

RUSSIA'S WAR IN UKRAINE: PRICE AND OPPORTUNITY COST OF DEMINING LAND OF SMALL-SCALE AGRICULTURAL PRODUCERS

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GENERAL CONTEXT AND OBJECTIVE

Due to the Russia's full-scale invasion of Ukraine, **around 174,000 km², or approximately 30% of Ukraine's territory, is potentially contaminated by explosive ordnance (EO)** and needs to be surveyed for the mine threat and cleared³. As of August 2023, the SESU has done so with 925 km², or nearly 0.5% of area to be examined. The operations are also conducted by units within the Ministry of Defence, the Armed Forces, as well as non-governmental mine action operators (MAOs), however information regarding the extent of their activities is not accessible to the public yet.

Demining activities is among top needs of humanitarian assistance to Ukraine, as EO contamination jeopardizes the lives and well-being of Ukrainian citizens while hindering regular economic activities in the affected regions. **A key focus in the field of demining is the clearance of agricultural land**, aiming to bolster both global food security and Ukraine's economic stability⁴.

Small-scale producers constitute about 65 percent of the overall number of agricultural businesses in Ukraine, contributing approximately 10 percent of the total production of cereals and leguminous crops⁵ ⁶. These farms have incurred substantial damages (US\$353 million⁷) and indirect financial losses (US\$3.5 billion) due to the war, suffering from occupation, active combat battles, market access limitation, disrupted logistics, increased input prices and EO contamination.

The current brief by **KSE Agrocenter** is based on a nation-wide survey⁸ among small-scale agricultural producers (with land up to 250 hectares) conducted by the **FAO** in January-February 2023. Its **objective** is to compare the **costs of clearing the land from EO** to the

alternative losses (opportunity cost), if the process is not carried out. It also points out an approach and its approximate cost that would **make a substantial share of land operatable at lower costs**. This may Ukraine to restore its agriculture, focusing on the most cost- and time-efficient tools.

Key takeaways

- Nearly 19% of micro-farmers¹ land is contaminated with explosive ordnance (EO) in the front-line regions².** After liberation of the temporarily occupied territories the portion and area of land would increase.
- The weighted price of full farmland demining is estimated at US\$1,781 per hectare**, a significant financial burden for small farmers. Complete demining payback period exceeds 30 years.
- The total demining cost for micro-farmers is estimated at over US\$250 million.** The process may take decades without joint efforts.
- Annual forgone revenue for a micro-farmer due to land contamination is around US\$930 per hectare.**
- Non-technical survey of EO contamination ensures safety of up to 90% of land affected to be safe, costing only \$6 per hectare.** Expansion of demining operational capacity among the non-commercial sector is needed.
- Specific programs for farmers to finance technical survey and clearance activities would accelerate the process.**

Dashboard on the impact of war on small agricultural producers by KSE Agrocenter ([Link](#)).

¹ With land of up to 250 hectares.

² Chernihivska, Dnipropetrovska, Donetska (only the parts controlled by the Government of Ukraine), Kharkivska (only the parts controlled by the Government of Ukraine), Khersonska (only the parts controlled by the Government of Ukraine), Mykolaivska, Sumska and Zaporizka (only the parts controlled by the Government of Ukraine)

³ **State Emergency Service of Ukraine (SESU)**. April 2023.

⁴ **Ministry of Economy of Ukraine**. ([Link](#))

⁵ **State Statistics Service of Ukraine**.

⁶ **FAO**. 2023. *Ukraine: Impact of the war on agricultural enterprises – Findings of a nationwide survey of agricultural enterprises with land up to 250 hectares, January–February 2023*. Rome.

⁷ **FAO** estimate as of February 2023

⁸ **The Food and Agriculture Organization of the United Nations (FAO)** conducted a country-wide (excluding temporarily occupied territories) survey during February 2023 targeting 1,927 small-scale agricultural producers (up to 250 hectares) across Ukraine. The survey aimed to gather essential evidence on the war's impact on agricultural producers' operations, informing programming decisions on their needs.

INCIDENCE OF EXPLOSIVE ORDNANCE LAND CONTAMINATION

With massive combat battles ongoing in Ukraine, having escalated since February 2022, the issue of farmland contamination has become widespread. According to FAO survey data, nearly **9% of farmland** owned or leased by micro-producers nationally is now **contaminated** with mines or unexploded shells. Even more concerning the problem is in the regions along the front-line, with almost **19%** of farmland EO contaminated.

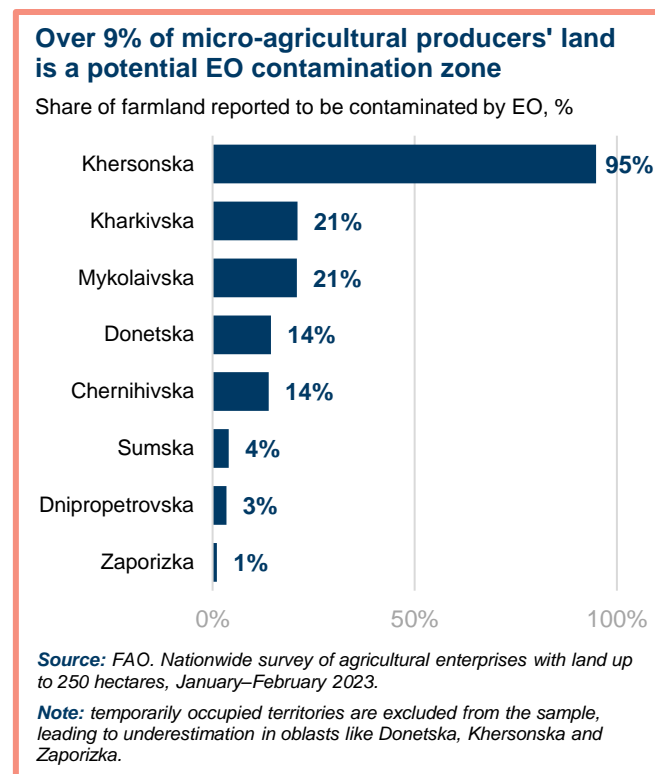
The regions of greatest concern are those experiencing intense battles and occupation. For instance, in Khersonska oblast, a staggering **95%** of micro-producers' farmland is contaminated. The proportions and affected areas may be even higher in regions temporarily occupied by Russian military forces, especially in Donetsk, Khersonska, Luhanska, and Zaporizka oblasts.

On average, the affected farms reported that **64% of their farmland is contaminated with EO**. This contamination implies that unless demining activities are carried out, their **operations will be significantly hindered**. When depicting an average small farm affected by land contamination, it manages 86 hectares of farmland, with **55 hectares falling within a high-risk explosion zone**. This particular area needs to undergo a thorough survey, followed by clearance of its portion using specialized equipment and techniques.

COST OF DEMINING

Demining activities typically involve three key stages or activities. The first stage is a **non-technical survey**, which covers, on average, up to **90%** of the land at risk⁹. This involves an investigation by demining entities to pinpoint the EO contaminated areas that require a more thorough, time- and resource-consuming activities. The remaining land, approximately **10%** on average, must undergo a so-called **technical survey**. This stage aims to determine the portion of land that needs direct clearance from mines, shells, and other hazardous debris. Finally, nearly **5%** of the initially designated contaminated zone should be cleared by specially equipped teams tasked with extracting and

neutralizing EO units, which is referred to **clearance activities**¹⁰.



Based on the recent estimates by the Kyiv School of Economics (KSE)¹¹ and the World Bank¹², the price for non-technical survey may vary around US\$6 per hectare, for technical survey at US\$3,050 per hectare and for clearance activities at US\$29,400 per hectare.

Complete demining is a significant financial challenge. The cost of demining can be approximately **US\$1,781 per hectare**, encompassing weighted expenses for non-technical survey, technical survey, and mines clearance. Based on a sample of 1,748 affected micro-producers, which may roughly represent 7% or more of the general population, we estimate the total demining cost for the surveyed sample at US\$18 million. Extrapolating from the State Statistics Service's data on the number of farmers depending on farmland area, we arrive at a figure exceeding **US\$250 million** required to ensure the safety of the farmland belonging to over 22 thousand small producers.

Demining activities require not only money, but time and skilled labor. The SESU's current operational capacity of land demining, at approximately **16**

⁹ Based on the estimates by the **World Bank** and the **Kyiv School of Economics (KSE)**.

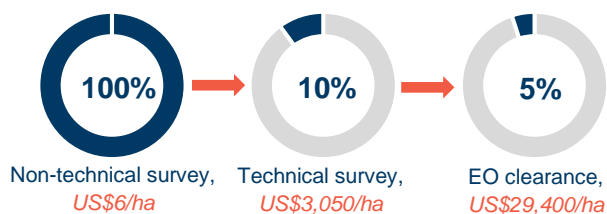
¹⁰ **Geneva International Centre for Humanitarian Demining**.

¹¹ **Kyiv School of Economics (KSE)**. 2023. Report on Damages to Infrastructure Caused by Russia's War against Ukraine One Year after the Start of the Full-Scale Invasion. ([Link](#))

¹² **World Bank; Government of Ukraine; European Union; United Nations**. 2023. *Ukraine Rapid Damage and Needs Assessment: February 2022 - February 2023 (English)*. Washington, D.C.: World Bank Group. ([Link](#))

hectares per day¹³, implies that clearance of the lands of surveyed micro-farmers alone (covering 10,000 hectares) would require over 1.5 years, considering a preservation of the existing technical and human resources. Extrapolating the figure at a general population, a rough estimate indicates the **need to demine more than 130,000 hectares** used by micro-farmers. Achieving this with the current resources of a single SESU would likely extend the timeline to more than **22 years**.

Share of EO contaminated land to go through demining stages, on average



OPPORTUNITY COST OF DEMINING

The central component of the opportunity cost associated with demining is the **forgone revenue** from the land contaminated. Micro-farmers in Ukraine primarily cultivate cereal, leguminous, and oil crops, with wheat and sunflower seeds being the most prevalent, accounting for nearly 25% of the harvested area each. Drawing from the State Statistics Service of Ukraine's yield and pricing data for 2021-2022, we estimate the annual forgone revenue from contaminated land to be nearly **US\$930 per hectare**.

Assuming a profit margin of 30%¹⁴, a straightforward calculation using the Discounted Cash Flow method (DCF) indicates that the costs of full demining have a **payback period** of over **30 years**, with high upfront costs. This can pose a considerable financial challenge for farmers, particularly when considering that 72% of them have already experienced a drastic decrease in revenues (between 50% and 100%) during the full-scale war.

Apart from the income lost due to the restricted operations, owners of contaminated land also face **challenges in the land market**. Taxes on agricultural land include a normative monetary valuation set by local authorities, unfortunately, without yet taking the EO factor into account. This means that if a landowner wishes to sell or lease land, which has not undergone

demining activities, at a reduced price, it is still required to **pay taxes** based on the full valuation within the territorial community.

OVERCOMING THE CHALLENGES

Focusing on a scaled non-technical survey could potentially provide a solution to the challenge of high upfront costs for micro-farmers. Although it reopens up to **90% of land** for agricultural operations, it accounts for only **0.02% of the total cost** of demining all potentially contaminated land. This presents an economically viable and efficient approach, requiring additional technical and human resources to complete the process in scale.

One issue lies in the fact that many corporate demining companies prefer to undertake all stages of demining activities as one agreement, therefore including the costly technical survey and clearance. This underscores the necessity for both governmental and non-governmental organizations to establish or expand existing specialized demining units to meet the demand for non-technical surveys.

Given that even after a non-technical survey, some land will still require a comprehensive survey and demining, **it is imperative to secure access to financial resources for small farmers**. Demining costs represent indirect financial losses resulting from the actions of the RF, making them the accountable party. The expenses linked to demining should be covered using assets from the RF. However, since this process may take some time, it's essential to **implement specific programs for farmers to support demining and land productivity restoration efforts**.

¹³ State Emergency Service of Ukraine (SESU). (Link)

¹⁴ An average of profitability level of wheat and sunflower seeds in 2020, according to the SSSU.

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