	16,30	5206,00	14,56	1183,05	28,48	6448,00	20,62	616,46	18,21
Inland waters	2415,00	4,00	135,90	1,62	153,00	0,28	786,00	2,20	372,00	8,96	658,00	2,10	96,54	2,85
Land area	57940,00	96,00	8252,00	98,38	54755,70	99,72	34939,00	97,71	3367,00	81,05	30613,00	97,90	3288,46	97,15
Country area	60355,00	100	8387,90	100	54908,69	100	35759,00	100	4154,00	100	31271,00	100	3385,00	100

¹ as of 01.01.2020

Results and discussion

The land fund of Ukraine is characterized by the presence of high bioproductive potential. Its structure is dominated by lands with fertile soils, since 7% of the world's chernozem reserves are concentrated in Ukraine (Про схвалення Концепції ..., 2022).

In Ukraine, more than 96% of the entire territory is used for economic purposes. Extremely high is the level of destruction that affect more than 69% of the territory. In the developed countries of Europe, this figure does not exceed 35%. The actual forestation of the territory of Ukraine is only 16%, which is not enough to ensure environmental balance (the average indicator of European countries is from 25 to 30%) (Третяк et.al, 2022).

As part of the lands of Ukraine as of 01.01.2020, agricultural land makes up about 41.31 million hectares (68.4% of the total land area). Of these, arable land takes up the most territory and covers an area of 32.92 million hectares (54.5% of the total land area), which indicates high arability and agricultural development of the territory of Ukraine, compared to 51.22% in Germany, 46.95% in Poland, and 31.55% in Austria (Table 1).

According to the World Bank (based on statistics of the World Food Organization) over 2007–2020 years, the area of arable land in Ukraine has increased by 490 thousand hectares (FAO, 2022). The excessive expansion of the arable land area led to a violation of the ecologically balanced ratio of land: arable land, natural forage land, forests and water bodies, which negatively affected the stability of agricultural landscapes and caused significant man-made damage to the ecosphere (Бавровська, Боришкевич, 2016). As a result, land resources are rapidly degraded, polluted and depleted, while not producing enough food even for the current generation, jeopardizing the needs of future generations (Величко et.al, 2020).

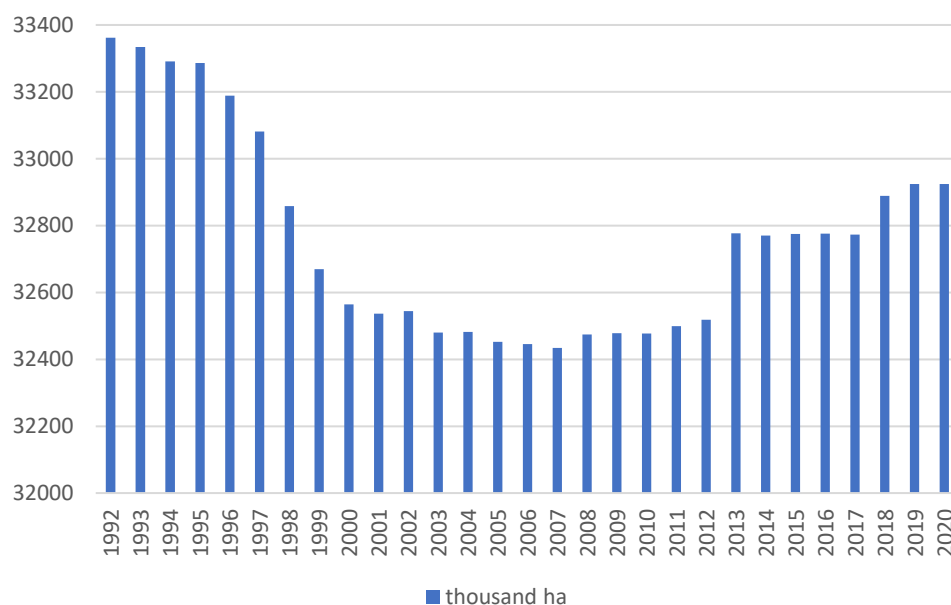


Fig. 1. Dynamics of change of arable land area in Ukraine since 1992 to 2020 (Source: compiled by the authors using Worldbank data)

In Ukraine, there are more than 1.1 million hectares of degraded, low-productive and technologically contaminated lands subject to conservation, 143,769 hectares of disturbed land requiring reclamation, and 294,568 hectares of low-productive land requiring improvement.

Under martial law, the economic, environmental and social challenges of food supply to Ukraine and the world have significantly worsened. One of these challenges is a significant increase in the current problem of land and soil degradation caused by warfare.

In Ukraine, because of the war, thousands of hectares of the land fund are littered with waste, contaminated with harmful substances that are damaged as a result of detonation, and suffer damage to the structure of the soil cover.

Damage to land resources includes all damage to and destruction of the fertile soil layer and damage caused by pollution and blockage of land resources, assessed taking into account the following indicators (Про затвердження Порядку ..., 2022):

1. Damage to soils and land due to contamination of soils with substances that adversely affect their fertility and other beneficial properties.
2. Damage to soils and land due to polluting land plots with foreign objects, materials, waste and/or other substances.
3. Costs for reclamation of lands that were affected as a result of hostilities, construction, building and maintenance of engineering and fortifications, fences, border signs, border clearances, the state border facilities.
4. Damage caused to the owners (land users) of agricultural land plots.
5. Reclamation system recovery costs (Про затвердження Методики ..., 2022).

Today, the basic regulations that can give an idea of the procedure for compensation for damage and losses caused to the land fund of Ukraine due to the act of war by the Russian Federation are: Land Code of Ukraine, Statement of the Cabinet of Ministers of Ukraine: «On Approval of the Procedure for Determining Damages and Losses, inflicted on Ukraine as a result of the armed aggression of the Russian Federation», «On approval of standards for maximum permissible concentrations of hazardous substances in soils, as well as the list of such substances», «On the Procedure for Determining and Compensating Losses to Land Owners and Land Users», «Rules for Development of Land Management Work Projects», «Methods for Determining Damages and Losses, to the land fund of Ukraine as a result of the armed aggression of the Russian Federation».

To the greatest extent, agricultural lands suffered two significant types of damages: mine and chemical pollution and direct physical damage. Now it can be stated that Russia has turned Ukrainian fertile black soil into the most contaminated with explosives in the world.

Analysis of the damage caused in Ukraine is carried out by analysts of KSE Institute and volunteers from partner organizations: Center for Economic Strategy, Dragon Capital, Anti-Corruption Headquarters, Institute of Analytics and Advocacy, Transparency International Ukraine, SE "Prozorro.Sales," Prozorro, Ukrainian Council of Trade Centers, CoST Ukraine.

According to preliminary data as of November 2022 in Ukraine, the area of land that needed demining and reclamation was 28,387,500 ha, preliminary estimate of direct losses to land resources was UAH 13.9 billion (in Table 2) (Проект Плану відновлення..., 2022).

Table 2

Direct loss of land resources due to military aggression against Ukraine, and preliminary assessment of the needs of the industry in recovery

(Source: compiled by the authors using (Проект Плану відновлення..., 2022)

Types of losses	Quantity unit	Initial number of objects	Number of damaged objects	Estimation of losses, billion UAH	Loss estimate, million USD
Contamination with Mines and other explosive objects • require demining • technical inspection	ha	28387500	594456	10,1 2,6	346,6 89,2
Land in need of reclamation	ha	28387500	198152	1,2	39,6

The National Mine Action Authority of Ukraine considers that 30 % of Ukraine's territory has been exposed to the warfare. Priorities in 2023 will include responding to the humanitarian needs outlined in the Humanitarian Response Plan 2023, and a focus on priority areas determined: residential areas; electricity and heating infrastructure; roads, bridges, and railways; and agricultural land (Table. 3). Area considered as exposed to warfare 187,732 km² and therefore potentially contaminated, including the following regions (Chernihivska, Kyivska, Sumska, Zhytomyrska, Kharkivska, Kherson, Donetska, Luhanska, Mykolaivska, Zaporizka).

The cost for clearance of explosive ordnance across Ukraine is currently estimated at US\$37.6 billion (you can see in Table. 3).

According to preliminary estimates, demining of agricultural land on the territory of Dnipropetrovska, Zaporizka, Kyivska, Mykolaivska, Sumska, Kharkivska, Khersonska, Chernihivska, Cherkaska oblasts with a total area of more than 470,854 hectares is required to ensure spring-field work (План заходів із розмінування земель ...,2023).

Table 3.

Explosive ordnance contamination and estimated clearance cost
(Source: compiled by the authors using (World Bank. Ukraine ..., 2023).

Name of administrative territorial unit	Km ² thousand					US\$ million
	Oblast area	% land exposed to war	Estimated area			Estimated Cost for humanitarian mine action, Total
			Non-technical survey	Technical survey	Clearance	
Cherkaska	20.9					
Chernivetska	31.9	80	25.5	1.3	637	2,897.3
Chernihivska	8.1					
Dnipropetrovska	31.9					
Donetska	26.5	64	17.0	1.69	1.27	5101.0
Ivano-Frankivska	13.9					
Kharkivska	31.4	46	14.4	1.4	1.1	4,349.5
Khersonska	28.4	95	27.1	2.7	2	8,153.0
Khmelnyska	20.6					
Kyivska	8.1	23.7	10.4	520	260	1,182.6
Kirovohradska	24.6					
Luhanska	26.7	100	26.7	2.7	2.0	8
Lvivska	21.8					
Mykolaiivska	24.6	14	3.4	170	85	386.7
Odeska	33.3					
Poltavska	28.7					
Rivnenska	20.0					
Sumska	23.8	70	16.7	417	208	956.9
Ternopilska	13.8					
Vinnytska	26.5					
Volynska	20.1					
Zakarpatska	12.8					
Zaporizka	27.7	74	20.1	2	1.51	6,052.8
Zhytomyrska	29.8	14	4.2	208	104	473.1
Ukraine	575.5		165.44	13.1	9.18	37,585.4

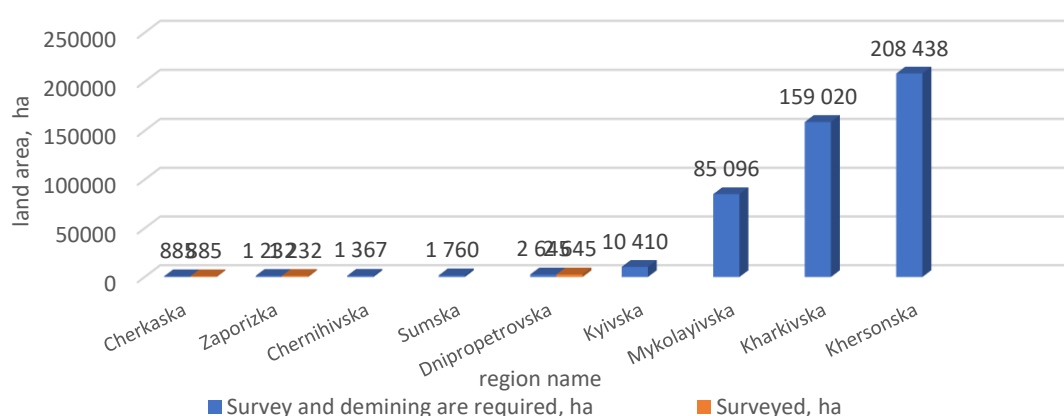


Fig. 2. Areas of agricultural land that require priority survey and demining across regions

Analysing the data in Fig. 2. we can see that to create a safe environment for the use of agricultural land for its purpose and to ensure the conducting spring-field work, the largest areas of land requiring priority demining in the territory of the Mykolaivska - 85,096.0 hectares, Kharkivska - 159,020.0 hectares, Khersonska 208,438.0 hectares. (План заходів із розмінування земель ...,2023), (Завершено пріоритетне розмінування сільгоспземель..., 2023).

These are mainly lands located in the Ukraine-controlled territories. In the regions where fighting continues, the list of priority mine clearance lands includes «lands located no closer than 20 km from the line of active hostilities and which are not subject to constant shelling». For humanitarian demining, territorial communities in the regions must submit information on agricultural lands by pollution density and categories of economic expediency to regional military administrations.

For this, the land is divided into three priority categories (low territories where no hostilities were conducted, medium – occupied territories, high territories near the front line), depending on the density of mining of the land.

The most economically justified is the concentration of efforts on demining priority agricultural land in the territories of Mykolaiivska and Cherkaska regions, according to the priority demining plan. As a result of the survey, more than 12 thousand hectares of agricultural land, which were determined for priority demining in oblasts: Cherkasska - 885 hectares; Zaporizka (land located in controlled territories) - 1,232 hectares; Dnipropetrovska - 2,645 hectares, at the same time 2,323 hectares were cleared (Завершено пріоритетне розмінування сільгоспземель..., 2023).

The issue of increasing the efficiency of land resources usage is an integral part of the unified environmental and economic state policy, which ensures the rational use, protection and management of land resources (Tykhenko, Bavrovska, 2020). The violation of the ecologically balanced ratio between land categories, the reduction of unique steppe areas, the excessive damage of the territory and military actions exacerbated the problem of soil degradation, and the high intensity of hostilities in certain areas called into question the safety of using the land directly affected by the warfare (Про Основні засади ..., 2019).

For rational use and protection of land, restoration of soils and improvement of their fertility, preservation of productive, ecological and social functions of soil cover, the following important measures should be implemented:

- actualization of scientific research on the restoration of degraded soils, in particular in the direction of studying the impact of armed aggression of the Russian Federation on the soil cover of Ukraine; determination of the current state of soil health;
- improvement of the methodology for determining the amount of damage and losses to land and soil resources caused by armed aggression;
- development and pilot implementation of rehabilitation technologies for war-damaged soils.

Conclusion

The main principles of post-war use of the lands of Ukraine should be:

1. Assessment of damage caused by hostilities, natural disasters or technogenic catastrophes to land resources and soils (determination, recording and assessment of damages caused by warfare).
2. Organization of the process of inventory and classification of the land damaged as a result of Russian military aggression.
3. Implementation of measures to preserve, reclaim and improve lands affected by Russian aggression. Creation of an incentive system for land protection and conservation. Development of land management documentation on land reclamation, as well as implementation of land protection measures.
4. Development of comprehensive plans for area development of territorial communities as a tool of post-war restoration, which will include the assessment of losses and the cost of restoring territories and land reclamation, based on the priorities of community development.
5. Expanding the area of the nature reserve fund by including preserved land to meet EU targets.

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