

# Summary of key findings on the Environmental Impact of the conflict in Ukraine – Preliminary Report

---

Dr. Andrea Hinwood  
Chief Scientist, United Nations Environment Programme

13 December 2022

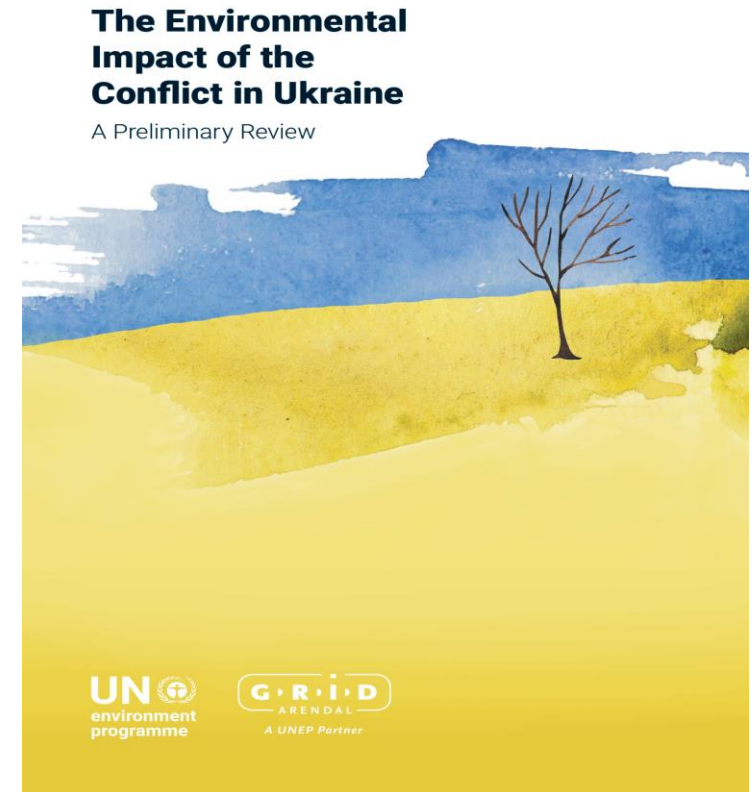
---

# Background

- UNEP is mandated to assist countries upon request, with pollution mitigation and control in areas affected by armed conflict or terrorism.
- Relevant UNEA Resolutions
  - UNEA resolutions 2/15. 2016.
    - Protection of the environment in areas affected by armed conflict
  - UNEA Resolution 3/1. 2017
    - Pollution mitigation and control in areas affected by armed conflict or terrorism
    - Work with national authorities & IOs in early identification of conflict pollution
    - Undertake field-based and post-crisis environmental assessment and recovery
- The review was undertaken in response to a request by the Government of Ukraine.

# Purpose and scope

- To aid preparations to assist Ukraine in its recovery and inform and prepare for a comprehensive post-conflict environmental impact assessment.
- The report presents a snapshot and preliminary review (Feb to June 30 2022) – of the damage to Ukraine's environment and the potential environmental and public health impacts, informing priorities for subsequent impact assessment work.



# Approach

The report consists of two part:

- I) A **rapid literature review** of official and peer-reviewed literature on the environmental impact of **past armed conflicts and war over the last thirty years**.
- II) Review of **current issues** and **incidents** of the current conflict organised around reported damage and risks of adverse impacts on the environment and human health.

## Source materials and indicative information used to develop the report

- International and Ukrainian sources, of the current environmental issues and their governance and management in Ukraine (existing environmental information prior to February 2022),
- Reviews of official or peer-reviewed documentation on environmental and related human health impacts from selected past conflicts with some similar characteristics and issues with the current conflict in Ukraine (e.g. Chechnya, Gaza, Iraq, Syria, eastern Ukraine and Yemen).
- Information from the Government of Ukraine and limited remote sensing information.
- Non-verified reports from citizen scientists, social media posts and regular media to help frame issues that may be encountered and hence the approach and assessment required.

# Key Findings – Damage, Risks and Impacts

- **Chemical Industry and Infrastructure**

Chemicals industry accounts for 3% of national GDP.

Ukraine biggest pesticide consumer in world [FAO]

Close proximity of chemicals plants & urban areas

Large industrial cities have highest density of chemicals industry.

In 2021, more than 600 industrial facilities stored or processed more than 200,000 tons of toxic chemical

Lack of technologies + capacity to treat/ dispose of obsolete pesticides or other toxic chemicals

- 7 confirmed incidents of release of toxic industrial chemicals (TICs) [Ukraine State Environmental Inspectorate]
- Release of ammonia, acid, smoke, use of depleted uranium.

# Key Findings – Damage, Risks and Impacts

- Fuel and Fuel Infrastructure
  - Significant damage expected from release of fuels and oils, impacts on soil, water, and fires impacting air quality
  - 100,000 apartment blocks provided heating via centralized district heating systems. 80% of these systems heated by natural gas
- Urban and Critical Infrastructure
  - Buildings. Municipal infrastructure. Railways, airports damaged
  - Asbestos likely to be present in debris. Accounts for 60% of roofing materials
  - Water supply & waste water treatment facilities damaged
  - Lack of sanitation, clean water.
  - Displacement of people also impacting sanitation issues.

# Key Findings – Damage, Risks and Impacts

- **Waste and Waste infrastructure (including radioactive waste)**

Ukraine has weak solid waste management systems.

~450 million tons waste in 2020, 6 million tons household waste; 84-86% generated from mining, metallurgy, chemical and energy sectors.

High rate of disposal of waste in landfills – non-engineered open landfills, soil contamination, leachate.

Landfills overloaded prior to conflict.

>500,000 tons of hazardous waste generated in 2020

>400 tailings facilities in natural or artificial reservoirs containing over 6 billion tons of waste.

Number of complexes where radioactive waste processed, stored or landfilled

- **Several reported incidents of release of materials from tailings facilities**
- **Munitions associated with hazardous waste eg. TNT, RDX**
- **Scrap metal**
- **Building waste substantial**
- **Landfills both controlled and not controlled present significant risk to contamination of surrounding environs**
- **Extent of damage and impact on radioactive materials storage, landfills and processing unclear**

# Key Findings – Damage, Risks and Impacts

- **Agriculture**

Large Ploughed area in Ukraine,

Agriculture is Ukraine's biggest exporter. 9.3% of GDP.

No. 1 sunflower exporter; corn, wheat, barley.

- **Nature**

Ukraine has 49 national parks.

39 Ramsar sites (wetlands of international importance)

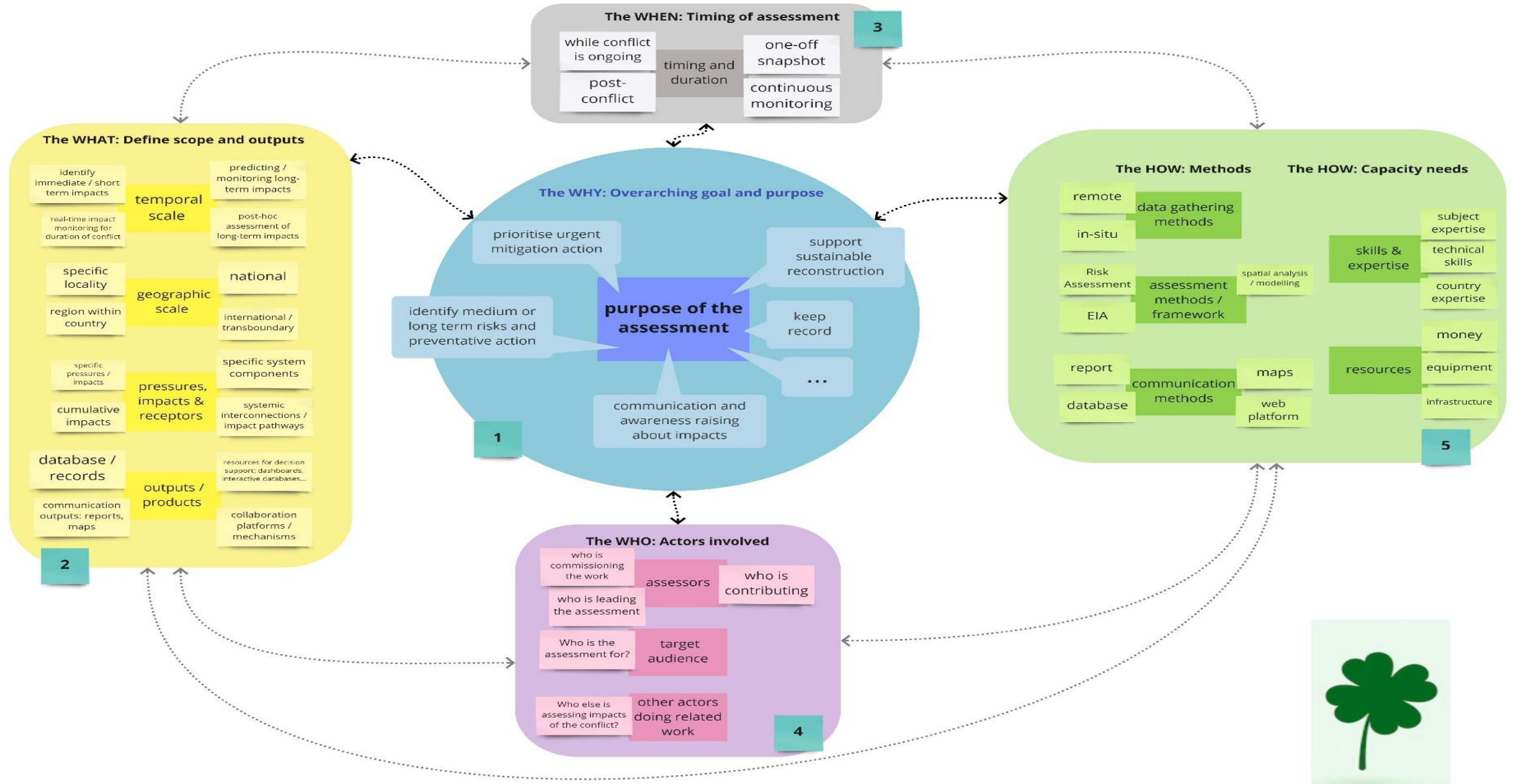
20% of natural conservation areas impacted

1 million hectares of protected areas impacted

- **Heavy shelling on black soils.**
- **Heavy metal, various chemical pollutants might affect agricultural lands in Kherson, Mykolaiv, Donetsk and Luhansk oblasts.**
- **Ammunition and chemicals residue.**
  
- **Impacts expected from damage to 3 marine drilling platforms in Black Sea. Unverified.**
- **3000 dolphins dead in Black Sea.**
- **Nearly a million (0.9) hectares of protected areas have been impacted**
- **Forest fires. Bee colonies lost.**



# Proposed Assessment Framework



# Concluding Remarks

- Ukraine is facing a compounded, multi-dimensional environmental crisis that has either exacerbated existing issues and/or added new ones.
- Multiple environmental issues to be assessed in the same locations.
- Complex assessment at local and regional scale.
- Long term legacy issues such as contaminated land and water and subsequent exposure pathways need careful consideration.
- Range of tools will be required.
- Some preliminary methods compiled and risk matrices developed to enable planning.

# Example of Risk Matrix

Pressures caused by military conflicts			Environmental Impacts				Knock-on consequences for human health			Comments
Confirmed episodes of pressure occurring	frequency / repetitiveness of events causing this pressure		Impacts / consequences for the natural environment (flora, fauna, ecosystems)		Impacts / consequences for the built environment (infrastructure) and agriculture			Number of people affected	Severity of impact	
			Severity / Extent of impact	Permanence of impact (duration of recovery)	Severity / Extent of impact	Permanence of impact (duration of recovery)				
Appearance of thousands of tons of scrap metal including military waste	Over 80.000 tons of military and other scrap metal (including destroyed bridges, vehicles and railways) – all around the country.	events causing this pressure are happening daily (use of weapons, resulting in ammunition and munitions waste)	Soil, surface and groundwater contamination by toxic chemicals			agricultural soils and water likely to be affected,	exact durations variable, depending on toxin and concentrations impact is cumulative / additive bioaccumulation is risk			
			physical obstruction and hazard			decrease in rivers' passability (in case of destruction of bridges)				

<p><b>Damage to urban water sector</b></p> <ul style="list-style-type: none"> <li>• Damage of the major water supply pipeline in Mykolaiv;</li> <li>• Damage the 3rd lift of the water pipeline of the Seversky Donets - Donbass canal with artillery;</li> <li>• Damage of the water supply in Chernigiv;</li> <li>• Damage of the Zaporizhye city wastewater treatment station (Vasilivka);</li> <li>• Damage of Severodonetsk city wastewater treatment station;</li> <li>• Damage of the wastewater treatment plants in Popasna in Donetsk oblast, Lisichansk and Rubizhne;</li> <li>• Damage of wastewater treatment plant in Druzhkovka and Velyko-Anadolska filtration station.</li> </ul>	<p>Contamination of drinking water supplies; untreated sewage and sludge leaks; contamination of surface and groundwater</p>	<p>High</p>	<p>Discharge of pollutants (e.g. chlorine and heavy metals) into bodies of water; surface and groundwater contamination; nutrient overload of aquatic ecosystems, leading to harmful algal blooms, eutrophication, and dead (anoxic) zones</p>	<p>Outbreaks of waterborne diseases (e.g. diarrhea and cholera) due to drinking water contamination or the use of unsafe water sources;</p> <p>dehydration, malnutrition and gastrointestinal diseases</p> <p>Chemicals contamination of drinking water sources</p>
---	--	-------------	--	---