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Humanitarian Demining and Ukraine's Recovery: Lessons Yet to Learn

This policy brief examines how land mine action underpins Ukraine's reconstruction and economic renewal. It outlines the current scale of contamination and the national humanitarian demining strategy. The brief also reviews international experience from countries around the world, discussing the economic recovery driven by demining and the economic efficiency of mine action. It documents significant variation in direct mine action costs across countries and contexts, complicating the assessment of these costs in the case of Ukraine. The brief also discusses the indirect costs arising from systemic inefficiencies in Ukraine's demining effort, including fragmented governance, shortages of qualified personnel, outdated standards, and security constraints. It concludes that Ukraine's success in transforming demining into a catalyst for recovery depends on effective coordination, data-driven planning, gender inclusion, and the adoption of best international practices.

Understanding the scale and current need for humanitarian demining in Ukraine

As of mid-2025, approximately 137,000 km² of Ukrainian land remains potentially contaminated by mines and unexploded ordnance (UXO). While this is a reduction from 174,000 km² at the end of 2022, Ukraine remains one of the most mine-contaminated countries in the world (Ministry of Economy of Ukraine, 2023; UDA, 2025).

The problem of demining is multidimensional, encompassing both humanitarian and economic consequences. More than six million people currently live in at-risk areas, and the number of mine incidents has already exceeded one thousand. Without addressing the problem, the number of victims could rise to more than 9,000 by 2030 (Ministry of Economy of Ukraine, 2023). Contamination affects some of the world's most fertile agricultural regions, as well as energy, transport, and residential zones.

The funding needs are substantial. According to UNDP (2024), Ukraine's total demining bill could reach USD 34–35 billion, requiring tens of thousands of trained specialists. As of early 2025, Ukraine has more than 4,500 sappers and deminers, but this number remains far below national needs. Experts emphasize that the workforce must increase significantly to ensure the timely clearance of contaminated territories. At present, approximately 87 mine-action operators are active in Ukraine, encompassing government bodies, private companies, humanitarian organizations, and international partners (UN Women Ukraine, 2025).

At the same time, the potential economic benefits of demining are immense. According to the TBI (2024) estimates, Ukraine loses about USD 11.2 billion each year (compared to 2021) due to mine contamination. Frontline regions such as Kharkiv, Mykolaiv, Sumy, and Chernihiv are particularly exposed, experiencing a reduction in exports of USD 8.9 billion and a loss of regional tax revenues of USD 1.1 billion annually.

In addressing the problem, the government has recently adopted a National Mine Action Strategy until 2033, which aims to clear about 80% of the de-occupied territories within 10 years (Ministry of Economy of Ukraine, 2024). However, this ambitious plan faces serious systemic challenges, including the dispersion of power among government agencies, insufficient and inconsistent funding, and delays in public procurement and tender processes (UDA, 2025). Thus, humanitarian demining stands at the crossroads of Ukraine's security and economic recovery, affecting how quickly the country can restore farmland, rebuild infrastructure, and attract investment. Its success depends on efficient resource use, data-driven planning, and the adoption of proven international practices. The following sections examine global experience and economic efficiency in mine action, as well as the key challenges Ukraine must address to achieve tangible and sustainable recovery.

Evidence and Lessons from Global Experience

The problem of humanitarian demining is widespread globally, affecting dozens of post-conflict states across Africa, Asia, the Middle East, and Europe. Many of these countries, such as Afghanistan, Mozambique, Eritrea, Sudan, Sri

Lanka, Bosnia and Herzegovina, and Croatia, have already undergone large-scale clearance operations and provide tangible evidence of how demining drives economic recovery and social stabilization.

In Afghanistan, humanitarian demining produced wide-ranging socio-economic benefits. It vastly improved mobility and access to resources and markets, served as a prerequisite for broader development initiatives, restored agricultural productivity and employment, and positively influenced mental health and community relations by reducing fear, enabling return, and rebuilding trust within affected populations (UNMAS, 2021).

In Mozambique, large-scale railway clearance reopened a key regional trade corridor, creating more than 400 jobs. The operation restored transport connectivity, enabled the renewal of coal exports, and stimulated agricultural and industrial recovery in the surrounding areas (Lundberg, 2006). In Eritrea, humanitarian demining enabled the return of more than 20,000 refugees within a year, which allowed about 29 villages to resume crop cultivation and schooling; casualty rates for both residents and livestock fell to zero, restoring local food security and rural incomes (Lundberg, 2006).

Sudan offers a contrasting case, where political and logistical barriers pushed costs to nearly USD 45 per m^2 (Bolton, 2008). Despite high costs, the reopened transport corridors and access to markets demonstrated substantial humanitarian and trade benefits, underscoring that elevated expenditure in complex terrains can still deliver strong socio-economic returns.

Post-war European experiences reinforce these findings. In Bosnia and Herzegovina, humanitarian demining has served as a foundation for sustainable socio-economic recovery, enabling the rebuilding of housing and infrastructure, reducing flood risks, restoring agricultural and forest productivity, improving access to water, and ensuring safe mobility essential for trade and community development (GICHD & UNDP, 2022). Similarly, mine clearance in Croatia has been pivotal to national recovery, restoring access to agricultural and forest land, enabling infrastructure and EU-funded development projects, and supporting tourism and investment in previously contaminated regions (Mine Action Review, 2021).

Collectively, these cases demonstrate that the economic dividends of demining are consistent across contexts. Clearing mines enables agricultural revival, facilitates transport and trade, lowers accident-related health costs, and strengthens confidence in governance. However, incomplete data and fragmented decision-making might delay land release and inflate costs.

For Ukraine, where contamination covers more than 137,000 km^2 of high-value farmland and industrial zones, these global lessons confirm that mine action must be integrated as a central pillar of the reconstruction process.

Measuring the Economic Efficiency of Humanitarian Demining: Indicators and Limitations

The Geneva International Centre for Humanitarian Demining, in its recent report, defines efficiency in demining as "a measure of how economically resources or inputs are converted to results" (GICHD, 2023, p. 6). In humanitarian demining, this

means achieving the maximum area of land safely released or the largest number of explosive items cleared using the least possible resources, without compromising safety. Efficiency, however, differs from effectiveness which is defined in the report as *"the extent to which the intervention's objectives were achieved, or are expected to be achieved, taking into account their relative importance"* (GICHD, 2023, p.6).

Yet, the quantitative framework developed by GICHD primarily focuses on efficiency indicators, particularly cost-based metrics such as cost per square meter of land released, cost per square meter of land fully cleared, and cost per explosive item found. This narrow focus allows for financial comparison but risks overlooking effectiveness dimensions such as the humanitarian, developmental, and social outcomes of mine clearance.

To operationalize this concept, the GICHD study developed a framework of Key Performance Indicators (KPIs) to measure economic efficiency across 17 mine-affected countries between 2015 and 2019 (GICHD, 2023, pp.14-17). Three indicators are identified as central for assessing the financial efficiency of mine action operations:

1. **Cost per square metre of land released** – measuring the overall cost of returning territory to productive use, encompassing land cleared, reduced, and cancelled. A lower value indicates greater cost efficiency in land release and better-targeted survey and clearance operations.
2. **Cost per square metre of land cleared** – reflecting the technical cost of full clearance, which is higher due to intensive labour, equipment, and safety requirements.
3. **Cost per explosive item found** – linking financial inputs to tangible outputs, i.e., the average expenditure needed to locate and neutralize one explosive ordnance.

These metrics allow analysts and policymakers to assess how funds are transformed into measurable clearance outcomes. However, as GICHD (2023) stresses, they should be used for internal evaluation and planning, not for direct comparison between countries. Differences in contamination types, topography, labour costs, access, and national data systems make cross-country benchmarking misleading. The report explicitly cautions that *"no country should be considered as having a 'good' or 'bad' performance in terms of operational efficiency purely on the basis of the KPI values"* (GICHD, 2023, p.21). Even similar indicators can yield different implications depending on whether operations are clearance-driven (activity-based) or survey-driven (decision-based). To illustrate the scale and variation in demining costs globally, Table 1 presents key indicators of humanitarian demining costs as of 30 November 2022.

As shown in Table 1, costs per square meter of released territory range from USD 0.02/m² (Thailand) to USD 5.87/m² (Lebanon), i.e., a 293-fold difference. Similarly, the cost per explosive item ranged from USD 274 (Sri Lanka) to USD 13,450 (Croatia) (Rohozian, 2024). Such disparities illustrate that comparing "price per m²" without context or establishing the "benchmark" in the field is quite problematic.

Table 1. Key indicators of the cost of demining across countries, as of 30 Nov. 2022

State	Cost per square meter of territory released from the local socio-economic system, USD	Cost per square meter of territory that has been cleared in the local socio-economic system, USD	Cost of a single found explosive item in the local socio-economic system, USD
Angola	0,32	7,88	9042
Afghanistan	0,79	1,48	911
Bosnia and Herzegovina	0,36	**19,06**	6059
Vietnam	0,28	0,65	500
Western Sahara	0,41	0,51	2183
Zimbabwe	1,89	4,49	289
Iraq	0,81	1,32	4437
Cambodia	0,22	**0,37**	678
Laos	0,99	0,99	356
Lebanon	**5,87**	10,65	2204
South Sudan	0,49	4,07	5667
Serbia	1,07	1,96	9757
Sudan	2,89	5,78	457
Tajikistan	1,29	1,98	1721
Thailand	**0,02**	2,25	281
Croatia	1,03	1,23	**13450**
Sri Lanka	2,26	3,65	**274**

Source: Rohozian, 2024.

Moreover, the study acknowledges limitations in data standardisation and completeness. Variations in how organisations record and report costs affect comparability. Aggregated national averages can obscure contextual factors such as contamination density or security conditions. For these reasons, GICHD recommends interpreting efficiency metrics in conjunction with qualitative information, including terrain, contamination type, and labour structure, and always balancing cost-efficiency with safety and effectiveness.

However, drawing on global patterns and Ukraine's official USD 34–35 billion cost estimate, we can expect Ukraine to fall within the middle range of international demining costs. It will likely be more expensive than low-cost cases in Asian contexts but substantially below the extreme-cost cases, such as Lebanon, due to its terrain, institutional capacity, and ability to scale mechanized clearance.

Challenges in Ukraine's Humanitarian Demining

In addition to the substantial direct costs of humanitarian demining, it is essential to understand the indirect costs generated by systemic inefficiencies, i.e., costs that arise not from clearance itself, but from delays, duplication, weak coordination, and different shortages.

A review of Ukraine's current mine-action landscape allows us to identify the main structural challenges that contribute to elevated indirect costs. These include fragmented governance, incomplete and inconsistent data, security-related access constraints, and a shortage of trained personnel.

One of the most pressing challenges is the fragmentation of coordination and governance. Responsibilities remain dispersed across numerous actors, including the Ministry of Defence, the State Emergency Service, the Ministry of Internal Affairs, the Ministry of Economy, the National Mine Action Authority, and over 20 accredited NGOs and private contractors.

According to the UDA (2025), this overlap of mandates and inconsistent prioritisation frameworks frequently results in duplicated surveys and delayed task approvals, reducing efficiency and transparency. At the same time, the idea of consolidating all authority within a single centralised body would risk excessive concentration of power and reduced accountability. A more effective path forward would be to strengthen the existing Mine Action Center's coordinating role while maintaining clear institutional separation between policymaking and operational implementation, ensuring transparency, competition, and sustained donor confidence.

A persistent shortage of qualified personnel represents one of the most critical challenges to scaling up humanitarian demining in Ukraine. According to UNDP (2025), the country currently employs around 4,500 trained deminers, while full national recovery will require at least 10,000 professionals over the next decade (TBI, 2024). The workforce is under pressure from wartime mobilization, which diverts potential recruits to defense roles, and from a shortage of experienced supervisors and explosive ordnance disposal (EOD) specialists, limiting the number of teams that can safely operate simultaneously. The National Mine Action Strategy for the Period up to 2033 (Ministry of Economy of Ukraine, 2024) further acknowledges that Ukraine's training system is inadequate for the sector's needs.

Current state-level training for the profession of "Sapper (demining)" follows military-oriented standards that demand extensive time and resources but offer limited relevance to humanitarian operations. Only ten educational institutions are licensed to train deminers, and only a few conduct active courses. To close this capacity gap, the Strategy calls for expanding domestic training infrastructure, establishing accredited qualification centers, recognizing informal and partial training, and developing new professional standards tailored to humanitarian demining.

Another set of pressing challenges in Ukraine's humanitarian demining effort concerns data deficits and security limitations. Incomplete and inconsistent mapping of hazardous areas continues to undermine planning and coordination. According to the Ministry of Economy (2023), Ukraine inherited multiple legacy databases using different coordinate systems and lacking harmonized metadata, resulting in duplication and delays in verifying "released" land. The absence of a unified digital mine-action information management system constrains both operational oversight and donor transparency. As Rohozian (2024) observes, such imperfect information leads to *"erroneous management decisions"* that increase total costs and prolong recovery.

In addition, large areas in the east and south remain off-limits due to ongoing hostilities, unexploded ordnance, and damaged infrastructure. Fluctuating front lines, dense contamination, and logistical barriers raise insurance and hazard-pay costs, shorten fieldwork periods, and cause rapid equipment deterioration.

Thus, addressing these interconnected challenges is essential to accelerate Ukraine's reconstruction and ensure that mine action effectively supports the safe return of communities, the revival of agricultural production, and the broader recovery of the national economy.

The Role of Women in Humanitarian Demining

The role of women in Ukraine's humanitarian demining sector deserves special attention, as they have become an integral part of the national workforce serving as deminers, team leaders, and technical-survey dog handlers. Their growing participation reflects both professional competence and the importance of gender-inclusive recovery efforts (UN Women Ukraine, 2025).

However, until 2017, Ukrainian legislation classified demining as a "dangerous profession," barring women from formal employment in this field (Ministry of Health of Ukraine, 2017). Following sustained advocacy by international organizations, this restriction was lifted, granting women official access to mine-action professions. Since then, the number of women in operational and leadership roles has grown steadily.

Nevertheless, persistent stereotypes suggesting that demining is unsuitable for women have been disproved by practice, as reported by UN Women Ukraine, 2025. In practice, modern safety protocols and technologies such as drones and remotely operated vehicles allow women and men to perform tasks under equal safety conditions.

Following the lifting of the employment ban in 2017, which opened demining professions to women, mine-action organizations began reconsidering how to better meet women's practical needs in the field. Recognizing that protective gear and uniforms had long been designed for men, many operators are now adapting equipment to fit women's bodies, enhancing both comfort and operational efficiency.

These findings further demonstrate that gender-inclusive employment contributes to a reconstruction process that benefits all citizens and fosters social recovery based on principles of equity and shared responsibility.

Conclusions

In conclusion, humanitarian demining represents a strategic prerequisite for Ukraine's reconstruction, food security, and long-term economic recovery. International experience demonstrates that mine clearance delivers substantial socio-economic dividends by restoring access to land, enabling trade, and rebuilding local livelihoods. However, the economic efficiency of mine action cannot be measured through simple cross-country comparisons. Costs per square meter or per explosive item differ widely depending on terrain, contamination density, labor costs, and institutional frameworks. Therefore, efficiency should be evaluated in context, i.e., by how well resources are transformed into measurable recovery outcomes without compromising safety or inclusiveness.

For Ukraine, transforming demining into a genuine driver of recovery requires addressing several domestic challenges. Fragmented governance and overlapping mandates continue to reduce coordination and transparency, while limited training capacity and workforce shortages constrain operational progress. Inconsistent data systems and incomplete mapping impede strategic planning, and security conditions still restrict access to large contaminated areas in the east and south of Ukraine. Overcoming these

barriers will require strengthening the coordinating role of the National Mine Action Center and expanding professional education and certification programs.

Equally important, the growing participation of women in mine action deserves special recognition. Since the 2017 reform that lifted employment restrictions, women have become active as deminers, team leaders, and survey specialists, demonstrating both competence and leadership in this traditionally male-dominated field. Promoting gender-balanced participation will strengthen Ukraine's mine action capacity and align reconstruction with broader principles of equality and social inclusion.

Thus, ensuring that clearance efforts are efficient, transparent, data-driven, and inclusive will determine how effectively Ukraine can restore productive land, rebuild infrastructure, and regain investor confidence.

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