

Environmental consequences of Russian war in Ukraine

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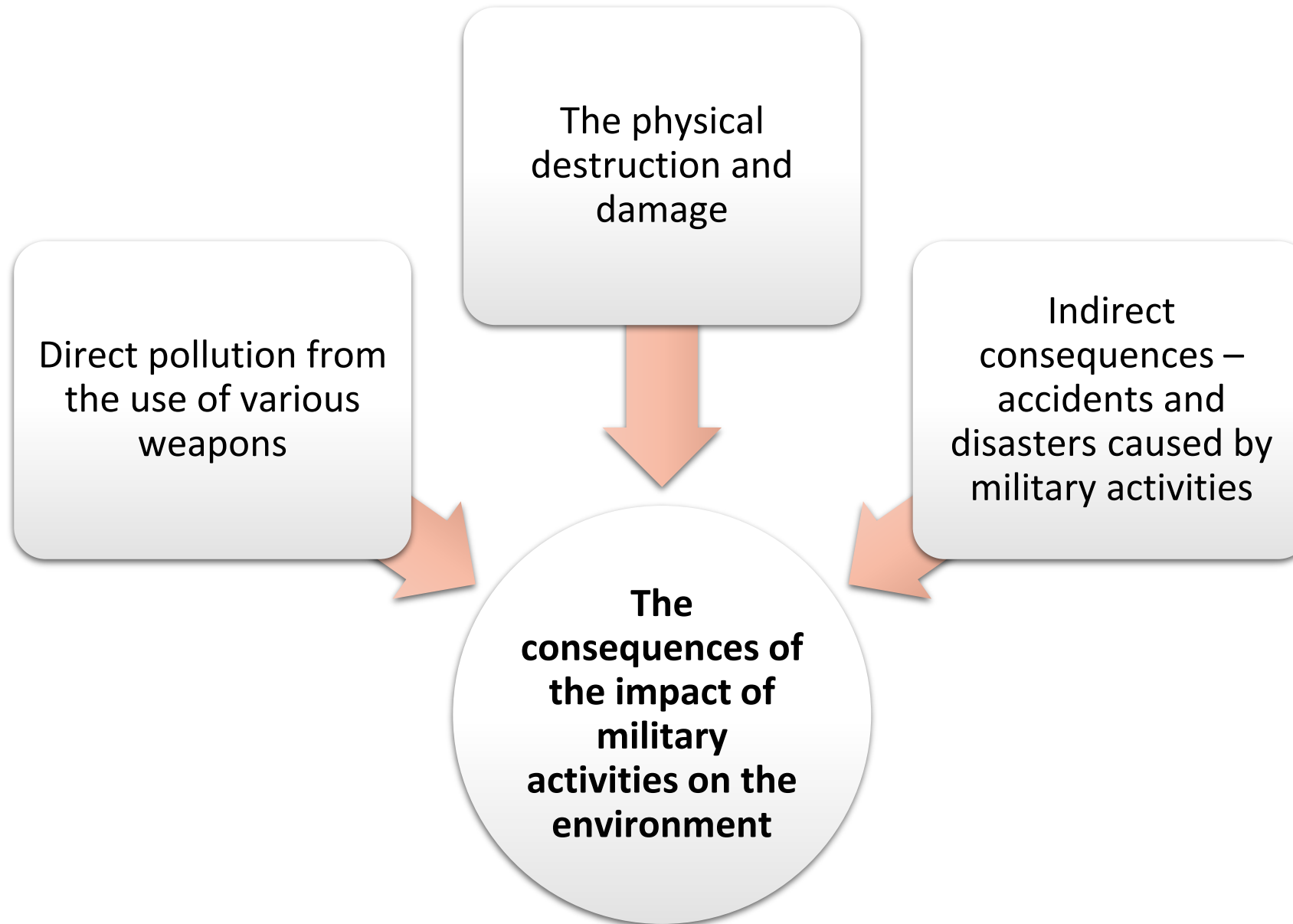


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Direct pollution from the use of various weapons



According to the Ministry of Defense of Ukraine, on the most active days Russia have **fired 40–60 thousand shells** of various types at the positions of the Ukrainian troops and about **5 thousand shells** of various types have been released in response.

A "cocktail" of various chemical compounds enters the environment as a result of the use of weapons:

→ **Ammunition and shells:**

- ◆ the armor-piercing part is made of **depleted uranium**;
- ◆ the toxic content of the percussion and blasting capsules, ($\text{Hg}(\text{ONC})_2$, Sb_2S_3 , KClO_3 , $\text{Pb}(\text{N}_3)_2$, $\text{C}_6\text{H}(\text{NO}_2)_3\text{O}_2\text{Pb}$, Pb , etc.),
- ◆ other additional chemical substances (tin and its compounds, bismuth and its compounds, strontium nitrate ($\text{Sr}(\text{NO}_3)_2$), magnesium powder, and many others).

→ **The missiles:**

- ◆ fragments of the rocket shell;
- ◆ explosives;
- ◆ remains of rocket fuel;
- ◆ the products of the combustion of electronics.



Direct pollution from the use of various weapons



- **Ammunition with white phosphorus** – white phosphorus combustion products poison the environment.
- **Destroyed/abandoned equipment** – a source of compounds of iron and other metals, fuel and lubricants and other pollutants.



Environmental devastation caused by physical impact



- **Destruction/damage of ecosystems** caused by combat activities – physical destruction, burning by fires, etc;
- **Mechanical disruption of the ground surface** as the result of explosions, moving equipment and construction trenches.;
- **Destruction/damage of hydrotechnical structures** - dams, canals, water supply. Flooding of large areas, disruption of the process of water supply to low-water areas, etc.
- **Destruction and burning of buildings, enterprises and industrial facilities:**
 - ◆ emissions and discharges of pollutants as a result of damage to storage and transportation tanks (ammonia emissions as a result of damage to the “Tolyatti-Odesa” ammonia pipeline; massive emissions of nitric acid, ammonia as a result of damage to storage tanks);
 - ◆ pollution of the environment by oil products and/or products of their combustion;
 - ◆ emissions from burning electrical equipment at enterprises (polychlorinated biphenyls (PCBs), dioxins, etc.)
- **Destruction of housing stock** – formation of a large amount of waste, leaks from communication networks (water supply, drainage, gas supply), population migration.

Indirect consequences caused by combat activities



→ Disruption of the sewage treatment plants:

- ◆ physical destruction of sewage treatment plants, sewage systems, filtration fields, etc.;
- ◆ damage to the electrical network;
- ◆ problems with supplies of reagents;
- ◆ shortage of specialists.

→ Damage to the energy infrastructure can lead to various consequences, for example:

- ◆ **About 4 million chickens died** at the poultry farm in the village of Chornobayivka due to a problem with energy supply;
- ◆ An increase of the air emissions caused by the use of gasoline and diesel generators of various capacities;
- ◆ Increased emissions from burning wood and pellets in solid fuel boilers, which are the choice for home heating.

Indirect consequences caused by combat activities



- **Internal migration** leads to the depopulation of certain areas and excessive population concentration of others. Due to the displacement of such a large number of people, additional burden incurs on the cities that host them. It includes an increase of water supply and pressure on drainage systems, increasing volume of household waste, etc. According to the estimates of international organizations, a real number of Ukrainians who have moved to safer territories of Ukraine may reach **8 million people**.
- Due to the lack of control, **abandoned pets**, primarily dogs can run wild and stray into packs.
- Environmental **pollution with garbage** from destroyed / damaged buildings and other objects.

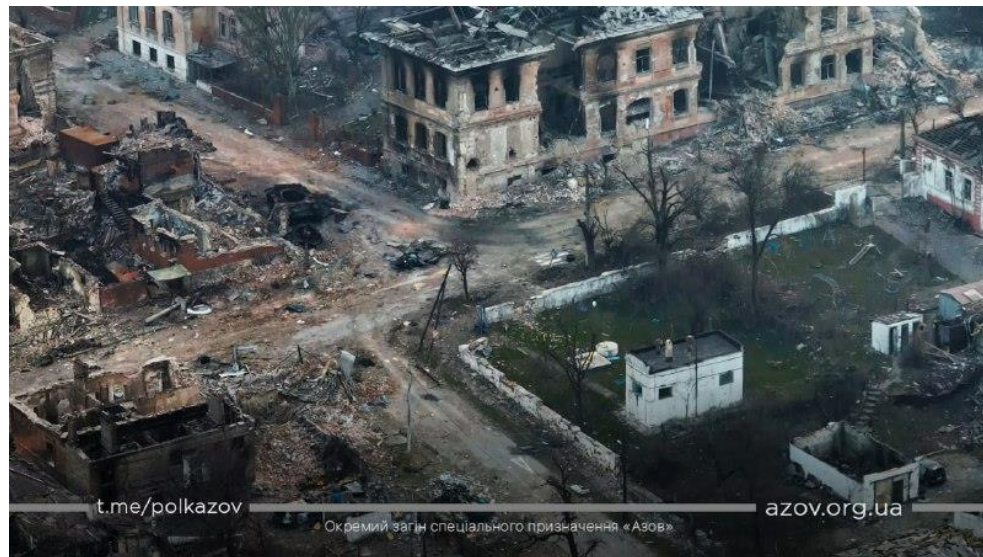
The impact of military activities on human settlements

- **Total physical destruction** of buildings, structures, critical infrastructure.
- **Contamination of the territory** with industrial and household waste, sewage, etc.
- **A humanitarian disaster** for the residents.
- **Increasing the risk** of spreading infections.

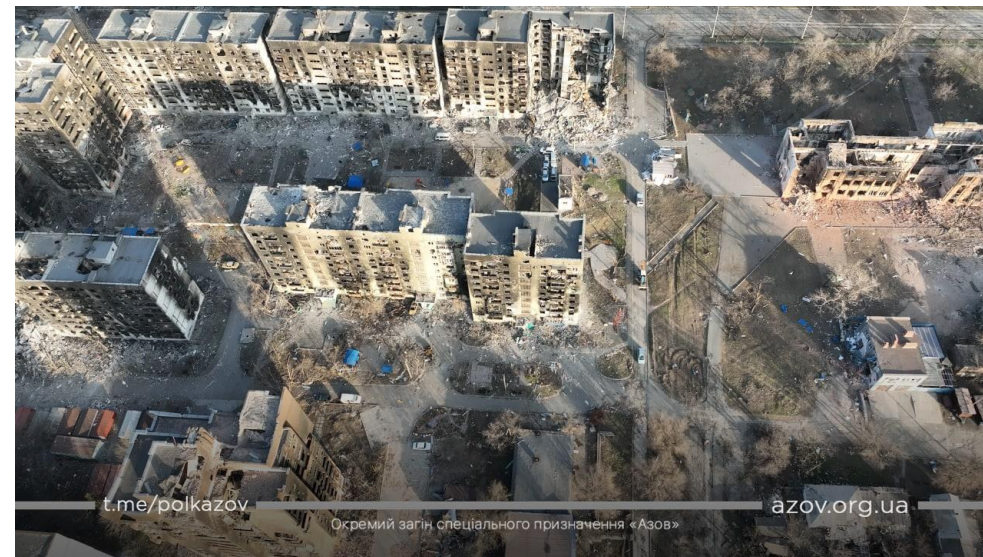


Photo of the destroyed city of Mariupol

Source: <http://surl.li/fpgol>



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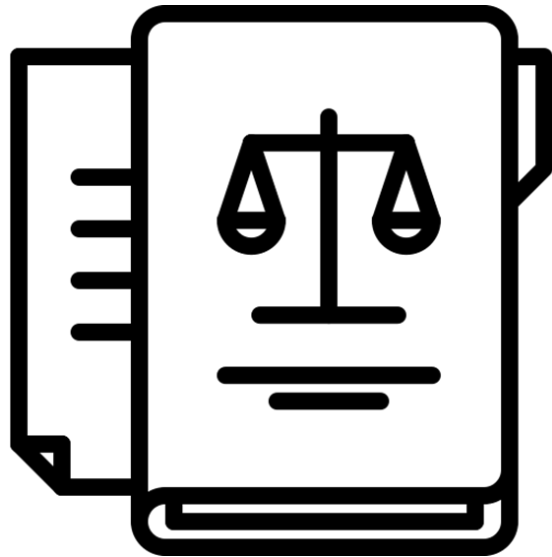
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Photos of the destroyed city
of Mariupol

Environmental damage in the history of wars and the mechanisms of international reparations



Even in the most ancient times, people saw and understood/realised the devastating consequences of warfare.

The first mentions of establishing certain environmental aspects of warfare - In Deuteronomy the Bible.

Nowadays, there are international legal norms for warfare means and rules, which should be strictly observed by the parties of the conflict.

One of the most famous examples of environmental disaster caused by war is **the Second Indochina War (1961-1975):**

- approximately 30% of the territory of South Vietnam was affected;
- about 80% of the mangrove forests were affected, and almost completely died;
- more than 60% of the trees died;
- a totally “burnt” territory is estimated at about 1.6 million hectares.

Environmental damage in the history of wars and the mechanisms of international reparations



In 1991, the **United Nations Compensation Commission (UNCC)** was established as a subsidiary organ of the United Nations Security Council to process claims and pay compensation for loss and damage suffered as a result of Iraq's unlawful invasion and occupation of Kuwait in 1990–1991.

The first official case of the international community addressing the **claims for compensation for environmental damage** in the post-war period - Kuwait's claims against Iraq arising out of **the Persian Gulf War (1990–1991)**.

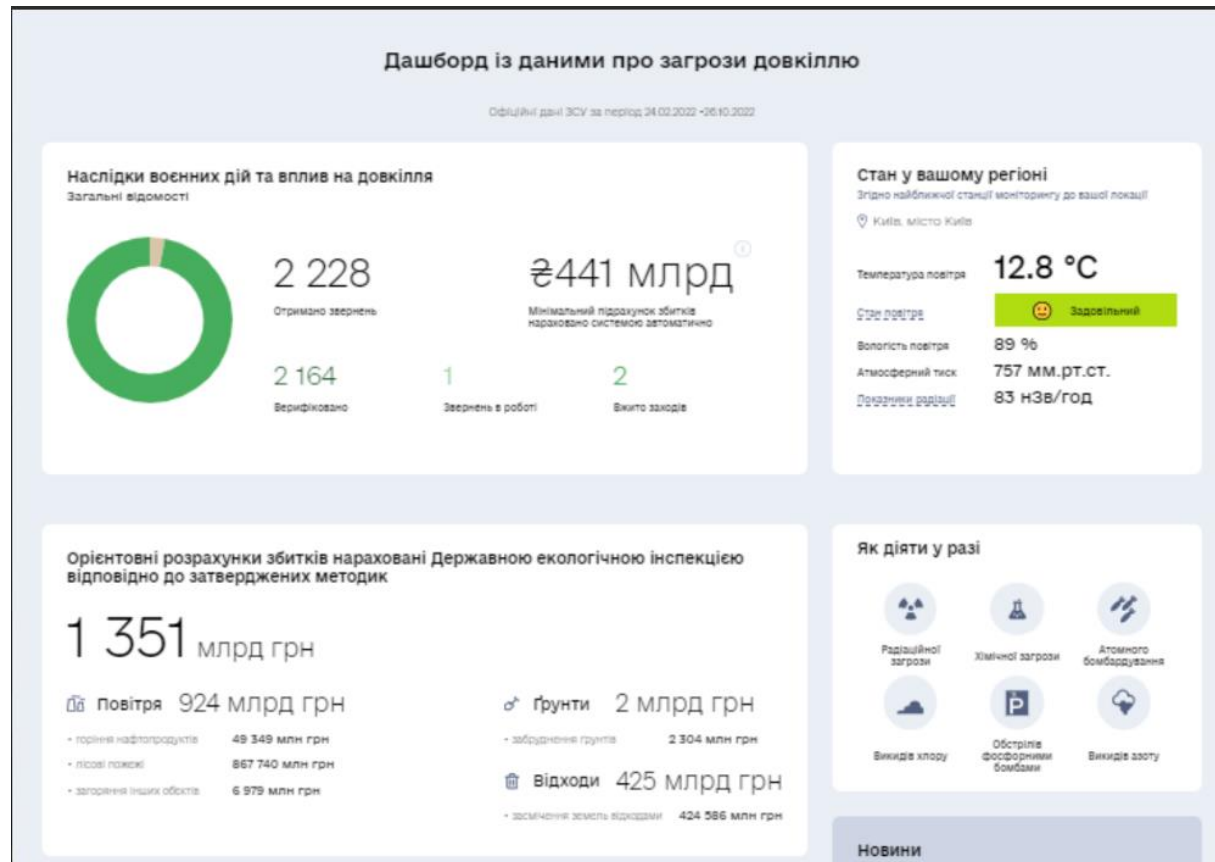
Iraq's aggression was accompanied by significant damage to the environment of Kuwait and the surrounding area:

- about 10.8 million barrels of oil were deliberately spilled in the Persian Gulf by the Iraqi military;
- 600km of the Saudi Arabian coastline was polluted;
- about 1 billion barrels of oil spilled due to the Iraqi military blowing up about 600 oil wells, resulting in the contamination of groundwater and desert ecosystems;
- damage was caused by the construction of military structures, fortifications, trenches, bunkers, etc.

Legal ways of determining and calculating the damage



Informing citizens about the consequences of Russian aggression for the Ukrainian environment

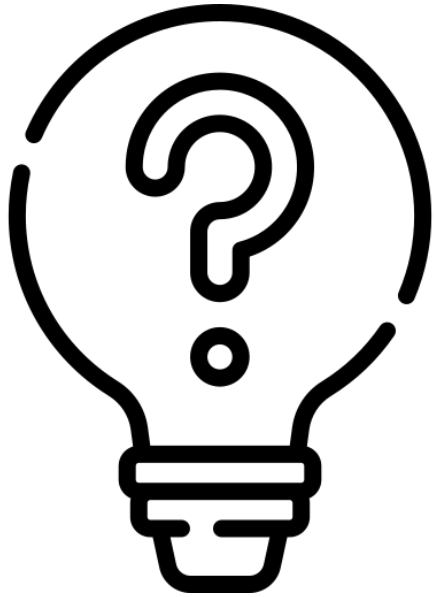


Information about the consequences of Russian aggression for the Ukrainian environment is regularly published in various formats (data panels, digests, infographics, etc.) and with the help of various resources (official pages of government bodies, social networks).

Operational information - makes it possible to support the activity of Ukrainian citizens, as well as citizens of other countries, in this info field.

EcoZagroza site page: dashboard with data on environmental threats

Post-war recovery of Ukraine

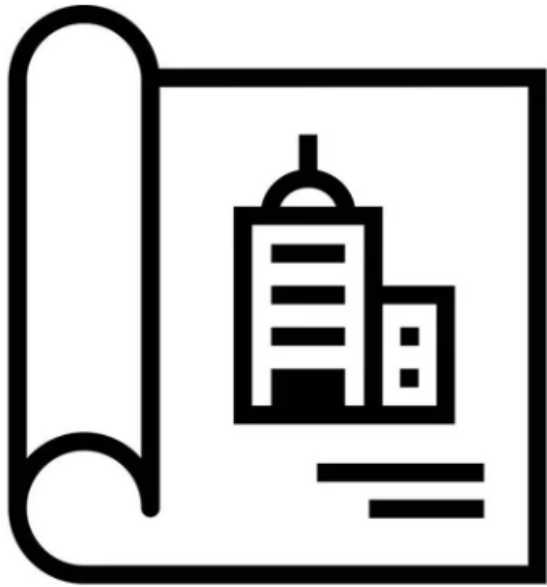


Environment. Comprehensive assessment of the state of the environment after the end of the war. Development of plans of restorations the natural state of damaged territories. Decontamination of contaminated soils.

Economy. Deconstruction of the remains of the post-Soviet industry. Search for a new economic model for Ukraine. Development of new directions according to the model of the post-industrial economy.

Energy. Modernisation of the energy system taking into account the lessons of the war. Decentralisation of community energy supply based on renewable energy sources. Wide discussion concerning role of nuclear and coal energy in future energy production system of Ukraine.

Post-war recovery of Ukraine



Urban development. A characteristic feature of this war is the massive destruction of urban, as well as energy and industrial infrastructure. A significant number of Ukrainian cities will require partial, and in some cases, almost complete reconstruction.

Principles of modern urbanism should be laid down in the plans of cities reconstruction.

The new conditions of existence of Ukraine require that all strategic documents, including general plans for the development of cities, be created and adjusted taking into account possible military actions and the need to create maximum security for citizens.

Mandatory presence of bomb shelters in new buildings and the construction of places that could protect against rocket attacks and bombings in crowded places (public transport stops, etc.).

The construction of new enterprises and the restoration of damaged and destroyed ones must take into account the danger Location of industrial facilities, the production cycle of which includes hazardous substances or leads to the formation of hazardous waste, within the city limits or near them.

Environmental monitoring should take on the additional function of determining dangerous substances in air, water, soil and radiation as a result of military operations and become a component of civil defense.

Global militarization



The war consequences will affect not only Ukraine. The biggest war in Europe since the Second World War has already become the cause of **global militarization**. Further, these trends will only intensify. This means an additional environmental burden on the entire planet and a weakening of priorities of environmental goals for a significant number of countries – a serious challenge for all humanity under the conditions of the existing climate and some other global problems for the biosphere.



**Зелений світ
Друзі Землі**



**ЧИСТЕ ПОВІТРЯ
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Thank you for attention!

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