Environmental and Societal Damage in Wartime Ukraine

A Multidisciplinary Assessment for Recovery & Accountability

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Russia's deliberate and systematic destruction of Ukraine's environment constitutes damage that will outlast the war by generations.

Air pollution, water contamination, and soil degradation are the direct result of targeted attacks on infrastructure, energy systems, and agricultural land. They determine where reconstruction can proceed, under what conditions, and at what cost.

This report documents the environmental destruction, psychological toll, and societal fractures caused by Russia's war, **establishing the evidentiary basis for accountability** and setting out structured pathways for resilient, compliant, and investable reconstruction.

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**Challenger Research coordinated and produced this assessment, drawing on its OSINT methodology, academic partnerships, and its network of geopolitical, environmental, socio-economic, and policy specialists.*

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Executive Summary

Russia's war against Ukraine has generated environmental, infrastructural and societal damage on a scale that directly constrains reconstruction choices. Air pollution, water contamination, soil degradation and persistent insecurity are not secondary concerns but **structural risks that will determine where reconstruction can proceed, under what conditions, and at what cost.** If left unaddressed, these risks threaten to embed long-term liabilities through health impacts, agricultural losses, regulatory non-compliance and stranded infrastructure — undermining both Ukraine's recovery and returns on external investment.

The destruction extends beyond the physical environment. Persistent drone warfare, displacement and family separation have inflicted profound psychological and **societal damage that will shape recovery conditions for decades.** Reconstruction frameworks that fail to account for these realities risk fundamentally mispricing the true economic and human cost of the war.

Accordingly, environmental degradation, societal harm and economic loss should not be treated solely as humanitarian or reconstruction concerns, but as **central components of future peace negotiations**, reparations frameworks and long-term European security planning.

Key Findings

EU-Aligned Governance Framework

Ukraine possesses a broadly EU-aligned environmental governance framework, including EIA, SEA, integrated pollution permitting, and the "Do No Significant Harm" principle embedded in EU-supported financing.

Governance and Implementation Gaps

Wartime disruption has fragmented environmental oversight and weakened the integration of documented risks into reconstruction planning, permitting and financing, increasing uncertainty for donors, investors and policymakers.

Finance as Accountability Channel

Under the EU-supported Ukraine Facility, disbursement of funds is linked to environmental safeguards, creating a conditionality that binds reconstruction and prevents further damage.

Enduring Psychological and Societal Damage

Drone warfare, mass displacement, and family separation have generated population-level stress injury, dismantled community governance structures, and created societal fractures that reconstruction planning must address alongside physical damage.

Core Recommendations

Build Back Better

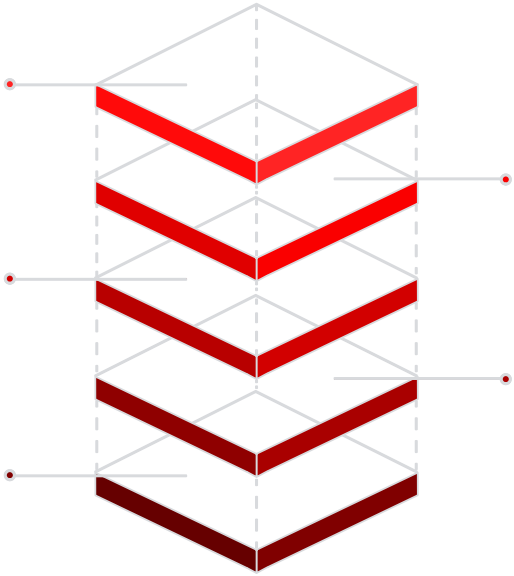
Surpass pre-2022 environmental standards.

Sequence Actions

Sequence reconstruction with modernised monitoring and environmental safeguards.

Fund Monitoring

Allocate dedicated environmental monitoring funds.



Restore Communities

Address psychological harm and social fragmentation to rebuild local governance capacity.

Embed Verification

Embed environmental verification in all reconstruction financing.

- **Reconstruction programming** should include funding and support for environmental monitoring, while environmental verification thresholds should be systematically embedded into funding, guarantees and project design as a prerequisite for resilient, compliant and investable reconstruction in Ukraine. Reconstruction must also be correctly sequenced to promote effective recovery.
- **Monitoring capacity** should be restored and modernised as an enabling condition for reconstruction finance, while water contamination assessments should precede soil remediation because groundwater pollution can continue to affect agricultural land.
- **Industrial and energy reconstruction** should proceed at scale only once emissions monitoring and permitting requirements can be met. Reconstruction programming should also aim to “build back better” by improving Ukraine’s land, air and water quality beyond conditions that existed before Russia’s full-scale invasion in 2022.
- **Psychological and societal recovery** must be treated as a prerequisite for durable reconstruction, not an afterthought. Population-level stress injury, dismantled community governance, and mass displacement determine whether reconstruction finds the institutional trust and local capacity it needs to function. Recovery programmes should fund psychosocial support, integrate mutual aid networks as delivery partners, and ensure communities hold genuine decision-making authority over reconstruction priorities.

Introduction

The environmental consequences of armed conflict often go overlooked, despite the Rio Declaration on Environment and Development stating that ‘peace, development, and environment protection are interdependent and indivisible’. The Russian war against Ukraine is no exception; the conflict is already considered an environmental disaster with the potential to worsen significantly.

Environmental damages may occur unintentionally as a byproduct of military operations and/or military strategy, **often persisting long after hostilities cease**. In the present conflict, key environmental effects of the conflict have been damage to infrastructure and industrial facilities, that may result in the release of hazardous substances into multiple environmental compartments. By affecting land, water systems, and critical infrastructure, the scale and distribution of these impacts suggest that Ukraine’s environmental condition will be an important factor in shaping its recovery trajectories and long-term economic outcomes.

This brief therefore sets out the most important ways in which Ukraine’s natural environment will need to recover, highlights regulatory and monitoring constraints, and suggests reconstruction priorities and sequencing in mitigation. Focusing on the key harms of water contamination, land degradation and air pollution, the brief identifies where environmental evidence is available under wartime conditions, which governance mechanisms can act on that evidence, and which authorities ultimately control reconstruction outcomes.

These environmental risks are deeply interdependent: water contamination alters soil chemistry and delays agricultural recovery; land degradation and forest fires drive air-quality spikes; industrial emissions deposit pollutants into waterways and soils. These cross-cluster linkages mean reconstruction sequencing cannot be treated as a purely infrastructural challenge. Environmental damage shapes the conditions under which recovery can safely proceed, affecting public health, agricultural productivity, and industrial output.

Experts argue that post-war recovery must be "sustainable and green," potentially guided by a proposed "Marshall Plan for Environmental Reconstruction". The World Bank Group estimates total environmental damage across natural resource management and forestry at US$2.0 billion, with total losses reaching US$36.0 billion (World Bank RDNA5, 2026). There is also an urgent international call to reform the ICC's mandate to include ecocide, ensuring accountability for the long-term ecological devastation caused by armed conflict.

This brief opens with an overview of the war's environmental impacts, then sets out the governance and monitoring frameworks that should underpin reconstruction decisions. It proceeds across air, water, and soil, explaining key impacts, evidence and monitoring constraints, relevant governance mechanisms, and sequencing recommendations for each. A further section addresses the war's consequences for climate, biodiversity loss, and antimicrobial resistance, areas where reconstruction investment pathways are less clearly defined. The brief concludes with structured recommendations for recovery.

Section I: The Scale of the Problem: Impacts of the War on Ukraine's Environment

Before the War

Before February 2022, Ukraine's environmental landscape was shaped by pollution from outdated industries, limited funding for environmental policies, ongoing steps toward a greener economy, and growing climate change impacts. Water pollution, ineffective waste management, and poor air quality were key problems. Since 2014, the EU-Ukraine Association Agreement guided much of Ukraine's environmental policy, though significant implementation gaps persisted. Despite these challenges, Ukraine had a strong environmental civil society sector and performed well in regional assessments of environmental governance, scoring high in transparency and public access.

The Situation Now

Data from the EcoDozor platform reveals extensive environmental consequences. Between February 2022 and November 2025, over 4,102 war-related environmental incidents were recorded across 2,136 facilities, involving destruction of industrial sites, fuel storage infrastructure, and waste repositories. High-risk damage includes the Kakhovka and Kyiv Hydropower Plants and critical nuclear facilities such as Chornobyl and Zaporizhzhia. The greatest number of incidents occurred in March 2022 (370) and June 2023 (267). In November 2025 alone, 109 additional incidents occurred, with 17.8% categorised as high or very high environmental hazards. Approximately 1 in every 5 incidents is classified as "High" or "Very High" (a combined average of 21.76%) representing a recurring potential for acute ecological disasters.

4,102

Environmental Incidents

War-related incidents recorded Feb 2022 – Nov 2025

21.76%

High/Very High Hazard

Combined average of incidents classified as high or very high environmental hazard

$36B

Total Losses

World Bank estimated total environmental losses from the conflict

109

Nov 2025 Incidents

New environmental incidents recorded in a single month, showing no sign of decrease

1.1 Documented Damage: Four Key Indicators

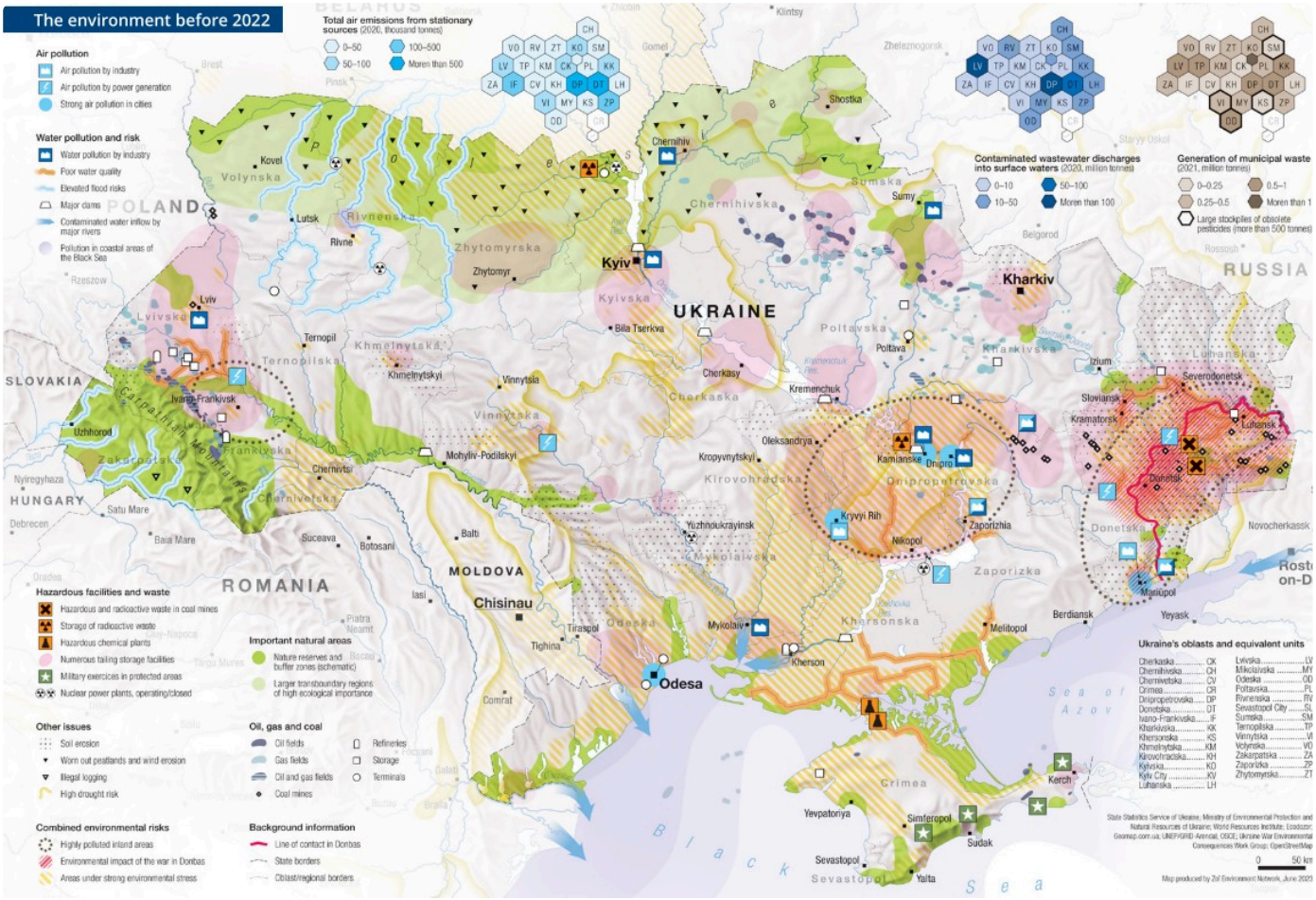


Figure 1. Ukraine's environment before 2022. Source: Conflict and Environment Observatory, & Zoï Environment Network, 2024.

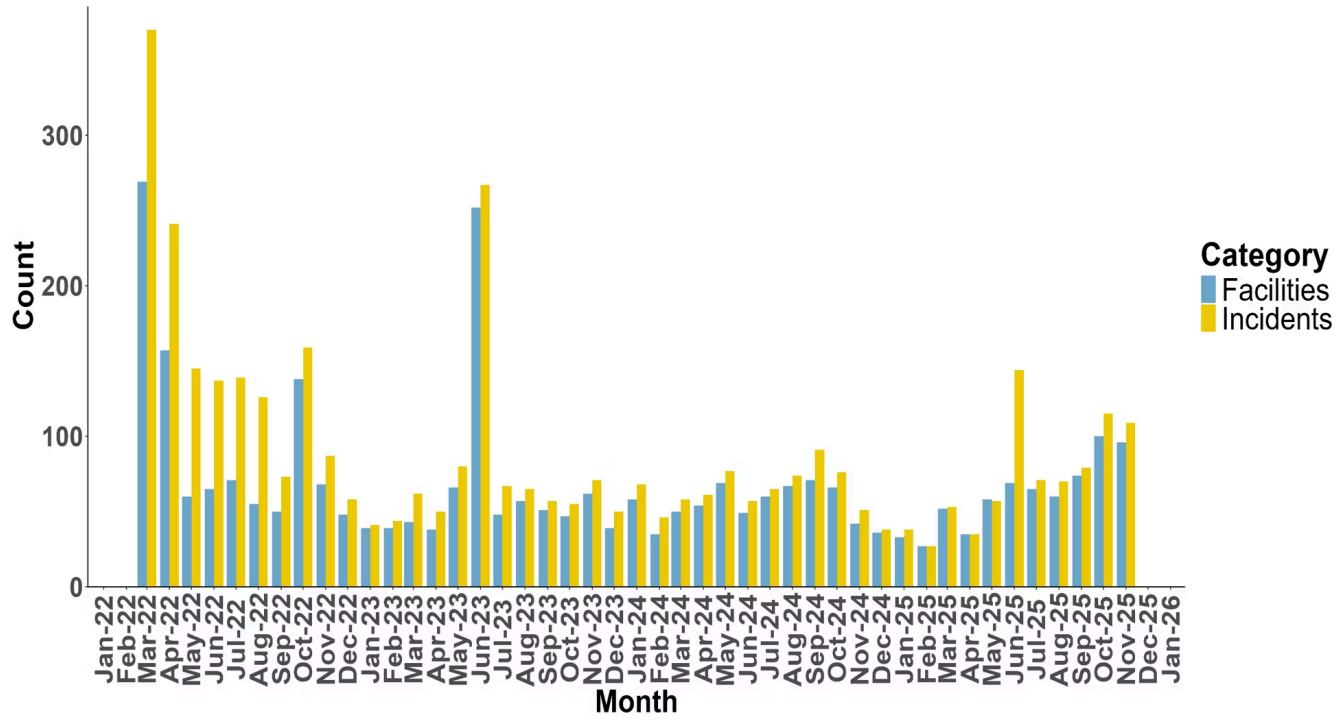


Figure 2. Number of facilities damaged and incidents reported from March 2022 to November 2025. Source: EcoDozor November 2025 Report.

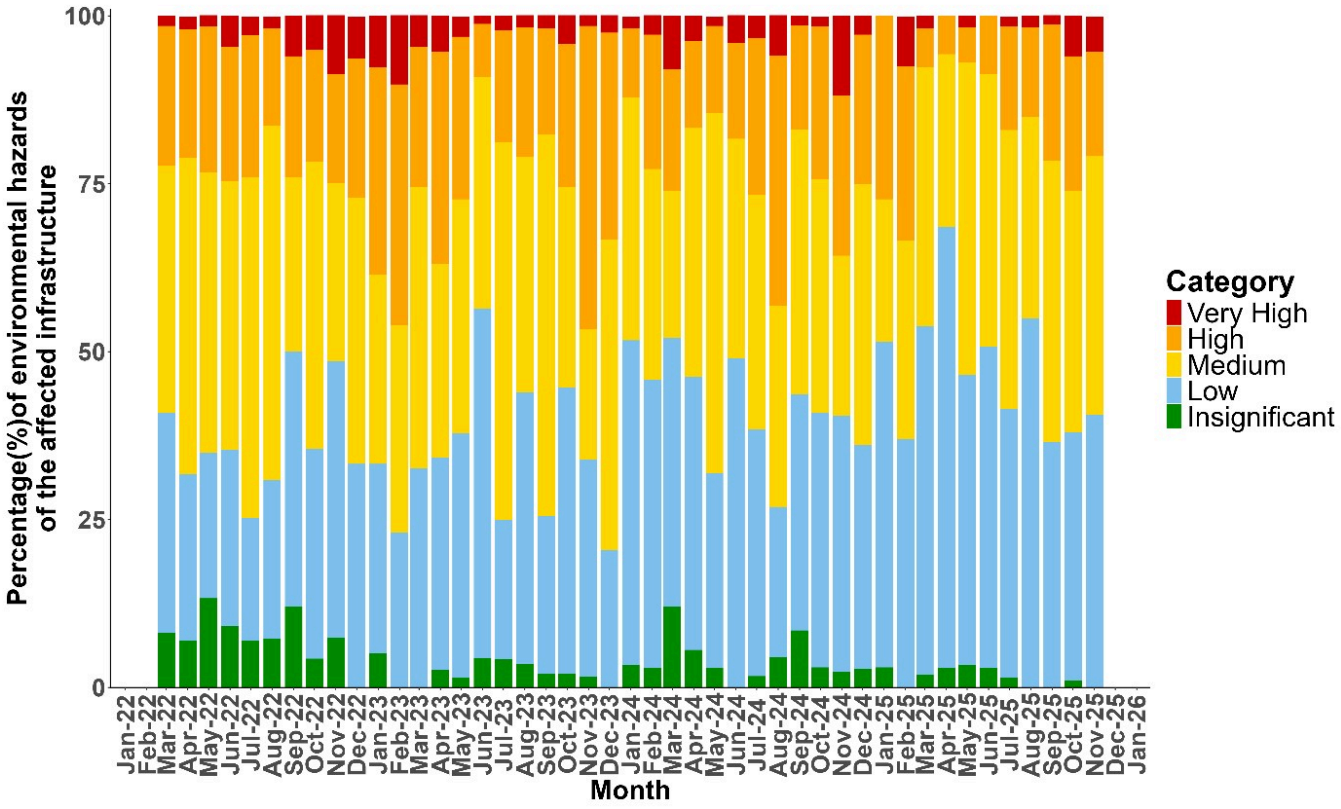


Figure 3. Percentages of environmental hazards due to damaged infrastructure from March 2022 to November 2025 categorized into insignificant (green), low (blue), medium (yellow), high (orange) and very high (red). Source: EcoDozor.

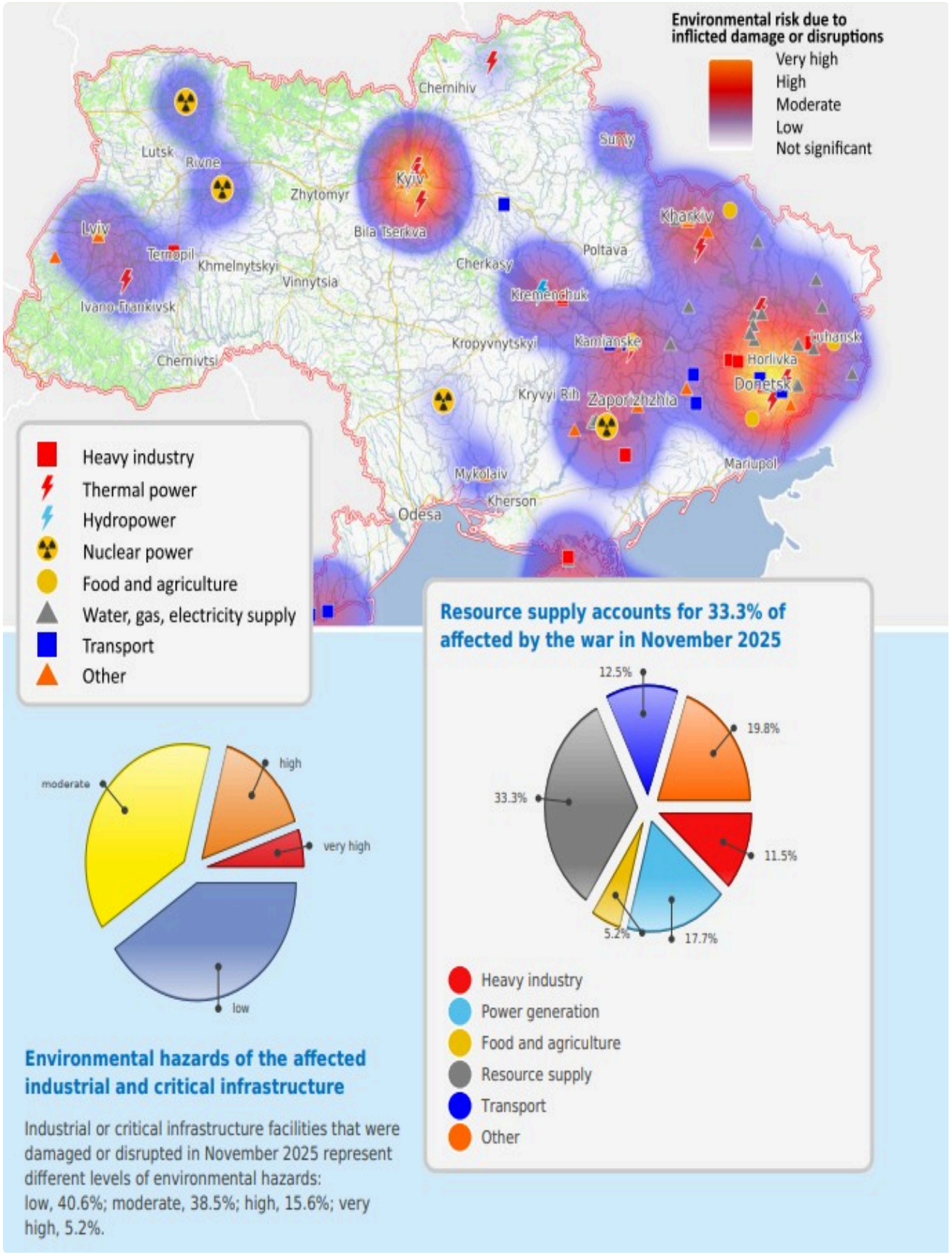


Figure 4. The environmental risks due to inflicted damage or disruptions in November 2025. Source : EcoDozor November 2025 Report.

Environmental Governance Architecture

Several governance mechanisms exist to translate environmental evidence into reconstruction decisions. Ukraine's Law "On Environmental Protection" establishes that environmental damage must be compensated in full. Recent reforms introduced integrated environmental permits through the Law on Integrated Prevention and Control of Industrial Pollution (2024), allowing regulators to assess cumulative impacts across air, water, and soil. Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) remain the principal legal instruments through which environmental risks should influence reconstruction decisions.

Table 1. Environmental Risk, Governance, and Reconstruction Bottlenecks by Sector

Sector	Environmental Risk	Available Evidence	Key Institutions	Governance Gap	Reconstruction Bottleneck
Air Quality	Toxic military-derived emissions; heavy metals, PAHs, radioactive particles	Satellite imagery; limited ground stations; Hydrometeorological Centre data	Ministry of Environmental Protection; Ministry of Health; Hydrometeorological Centre	No binding national ambient standards for PM2.5/PM10; fragmented monitoring authority	Industrial reconstruction cannot verify emissions compliance without restored monitoring
Water Quality	Targeted destruction of infrastructure; chemical, radiological and biological contamination	State Water Monitoring System; EcoZagroza; satellite/remote sensing	Ministry of Environmental Protection; State Water Resources Agency; State Emergency Service	Regulators identify risk but reconstruction authority sits with military administrations	Water infrastructure cannot be safely restored where contamination is unverified
Soil Contamination	Bombturbation, heavy metal accumulation, explosive residues; phytotoxicity up to 99.8%	Institute of Soil Protection; State Environmental Inspection; satellite/remote sensing	Ministry of Environmental Protection; Ministry of Agrarian Policy; Institute of Soil Protection	No binding EU-equivalent soil protection directive; responsibility split between ministries	Agricultural recovery blocked until demining and contamination surveys complete; $20bn remediation cost
Forests & Ecosystems	Nearly 30% of forests affected; wildfire area 45x greater in 2022 vs 2021	WWF Ukraine; FAO assessments; satellite fire detection; RDNA5	State Forest Agency; Ministry of Environmental Protection; Ministry of Agrarian Policy	Mandates split across three ministries; no cross-sector coordination body	Reforestation cannot proceed safely without demining; carbon stock recovery requires decades

1.2 Monitoring and Accountability

Monitoring Under Wartime Conditions

Even under wartime conditions, Ukraine has developed digital platforms like EcoZagroza and EcoDozor to track environmental crimes and map pollution events, and has adopted new legal methodologies to calculate the cost of damages. However, incomplete monitoring data complicates enforcement. Active hostilities and widespread landmine contamination make field surveys dangerous or impossible. Relaxations of SEA and EIA procedures and incomplete data further weaken the ability of environmental governance frameworks to shape reconstruction decisions.

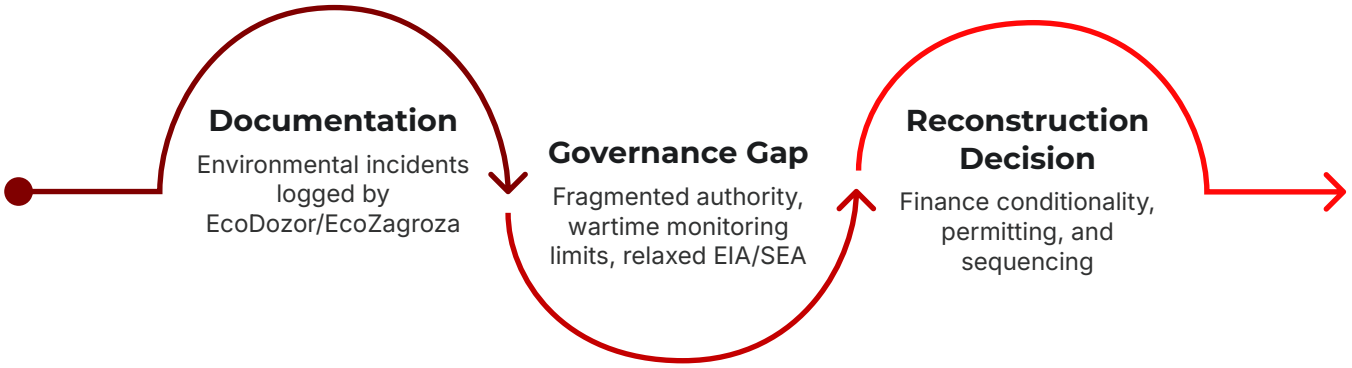
Research on forest landscape governance in Ukraine shows that institutions remain weakly connected across sectors, with no consistent link between environmental knowledge, authority, and implementation — meaning that even well-documented ecological problems do not translate into coordinated recovery decisions. The evidence-to-decision gap reflects a structural feature of Ukraine's cross-sector environmental governance, not only a product of wartime disruption.

Accountability and Finance

Environmental Impact Assessment procedures provide an accountability checkpoint: projects subject to EIA cannot legally proceed without a valid assessment, and planning decisions may be challenged in court where environmental procedures are bypassed. Atmospheric emissions exceeding regulatory limits may trigger enforcement under the Law "On Air Protection," while violations involving excessive discharges may generate liability across water and soil systems.

Reconstruction finance provides an additional accountability channel: under the EU-supported Ukraine Facility, disbursement of funds is linked to environmental safeguards, creating a conditionality that binds reconstruction and prevents further damage. A range of international programmes are already active, including NEFCO green financing instruments, EU LIFE-funded projects, the UNEP Green Recovery Platform, and FAO and World Bank reconstruction programmes.

Reconstruction finance provides an accountability channel that could help counterbalance limited monitoring and relaxed environmental standards under wartime conditions.



Section II: Sector-Specific Impacts

2.1 Air Quality

Air quality is a public health determinant and an important indicator of urban resilience. Even prior to the invasion, Ukraine's baseline air quality was among the poorest in Europe: 2019 data attributed **42,900 premature deaths** and **953,500 disability-adjusted life years (DALYs)** to air pollution, representing approximately 10% of all morbidity and mortality. The war has fundamentally altered the nation's air quality, shifting the emission profile from traditional industrial sources toward unstable, unconventional military-related emissions.

The destruction of industrial facilities, fuel depots, and residential areas — combined with detonation of artillery shells, bombs, and rockets — released hazardous substances including carbon monoxide (CO), hydrogen cyanide (HCN), lead, mercury, and nitrogen dioxide (NO_2). During the initial phases of the invasion, Kyiv exceeded the WHO recommended guideline for fine particulate matter by **27.8 times**.

Across the province of Kyiv, monthly average concentrations of PM2.5 increased by **65%** compared with 2022.

Of particular concern is the release of asbestos fibres from the destruction of residential and commercial buildings — **70% of residential roofs** were covered with asbestos-cement roofing sheets.

Military activity near nuclear sites represents an unprecedented risk. Movement of heavy military equipment through the Chornobyl Exclusion Zone disturbed surface soils containing Caesium-137, leading to gamma-radiation doses recording values **30 times higher** than background levels. Paradoxically, the war's disruption of Ukraine's economy led to a 26–40% reduction in Total Suspended Particles in Zaporizhzhia in the initial months. Yet, this temporary reduction is offset by the acute toxicity of war-related pollutants, shifting the atmospheric burden from manageable industrial emissions to irregularly dispersed toxic releases.

Chornobyl Exclusion Zone. Source: BBC 2025.

2.2 Water Quality and Availability

Ukraine's extensive water resources are essential for navigation, agriculture, and public water supply, with approximately **75% of drinking water derived from rivers.** Ukraine entered the full-scale invasion as one of the least water-secure countries in Europe, and wartime damage has further weakened already fragile water systems. Water has now transitioned from a basic necessity to a central element of military strategy. Water has transitioned from a basic necessity to a central element of military strategy.

The April 2022 breaching of the Mykolaiv pipeline forced 500,000 residents to rely on highly mineralised, corrosive water from the Dnipro-Bug estuary, exemplifying what researchers have termed "hydrological warfare" or "aquacide." **The Ikva River attack caused ammonium and nitrate levels to spike 163 and 50 times above permissible limits** respectively. Attacks on eastern infrastructure, comprising mines, refineries, oil depots, and gas lines, have the potential to release toxic substances into water bodies. Electrical blackouts may cause uncontrolled mine water rises, increasing salinity 20–70% and doubling organic substance and hydrocarbon levels.

6M

People Without Water

Approximately 6 million people were facing daily struggles for drinking water access by April 2022

$7.8B

Water Sector Damage

World Bank estimated damage to water supply and sanitation sector, Feb 2022 – Dec 2025

36,111

Tons Contaminated

Tons of contaminated water bodies recorded by EcoZagroza by March 2026

163x

Ammonium Spike

Ammonium levels spiked 163 times above permissible limits in the Ikva River after missile strikes on fertilizer tanks

Case Study: Destruction of the Kakhovka Dam

Of greatest concern is the Kakhovka Reservoir: its critical role in providing cooling for the Zaporizhzhia Nuclear Power Plant and supplying Europe's largest irrigation system makes its integrity a prerequisite for preventing both a regional nuclear emergency and the collapse of agricultural water supplies underpinning global food security.

On June 6, 2023, a catastrophic explosion breached the dam while under Russian military control. The breach released nearly 20 billion cubic metres of water, creating a flood wave that rose over 5 metres in Kherson, inundating 80 settlements, causing dozens of casualties, and displacing approximately 40,000 people.

The disaster released at least 150 tons of machine oil, swept industrial pollutants and landmines into the Black Sea, altered salinity, and triggered massive algal blooms killing tens of thousands of fish and approximately 20,000 animals.

Environmental pressures on marine and aquatic ecosystems have intensified significantly beyond this single event, with 66,802 tons of pollutants entering seawater by March 2026 according to EcoZagroza.

The destruction deprived up to six million people of safe drinking water, disabled irrigation for nearly 1 million hectares of farmland, and introduced persistent risks for the Zaporizhzhia Nuclear Power Plant. The sudden drainage exposed nearly 2,000 km² of reservoir bed, described by researchers as a "toxic time bomb," containing an estimated 83,300 tonnes of toxic heavy metals including lead, cadmium, and nickel accumulated since the mid-20th century.

⚠ Continuous monitoring and further research are essential to fully understand the ecological consequences of the dam's destruction and to develop effective strategies for ecosystem recovery.

Before and after satellite images of Nova Kakhovka dam. Source: UWEC, 2023.

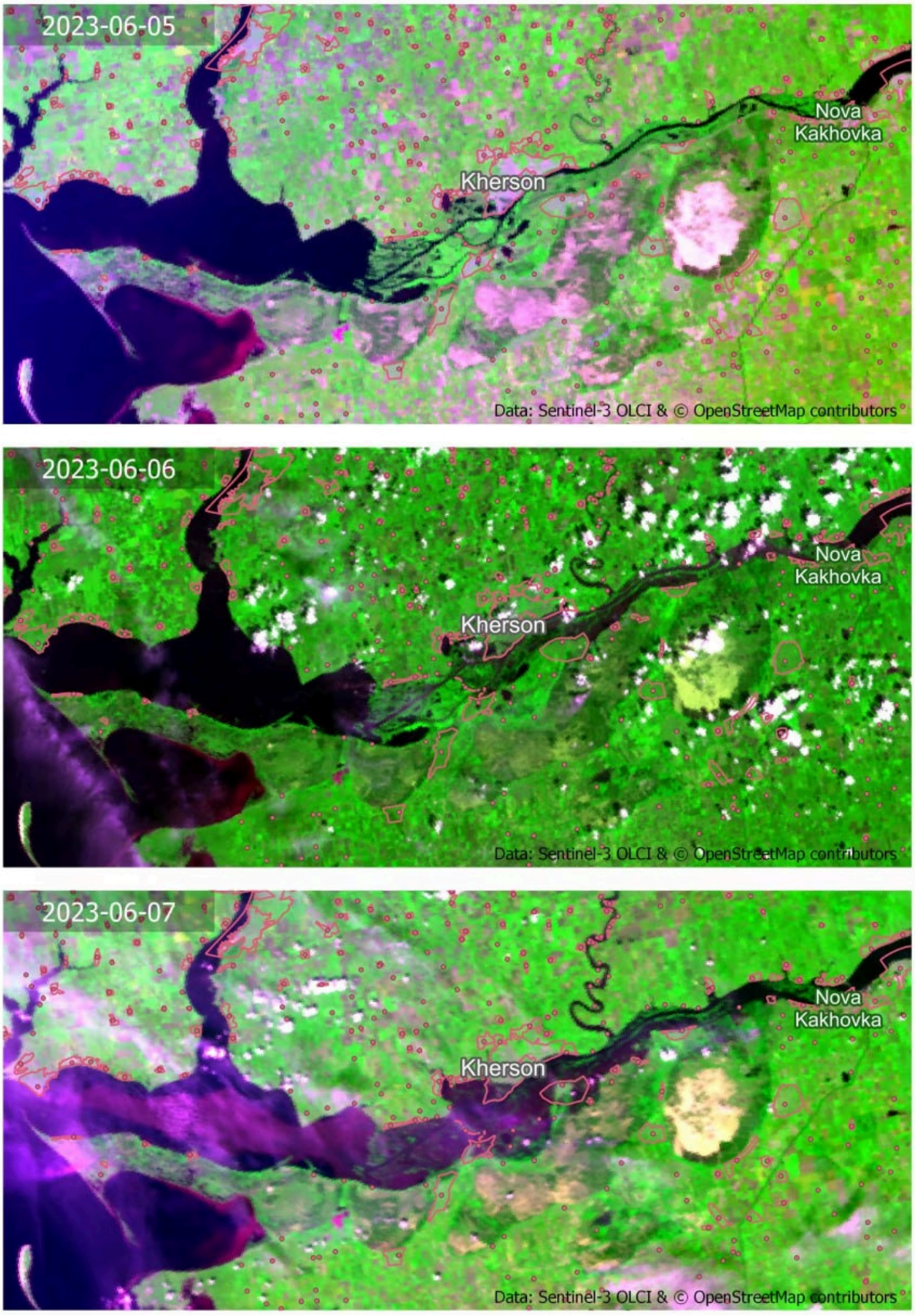


Figure 5. Comparison of satellite imagery on June 5th (pre-damage), 6th, and 7th. Source: SCGIS Ukraine, UNCG, 2023.

Primary Water Pollutants from the Conflict

Table 2. Water Contamination by Pollutant Type: Affected Regions and Documented Impacts

Type	Specific Pollutants	Affected Region	Environmental & Health Impacts
Chemical	Heavy metals, petroleum hydrocarbons, PCBs	Dnieper River, Black Sea, Lviv Region	Deterioration of water quality, toxic contamination of sediments, long-term toxic legacy for aquatic life
Chemical	Ammonium and Nitrates	Ikva River, east of Lviv	Dangerous concentration spikes, mass fish deaths, methemoglobinemia risk in children
Radiological	Cesium-137, Strontium-90	Dnieper River Basin and Reservoir Cascade	Secondary radioactive contamination from dislodged Chernobyl-era sediments
Biological	Pathogenic bacteria, helminth eggs	Dnieper River, Black Sea, Mariupol	Spread of waterborne infectious diseases, epidemic outbreaks
Chemical	Acid mine drainage (sulfates, chlorides, heavy metals)	Donbas region, Siverskyi Donets River basin	Increased salt concentrations 20–70%; pollution of groundwater aquifers
Biological	Algal biomass	Dnieper Reservoir Cascade	Persistent algal blooms exceeding WHO standards; potential long-term ecological collapse

2.3 Soil Contamination

Ukraine's soil systems represent both a strategic economic asset and a long-term environmental vulnerability. Soil pollution from the war is a multi-dimensional disaster involving extensive physical destruction, persistent chemical contamination, and biological degradation, with effects predicted to last for centuries. The most visible impact is **bombturbation**, involving explosions from mines and bombs violently mixing horizontal soil layers, destroying fertile topsoil. In the Kharkiv region alone, researchers have identified over **420,000 craters**. Satellite analysis covering 2.37 million hectares by the FAO identified more than **one million craters** across Ukraine.

The circulation of heavy military machinery, like T-64 tanks weighing up to 45.5 metric tons, causes severe soil compaction, reducing porosity and accelerating erosion, leading to agricultural yield drops of **40–60%** in affected areas. Chemical contamination hotspots arise from munitions residues: field data from Lviv showed lead levels up to **78.8 times the Maximum Allowable Concentration** near burned military wreckage.

These chemical and physical shifts have a devastating biological impact, suppressing essential microbiological processes and destroying soil fauna. Hostilities lead to a significant decrease in microbial biomass and a suppression of necessary pathways involved in nutrient cycling, undermining long-term ecosystem function. Soil organisms such as earthworms are particularly sensitive to explosives, with very high mortality rates observed in soil taken from explosion epicentres.

The environmental Copper risk index has reached a critical **58.2**, associated with tissue damage and inhibition of photosynthesis. Munitions leave behind TNT and RDX, which are resistant to biological degradation and can remain toxic for decades.

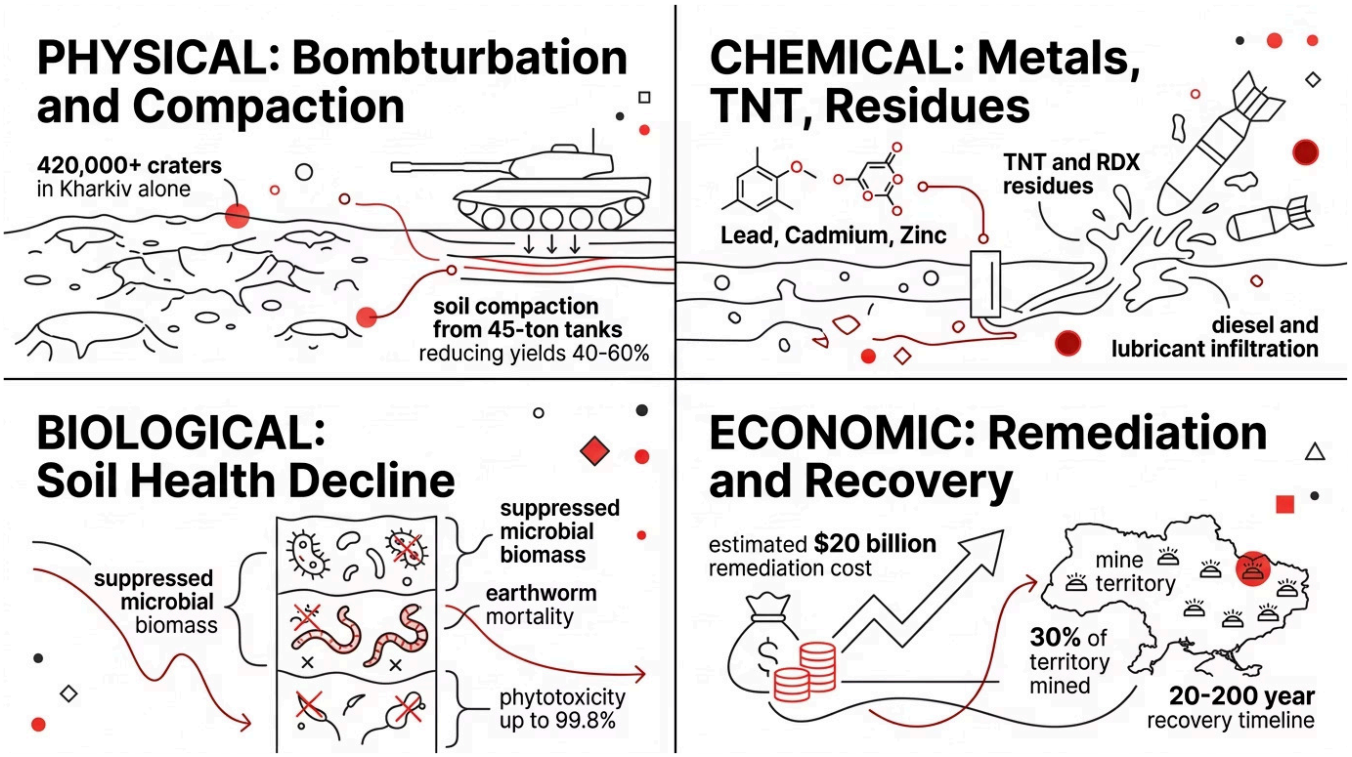


Figure 6. Four Dimensions of Wartime Soil Degradation in Ukraine

The resulting phytotoxicity has been measured at levels up to **99.8%**, preventing germination of both wild and cultivated plant species. For the plants that do survive, heavy metals can be absorbed through the roots, allowing hazardous toxins to migrate from the soil into edible tissues within the plant, thereby entering the human food chain, posing long-term public health risks.

Restoring Ukraine's agricultural land — which includes roughly **one-third of the world's supply of fertile Chernozem (black earth) soil** — is a global food security priority that will take decades or even centuries to achieve. Nature-friendly remediation solutions such as phytoextraction, using plants like sunflowers, miscanthus, or industrial hemp to remove heavy metals and radioactive isotopes, **could take between 20 and 200 years to complete.** This recovery effort is further complicated by extensive landmine and unexploded ordnance (UXO) contamination, which currently covers less than 30% of the country's territory.

2.4 Monitoring, Governance & Recommendations

Evidence & Monitoring Constraints

Ukraine's monitoring infrastructure largely dates back to the Soviet period and relies on non-automated instrumentation, limiting high-resolution real-time data. **By end of 2022, the number of cities with active state monitoring stations had declined significantly**, and monitoring in occupied territories remains largely absent. Environmental assessments increasingly rely on satellite imagery, emissions modelling, and limited ground monitoring rather than comprehensive atmospheric surveys.

Regulation & Governance

The core legal framework is the Law "On Air Protection." However, it does not establish binding national ambient air-quality standards for $PM_{2.5}$ and PM_{10}, a regulatory gap creating misalignment with EU environmental governance. Institutional responsibility is distributed across the Ministry of Environmental Protection, Ministry of Health, Ukrainian Hydrometeorological Center, and State Emergency Service. No single institution currently has full operational authority to enforce EU-aligned air-quality standards during reconstruction.

Recommendations for Reconstruction Sequencing

- Industrial reconstruction must be conditional on compliance with integrated environmental permitting systems that account for cumulative emissions impacts.
- Modernization of air-quality monitoring infrastructure is necessary to ensure compliance with EU environmental standards and support accountability mechanisms.
- Reconstruction of energy systems should prioritize low-emission technologies to reduce long-term atmospheric pollution and align with climate commitments.
- Without improved monitoring capacity and regulatory enforcement, reconstruction risks restoring industrial and energy infrastructure in ways that perpetuate long-term air pollution and public health risks.

Section III: Climate, Biodiversity & Antimicrobial Resistance

Climate Impact

Prior to the invasion, Ukraine had reduced GHG emissions by **62.5%** compared to 1990 levels. The war created a paradox: national gas consumption fell 28.7% and electricity use 30–35% in 2022, yielding a 23–26% reduction in traditional GHG emissions. However, the carbon footprint of the invasion itself (fuel combustion, fires, explosives etc.) amounted to an estimated **77 $MtCO_2e$** in the first 18 months. Forest fires in 2022 burned 45 times more area than 2021, releasing approximately **180.7 million tonnes** of emissions. By the fourth year of full-scale invasion, cumulative war-related emissions reached **311 $MtCO_2e$** — comparable to France's annual emissions. At COP30, Ukraine announced plans to pursue accountability for these emissions, with total climate-related damages estimated to exceed **$57 billion** based on a social cost of carbon of $185 per tonne.

Biodiversity Loss

Ukraine is home to **35% of Europe's total biodiversity**. Approximately **20–30%** of the country's protected areas have been impacted by military operations, leading to massive deforestation and wildfires that burned 45 times more forest area in 2022 than in 2021. Marine ecosystems in the Black Sea and Sea of Azov face severe pressure from oil spills, chemical contamination, and acoustic trauma from naval sonar and underwater explosions. The destruction of the Kakhovka Dam released massive amounts of pollutants and sediments that smothered sensitive coastal habitats. With 2,700 km of coastline, further investigation of marine environment impacts is essential for long-term recovery planning.

Antimicrobial Resistance

Conflict has been recognised as a driver of antimicrobial resistance (AMR). Ukraine already recorded more than **8,000 deaths annually** from resistant infections since 1990. The full-scale invasion has significantly accelerated this crisis: major hospitals now report that over **80%** of admitted patients suffer from infections resistant to commonly used antibiotics. Research on wounded soldiers in 2024 found **84.6%** of isolated bacterial strains were multidrug-resistant (MDR). Destroyed water and sanitation systems create "techno-natural ecosystems" serving as environmental reservoirs where resistant organisms proliferate. Heavy metals from munitions residues co-select for resistance genes. Conflict-accelerated resistance represents a global, rather than regionally contained, health threat.

Section IV: Human Dimensions of Environmental Destruction

Psychological, Anthropological and Historical Perspectives

The environmental damage documented in Sections I–III is not abstract. It is experienced daily by millions of people who continue to live, work, and attempt recovery within contaminated, disrupted, and dangerous landscapes.

The devastation wrought by Russia is unprecedented in the modern world. Kyiv Dialogue (2026) have recorded nearly 100,000 strikes on cities and civil infrastructure since the start of the war.

Environmental damage is also social damage. It reorders trust, labour, care, belonging, and the capacity to imagine a future. Any reconstruction framework that treats the physical and environmental recovery as separable from the human one will fail to close the governance gaps that currently threaten to render documented damage irremediable.

This section also contributes directly to the accountability dimension of this report. The scale and nature of the psychological, social, and community harm documented here constitutes an additional evidential basis for establishing the extent of Russia's responsibility for destruction that extends far beyond infrastructure. Environmental harm that generates population-level mental health burden, dismantles community governance structures, and creates multigenerational recovery timelines is harm of a fundamentally different order from temporary disruption. It must be reflected in any serious peace negotiation, reparations framework, or international accountability mechanism.

Psychology of Persistent Threat

Field research and clinical data examining the psychological consequences of Ukraine's drone-saturated war — with particular attention to population-level stress injury, alert fatigue, and the governance consequences of redistributed trust.

Anthropological Evidence from Kharkiv

Ethnographic and community-level evidence documenting how civilians interpret and adapt to environmental risk, how mutual aid networks have become de facto governance infrastructure, and what this means for reconstruction strategy.

Historical and Comparative Perspectives

International disaster recovery scholarship and analogues from Vietnam, France, India-Pakistan, and post-Soviet Ukraine itself. This data helps establish what recovery from compound physical, environmental, and societal destruction requires.

4.1 The Psychology of Persistent Threat

Ukraine's drone-saturated war has produced a form of civilian harm that standard post-conflict recovery frameworks were not designed to address. The psychological damage is not episodic but **cumulative and atmospheric**: a continuous condition in which threat and anticipation bleed across day and night without respite.

The Structural Mechanism

Russia launched an estimated **54,538 drones in 2025 alone**, generating more than **19,000 air-raid sirens** across Ukraine. Unlike bombardment cycles of twentieth-century warfare, Ukraine's drone war dissolves the structure of respite:

- **Sound** makes threat constant
- **Timing** makes respite impossible
- **Space** offers no escape near the front line

Alert Fatigue and Its Governance Consequences

With more than 19,000 alarms in a single year, many civilians have ceased responding to every siren. This is not denial but adaptation: exhaustion has overridden vigilance, producing what crisis psychologists term **alert fatigue**. The same habituation that stops people responding to sirens will, absent deliberate policy intervention, cause them to stop responding to institutions once fighting ends.

Population-Level Stress Injury

The clinical data are indicative of population-level harm. The WHO estimates that approximately **2 in 5 Ukrainians now meet the clinical criteria for a mental health disorder.** Pharmaceutical data show a 46% increase in antidepressant demand in 2024. Field psychiatrists report high rates of insomnia, depressive and anxiety symptoms, psychosomatic complaints, and drone-related hallucinations.

Children are particularly vulnerable. Nationwide survey data from more than 1,200 parents document increased emotional, behavioural, and attention problems. Save the Children reports that **43% of children supported by the organisation show psychosocial distress**, including speech difficulties, involuntary movements, nightmares, and night-time screaming.

Drone Operators: Moral Injury and Perpetration Stress

A distinct psychological risk category concerns the tens of thousands of civilians who have operated lethal drone systems during the conflict. Most Ukrainian drone operators are civilian volunteers with no prior military background. First-person-view systems narrow the psychological distance between operator and target. Indicative data suggest **PTSD estimates of around 38% among FPV operators, compared with 4–5% for high-altitude crews,** alongside burnout rates approaching 70% and suicidal ideation of approximately 11%.

Psychological safety is a precondition for every other element of recovery to function, not a welfare concern to be addressed once reconstruction is underway.

4.2 Living Inside Environmental Destruction — Kharkiv

Kharkiv, Ukraine's second-largest city, provides the most extensively documented case study of how civilians experience the intersection of active conflict and environmental destruction. The central finding is consistent: environmental degradation in Kharkiv is not a secondary consequence of war but a core condition through which the war is lived and socially organised. In the language of Nixon's (2011) concept of *slow violence*, the harm is cumulative, delayed, and often invisible.

Daily Life Under Environmental Collapse

Residents describe a "temporal geography" of survival in which cooking, water collection, caregiving, and children's routines are planned around perceived safe windows between bombardments. Where water supply is intermittent or suspected to be contaminated, households use snow when accessible, boil and ration supplies, or accept uncertainty because there is no alternative. The financial costs of environmental damage fall overwhelmingly on civilians. Replacement water filtration, mould remediation, structural repairs, and increased food costs are borne by households already depleted by economic disruption and displacement.

Environmental Anxiety and Risk Perception

Residents interpret wartime environmental pollutants through a double register: as an unconsented compromise to be managed practically, and as a moral transgression that provokes grief and outrage. "The war took the land too," as one interviewee expressed it. Parks, gardens, and riversides (spaces of psychological restoration) have become reminders of loss, and the timeline for their recovery is experienced as generational rather than immediate.

Mutual Aid as Governance Infrastructure

The most significant finding for reconstruction policy is the nature and function of informal governance structures that have emerged under systemic institutional failure. Neighbour networks coordinate water hauling, informal repairs, child and elder care, and information sharing. Regional cafes and bakeries with generator power have become rally points and informal distribution nodes. Social media platforms (Telegram, Facebook, WhatsApp groups) operate simultaneously as practical logistics infrastructure and collective emotional spaces.

These systems are akin to operational governance, filling institutional gaps at a speed and granularity that central authorities cannot match. Recovery programmes that treat these networks as temporary wartime arrangements to be unwound, rather than as reconfigured governance infrastructure to be worked with, will encounter sustained resistance.

Identity and the Politics of Reconstruction

Environmental degradation intensifies identity formation by framing damage to land and resources as an assault on the foundations of life itself. International response is interpreted through a lens of politicised expectation: perceived indifference deepens suspicion, while targeted, responsive support builds credibility. The conditions for a "we bled, they profit" narrative are already present. How reconstruction arrives will determine whether that narrative finds confirmation or contradiction.

4.3 Historical and Comparative Perspectives on Recovery

Ukraine's recovery challenge is unprecedented in scope but not without instructive precedent. Historical analogues illuminate the long timelines involved, the recurring patterns of decision failure that have hampered recovery elsewhere, and the conditions under which genuine reconstruction has succeeded.

> *"The most important feature of successful recovery is enabling people to lead their own reconstruction, rather than imposing external approaches and priorities."* **— Haines (2026)**

1 France's Zone Rouge

Over 100 years after WWI, large areas of northern France remain uninhabitable due to persistent contamination from bombturbation, heavy metal contamination, and unexploded ordnance. **Lesson:** When ecological destruction reaches a certain threshold, recovery shifts from cleaning the land to permanent exclusion — contamination mapping and demining must precede agricultural recovery.

2 Post-WWII Kyiv

Soviet reconstruction prioritised rebuilding the Khreshchatyk and projecting Soviet identity, while citizens faced severe housing crisis. High-visibility projects masked structural neglect of the population's needs. **Lesson:** Reconstruction sequencing that prioritises symbolic restoration over daily life generates predictable failures.

3 South Asia Displacement

Experiences of mass displacement during the India-Pakistan partition of 1947 show that centralised government prioritisation alienated existing populations, while provincial-level management with sensitivity to local conditions produced far more successful social integration. **Lesson:** Participatory, locally managed resettlement and recovery processes outperform centrally imposed ones.

4 Vietnam 1950s–70s

Millions of litres of herbicides left a toxic legacy persisting to this day. Successful ecological recovery took decades and required sustained institutional effort, including land rights reform giving households direct incentives to care for their land. **Lesson:** Sustained effort over decades is required; genuine land tenure produces more durable outcomes.

5 Chornobyl 1986

Official narratives suppressed trauma and focused on heroic technical response, inhibiting genuine recovery. The trajectory from disaster to genuine recovery spanned over three decades. **Lesson:** Where environmental contamination is severe, recovery is a cultural and political process requiring honest acknowledgment and genuine community agency.

Figure 7. Historical Precedents for Environmental and Societal Recovery: Five International Case Studies

4.4 Human Harm as Accountability Evidence

The findings of this section — psychological harm at population scale, dismantled community governance, generational recovery timelines — are not only relevant to reconstruction planning. Rather, they constitute an additional and distinct body of evidence for the accountability dimension of this report and for any peace negotiation or reparations framework.

There is an emerging international call to reform the mandate of the International Criminal Court to include environmental crimes (**'ecocide'**) to ensure accountability for the long-term ecological devastation caused by armed conflict. The human dimensions documented in this section strengthen that argument considerably. When the causal chain from deliberate environmental destruction to population-level psychological harm, disrupted governance, and multi-generational recovery obligations can be traced through the evidence presented here, the case for treating environmental harm as a core accountability category is substantially reinforced.

Water Systems as Sustained Assault

Contaminated water systems that generate population-level mental health burden through chronic uncertainty and exposure are not merely infrastructure damage: they are a sustained assault on the conditions of normal life.

Agricultural Land as Attack on Identity

Deliberate targeting of agricultural land with munitions that render soil toxic for decades is not merely property damage: it is an attack on food security, economic viability, and the capacity of communities to maintain connection to their land and cultural identity.

Urban Destruction as Social Severing

The destruction of urban neighbourhoods causes the complete elimination of 'the sense of familiarity, of living in a neighbourhood' — severing the connective tissue of social life essential to functioning citizenship.

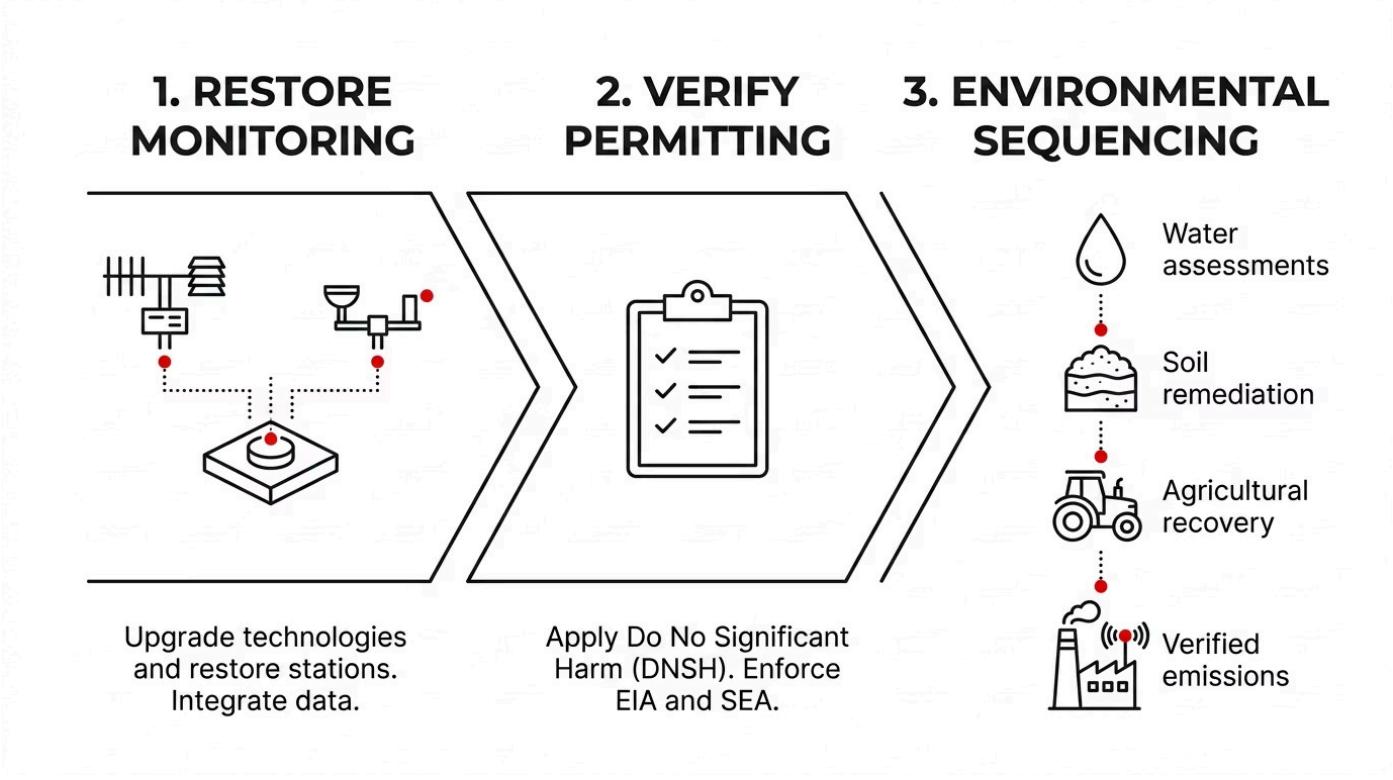
Section V: Conclusion

5.1 Structured Pathways for Reconstruction

Across environmental sectors, the war has damaged Ukraine's environment while exposing governance constraints that prevent environmental evidence from translating into reconstruction decisions. Authority is fragmented, monitoring capacity is degraded, and no single institution combines regulatory authority with operational reconstruction control. Environmental damage is increasingly documented but not consistently integrated into planning or financing.

Three adjustments would close this gap: restoring and modernising environmental monitoring systems; systematically embedding EIA, SEA, and Do No Significant Harm thresholds into reconstruction permitting and financing; and sequencing reconstruction explicitly, with water contamination assessments preceding soil remediation, agricultural recovery following land clearance, and industrial reconstruction conditional on verified emissions monitoring.

Together, these measures would allow environmental safeguards already embedded in Ukrainian law to function effectively within reconstruction governance.



Any peace settlement that does not incorporate this full scope of harm into its reparations and accountability architecture risks producing a framework that accurately values infrastructure while dramatically undervaluing the human cost of what Russia's invasion has done to Ukrainian society and to Ukraine's relationship with its land.

5.2 Recommendations: Human Dimensions of Reconstruction

Accountability and Peace Negotiations

The psychological, social, and community harm documented in this report should be included in any formal assessment of Russia's accountability for damages, alongside the physical and environmental damage. Reparations frameworks that capture only infrastructure costs will substantially undervalue the full scope of harm. The evidence base assembled (environmental incidents, contamination data, psychological harm indicators etc.) should be systematically incorporated into accountability mechanisms including international legal proceedings, reparations negotiations, and any future war crimes or ecocide prosecutions.

Governance and Reconstruction Legitimacy

Mutual aid networks and community-level governance structures must be recognised as delivery partners in reconstruction, not temporary wartime arrangements. Local prioritisation processes must be built into reconstruction programme design from the outset as genuine co-design processes that devolve real decision-making authority to affected communities. Reconstruction financing and contract design should include transparent local procurement targets, accessible grievance channels, and investment decisions communicated through trusted community networks.

Psychological Recovery

Psychological safety must be treated as a precondition for reconstruction, not a welfare add-on. School-based psychosocial programmes, community mental health support, and accessible counselling services should be funded and operational before major infrastructure rebuilding begins. Specialist demobilisation pathways for drone operators, air-defence crews, and frontline repair teams must be developed in advance of any post-conflict transition. Generic veteran services are insufficient for individuals carrying moral injury and perpetration stress.

- Environmental remediation capacity should be explicitly funded as part of accountability and justice frameworks, not only as technical reconstruction requirements. The ability to document ongoing harm is itself a component of accountability.