

The Right to a Clean and Healthy Environment in the European Human Rights System: The Impact of the Russia-Ukraine War (Part II)

**Chiara Innocenti, Elisabedi Koridze, Jasmin Kaur
Rajwant, Megan Howlett-Farmer, Giulia Villa, Phathisani
Sibanda, Uliana Kalinina, Zurab Kochladze**

Europe Team – 19.09.2025



Photo source: A tank that is sitting in the grass © Mykhailo Volkov / Unsplash, 2022.



Riviermarkt 5, 2513 AM The Hague, Netherlands



+ 31 62 72 41006



info@ghrd.org



<https://www.ghrd.org>

CONTENTS

INTRODUCTION	7
3. THE UKRAINE WAR: A CASE STUDY OF ENVIRONMENTAL DESTRUCTION AND LEGAL GAPS	8
3.1 Nature Under Siege: Environmental Destruction During the War	8
3.1.1 <i>Systematic Attacks on Infrastructure</i>	8
3.1.2 <i>Air, Water, Soil Pollution</i>	9
3.1.2.1 Air Pollution	9
3.1.2.2 Water Pollution	10
3.1.2.3 Land Pollution	11
3.1.3 <i>Damage to biodiversity</i>	11
3.2 The Climate Cost of War	13
3.2.1 <i>Destruction of renewable energy capacity</i>	21
3.3 Human Rights at Risk in an ecologically collapsing environment	22
3.3.1 <i>The right to Life and Health is endangered by environmental degradation</i>	22
3.3.2 <i>Environmental injustice: impact on displaced populations, rural communities, and minorities</i>	25
3.3.3 <i>Intersection with the right to a safe, clean, healthy, and sustainable environment</i>	27
3.4 Accountability Mechanisms: Failure and Legal Fragmentation	29
3.4.1 <i>Russia's withdrawal from the Council of Europe (2022)</i>	29
3.4.2 <i>International Humanitarian Law: Partial and Insufficient Protection</i>	31
3.4.3 <i>Movement for Recognition of Ecocide</i>	33
3.4.4 <i>Lack of Enforceable International Environmental Rights</i>	34
CONCLUSION	36

Abbreviations	Full terms
ANA	All Nippon Airways
API	Additional Protocol I
CH ₄	Methane
CO	Carbon monoxide
CO ₂	Carbon dioxide
CoE	Council of Europe
DALYs	Disability-adjusted life years
ECHR	European Convention on Human Rights
ECtHR	European Court of Human Rights
EU	European Union
GBD	Global Burden of Disease
GDP	Gross Domestic Product
GHG	Greenhouse Gas
HONO	Nitrous Acid
IAC	International Armed Conflict
IACtHR	The Inter-American Court of Human Rights
IAEA	International Atomic Energy Agency
ICRC	International Committee of the Red Cross
ICESCR	International Covenant on Economic, Social and Cultural Rights
ICJ	International Court of Justice
ICJPR	International Covenant on Civil and Political Rights
ICL	International Criminal Law

ICRC	International Committee of the Red Cross
ICC	International Criminal Court
ICCPR	International Covenant on Civil and Political Rights
IDP	Internally displaced people
IHL	International Humanitarian Law
IOM	International Organisation for Migration
LNG	Liquefied natural gas
NIAC	Non-international Armed Conflict
NIR	National Inventory Report
NO	Nitrogen Oxide
OECD	The Organisation for Economic Co-operation and Development
PACE	The Parliamentary Assembly of the Council of Europe
PM	Particular matter
SF ₆	Sulfur hexafluoride
UK	The United Kingdom
UNDP	United Nations Development Programme
UNEP	The United Nations Environment Programme
UNGA	United Nations General Assembly
UNHCR	United Nations High Commissioner for Refugees
UNFCCC	United Nations Framework Convention on Climate Change
UN	United Nations
US	The United States

WUR	Wageningen University & Research
WWF	World Wildlife Fund

INTRODUCTION

The ongoing international armed conflict between Ukraine and Russia and its effects on the environment and people show how important it is for the international community to recognise the right to a healthy environment. During the armed conflict, whether intentionally or accidentally, the environment gets damaged, and people living in those environments have to either leave their homes or live in an unhealthy and unsafe environment, which also damages their health and well-being.

The first part of this report discusses the European human rights system and its approach to the right to a clean and healthy environment. In the first part, the authors discuss the history of environmental protection under the ECHR, relevant articles, and case law from the ECtHR, where the Court has found violations under Article 2 (the right to life) when human life was under direct threat and under Article 8 (the right to respect for private and family life) when pollution and other environmental disturbances affected individuals' well-being and home life. The first part of the report also talks about the global and comparative perspectives.

The first part concludes that there is a need to recognise the right to a healthy environment as a distinct human right, so the ECtHR has the legal clarity to issue binding judgments that can actually cause state compliance. Also, by recognising this right, the understanding of what it means to live a life of dignity and freedom can change. The first part gives some crucial insights on the right to a healthy environment in international and national legal systems beyond Europe.

The second part of the report will initially focus on the war in Ukraine and its impact on the environment, specifically examining how air, water, and land pollution harm biodiversity. Moreover, it is interesting to delve deeper into human rights in an ecologically collapsing environment, and the legal gaps, more specifically, the lack of accountability mechanisms. Finally, the report also suggests policy recommendations, how to strengthen the existing legal mechanisms, what role civil society can play in this regard, and what the necessary steps are towards the codification of the right to a healthy and safe environment.

3. THE UKRAINE WAR: A CASE STUDY OF ENVIRONMENTAL DESTRUCTION AND LEGAL GAPS

3.1 Nature Under Siege: Environmental Destruction During the War

3.1.1 Systematic Attacks on Infrastructure

Attack on infrastructure is one of the most common tactics used during warfare. These assaults are sometimes perceived as less severe due to the absence of direct harm to civilians. Nevertheless, targeting the civil infrastructure can still cause significant suffering among non-combatant citizens (Peace Research Institute Frankfurt, n.d.). One example of this is the destruction of the Kakhova dam, which is sometimes referred to as an act of ecocide (Martsynkevych, 2023). According to the New York Times, the evidence suggests that on June 6th, 2023, the Russian forces blew it up (Glanz et al., 2023).

In the early days of the catastrophe, the destruction caused the flooding of approximately 620 square kilometres of land, impacting around 110,000 people (UNOSAT, 2025). As expected, there were major humanitarian and environmental consequences. For instance, many civilians in southern Ukraine died, although the exact number remains uncertain. According to an Associated Press investigation, the Russian side was hindering the process of issuing death certificates to decrease the official number of casualties (Samya Kullab & Novikov, 2023). In the same investigation, it is reported that only in Oleshky, a town occupied by Russia, the number can be as high as 300.

On the other hand, the catastrophic environmental consequences can pose a long-term threat to Ukrainians. There is a risk of toxic heavy metals such as lead, cadmium and nickel, spreading over time (Niranjan, 2025). When the water in the reservoir drained, less than one percent of these toxic pollutants were immediately released into the environment. Meanwhile, the remaining amount is trapped beneath the soil and will be gradually released over time due to soil erosion caused by rainfall. Therefore, there is a possibility that these metals may slowly leach into nearby rivers, which are used by local communities during municipal water shortages. As Oleksandra Shumilova, the lead author of the study investigating this phenomenon, explained to the Guardian:

All these pollutants that were deposited on the bottom can accumulate in different organisms, pass through the food web, and spread from vegetation to animals to humans...its consequences can be compared to the effects of radiation (Niranjan, 2025).

Furthermore, four already recognised and one nominated Emerald Network sites were flooded (Conflict and Environment Observatory, 2023). These sites represent areas of special conservation interest by the Bern Convention, an international treaty aimed at preserving nature (Council of Europe, n.d.). Additionally, the disaster can disrupt agricultural production in the southern parts of Ukraine due to drier soil and degraded vegetation (Conflict and Environment Observatory, 2023).

Moreover, the largest nuclear power plant in Europe, Zaporizhzhia Nuclear Power Plant, has also been affected by the destruction of a dam. The power station relied on the Kakhovka Reservoir for water, generally used for cooling nuclear stations (World Nuclear Association, 2020; Maksym Sushchuk, 2024). Although the nuclear station is now using water from other sources, the situation still requires monitoring. Throughout the conflict, the safety of nuclear power plants in Ukraine has been a widely discussed topic. For example, the United Nations' International Atomic Energy Agency (IAEA) raised concerns regarding the Zaporizhzhia Plant. While there were no direct attacks on the power plant itself, frequent explosions could be heard around its territory. Moreover, the media also reported drone attacks and fighting in the area.

The chemical industry is already known as one of the most polluting industries (Rovira, Nadal, Schuhmacher & Domingo, 2021). Meanwhile, during the war in Ukraine, several of them were damaged, leading to serious environmental hazards. In Sumy, the fertiliser producing Sumykhimprom facility has been shelled by Russian forces, leading to the leak of ammonia into the air (The Guardian, 2022). This gas is highly toxic, and inhaling high levels of it can lead to death. For this reason, local residents were told to avoid exposure and seek refuge in their basements. In addition, there were two instances of nitric acid leaks documented in the Luhansk region (Ratushna, 2022). Its vapour is also dangerous and can lead to eyesight loss.

3.1.2 Air, Water, Soil Pollution

3.1.2.1 Air Pollution

Ukraine already struggled with poor air quality even before the Russian invasion (Belis C et al., 2025). For example, the EU's Joint Research Centre's report relying on the Global Burden of Disease (GBD) database states that: "in 2019, 42,900 premature deaths and 953,500 disability-adjusted life years (DALYs) in Ukraine were related to air pollution, which corresponds to about 10% of all cases of morbidity and mortality". Moreover, the report explained that the entire population of Ukraine is exposed to unhealthy levels of 2.5 particulate matter (PM) concentrations in the air. This can increase the risk of various health conditions, such as heart disease, asthma, and low birth weight (New York State Department of Health, n.d.).

The precise impact of war on air quality can be difficult to determine due to the lack of available measurement data (Mykhailo Savenets, Volodymyr Osadchyi, Komisar, Zhemera, & Andrii Oreshchenko, 2023). However, several studies have tried to estimate the effects. In a study carried out by Rasa Zalakeviciute and her colleagues, the authors found that reduced anthropogenic activities at the beginning of the war caused a decrease in air pollution (Zalakeviciute et al., 2022). Nevertheless, they also mentioned how during the third to sixth weeks of the war, the level of PM_{2.5} rose around Kyiv. The authors associated this increase with the attempts of the Russian forces to take over Kyiv when they intensified the hostilities.

Another study indicated the Russian invasion of Ukraine has worsened the air quality in other European cities close to Ukraine as well (Meng et al., 2023). For example, in the cities near the battlefields, there was an average increase of 9.78 percent in PM2.5, 10.07 percent in nitrogen dioxide, and 7.93 percent in ozone. A different yet to be peer-reviewed research article also highlighted that the impact of war varied across the regions. However, concentrations of dust, nitrogen dioxide and carbon monoxide increased in the city of Sloviansk, which is 20-30 kilometres away from the front line. Worsened air quality was directly linked to military actions (Malytska, Galytska, Savenets, Ladstätter-Weissenmayer, & Krajčovičová, 2025).

3.1.2.2 Water Pollution

Water scarcity and pollution in Ukraine are another result of the invasion. In 2022, the United Nations reported that 1.4 million people in eastern Ukraine were left without access to safe water; in addition, 4.6 million people had access to only a limited amount (Shumilova et al., 2023). Furthermore, it was estimated that between March and December 2022, 16 million people in the entire country would require water, sanitation, and hygiene assistance (Shumilova et al., 2023). The lack of water can directly cause the widespread of different diseases. For example, in May 2022, the World Health Organisation warned about a possible cholera outbreak in Mariupol due to damage to water infrastructure, which led to the mixing of sewage and drinking water (Shumilova et al., 2023).

Even prior to the complete invasion of Russia, in the war-torn separatist region, Donbas, the Komyshevakha river was highly contaminated, colouring it orange (Ptak, 2021). Due to the conflict, many mines were abandoned, leading to the release of toxic water from mines into rivers and groundwater. These mine waters contain heavy metals, sulfates, chlorides, and even radioactive materials. The French journalist, Guillaume Ptak, documented a case of 82-year-old pensioner Lyudmila Ivanovna Tarasova, who in the past was using water from Komyshevakha for her garden, but cannot do it anymore due to contamination.

The Ukrainian government also accused Russia of intentionally discharging organic waste in the Sychov River that flows northeast of Kyiv (Follorou, 2024). This act severely impacted the river ecosystem, resulting in widespread fish die-offs and significant changes to the chemical composition of the water. For example, concentrations of ammonium nitrogen and manganese in the river exceeded safety levels. Crucially, if not for the actions of the Ukrainian authorities, the contamination of the river could have affected the inhabitants of Kyiv through drinking water. The Sychov River connects with the Dnipro River, which is the main source of drinking water for the capital. Furthermore, it is reported that Russian forces damaged the reservoirs with organic fertilisers in the Ternopil region, polluting the Ikva River (Ratushna, 2022).

Finally, it is projected that Ukraine will face water security risks due to climate change (Snizhko, Didovets & Bronstert, 2024). Therefore, the current war might be hindering the opportunity for the country to adapt to more climate-resilient water management.

3.1.2.3 Land Pollution

Ukraine is commonly referred to as one of the world's breadbaskets due to its high exports in grain (Knox, 2022). This strong agricultural potential is attributed to its highly fertile soil called chernozem (black soil) (Knox, 2022). Nevertheless, war not only impacted the water system essential for irrigation, but also directly contaminated soil (Belis C et al., 2025). According to Ukraine's Institute for Soil Science and Agrochemistry Research, more than ten million hectares of agricultural land across the country have been degraded due to war (Belis C et al., 2025). Moreover, a Wageningen University & Research (WUR) study estimates that restoring the soils affected by the war will cost at least 20 billion dollars (Wageningen university & research, n.d.). As explained by Serhii Sydorenko, WUR researcher:

War has different kinds of impact on soils...The impact can be mechanical, like soil compression by heavy military equipment or the formation of trenches and craters. It can also be chemical, such as the contamination of soil with heavy metals and rocket fuel. (Wageningen university & research, n.d.)

For example, in the EU's Joint Research Centre report, it is stated that potentially toxic elements, such as lead, mercury, and arsenic, were released into the Ukrainian soil due to the use of explosives and ammunition (Belis C et al., 2025). These, predictably, can have a serious negative impact on public health due to the possibility of these toxic substances entering the food chain (Belis C et al., 2025). Additionally, it is already confirmed that many farmers have experienced economic loss due to hindered agricultural production caused by the war (Belis C et al., 2025).

Another significant problem is unexploded ammunition buried deep in the ground (Wageningen university & research, n.d.). As a result, there are discussions of converting these lands into protected areas. The United Nations Development Programme estimates that 139,000 square kilometres of Ukrainian land could be mined; this area corresponds to the size of Greece's territory (UNDP, n.d.). Nevertheless, there are positive developments as well. For instance, 35,000 square kilometres of agricultural land have already been cleared. With this size of land, wheat necessary for 10.5 million tonnes of bread can be grown. This is important since the country plays an essential role in the world's food security (Bychkovska, 2024).

3.1.3 Damage to biodiversity

Due to Ukraine's favourable location, numerous migration routes and diverse natural zones can be found across the country, significantly contributing to its biodiversity (Secretariat of the Convention on Biological Diversity, n.d.). As explained on the website of Convention on Biological Diversity, its "Biota comprises over 70 thousand species, including many rare, relict and endemic...". Although the country occupies less than 6 percent of the European area, Ukraine possesses 35 percent of its biodiversity. Therefore, it can be said that the war in Ukraine significantly affects the biodiversity in Europe as well.

A study carried out by Roberto Cazzolla Gatti and his colleagues shows that from 2022 to 2023, Ukraine lost nearly 1,600 square kilometres of forest (EurekAlert!, 2025). The primary

cause of this deforestation is believed to be fire. Notably, the Russian troops have been accused of hindering the efforts to extinguish the flames. For example, the unique Kinburn Spit was affected. The site has its own distinctive microclimate and hosts over 500 species of plants, some of which are medicinal (Mykolaiv Hidden Treasures, n.d.). According to researchers, 20 to 30 percent of the Cape of Kinburn's area was destroyed due to fires, and is now occupied by the Russian forces (EurekAlert!, 2025). Sviati Hory National Nature Park in the Donetsk region was also destroyed by the Russian invasion (Kravchuk, 2024). These are just two cases of how the Russian invasion damaged important natural areas, but there are many more.

As anticipated, wildlife was directly affected by this. According to Olga Chevhanyuk, Chief Operating Officer of UAnimals, "More than 80 species of animals in our country are on the verge of extinction and may completely cease to exist due to Russian aggression", referring to animals such as steppe eagle, black stork, brown bear, Eurasian lynx, barn owl and eared hedgehog (Platt, 2023). On the other hand, according to Ostap Reshetylo, Associate Professor at Ivan Franko National University of Lviv and Project Manager at World Wildlife Fund (WWF)-Ukraine, some animals such as bears, wolves, lynx, deer, and elk are less directly affected by the war due to their mobility and adaptability skills (Minkina Kateryna, 2024). However, he also mentions that there are isolated incidents of some animals being killed by mines or tripwires.

Reshetylo shares insights about how European bison living in Ukraine are affected during war (Minkina Kateryna, 2024). For example, one of their habitats, Zalissia National Park, became an active frontline of the war, posing a significant risk for people and animals in that area due to mines and shelling. This had serious consequences for the bison as they lost the males in their population, meaning that the herd became infertile. Moreover, although in the Konotop forest there were no hostilities, the noise of war could still be heard by the bison, leading to stress among the herd, which also resulted in zero births.

Additionally, the conflict destroyed the nesting sites of approximately 100 bird species. Birds were also negatively affected by intense disturbance from explosions, flashes of light, the movement of heavy machinery, and the ongoing presence of military forces (Drapaliuk, Vasyliuk, & Kuzemko, 2024).

The marine environment has been damaged as well. For example, some scientists attributed the death of 2,500 dolphins, which were washed ashore on Tuzly Estuaries National Nature Park, to acoustic trauma from submarine sonar (Kvach, Stepien, Minicheva, & Tkachenko, 2025). In addition to noise pollution, there is chemical pollution, which destroys the marine ecosystem (Bechev, 2025). According to the estimates of Ukrainian authorities, the damage amounts to 14 billion dollars.

The pollution of the Black Sea with naval mines poses a significant challenge to the entire Black Sea region, not just Ukraine, as it negatively impacts maritime traffic (Bechev, 2025). For this reason, in January 2024, Türkiye, Romania, and Bulgaria developed and adopted a joint plan to remove floating sea mines.

In conclusion, the Russian invasion of Ukraine has seriously affected the country's environment, damaging its ecosystems via air, soil, water pollution, or just by changing its natural landscape.

3.2 The Climate Cost of War

Beyond its devastating impact on the natural landscape, the war in Ukraine is substantially accelerating global warming, thereby endangering human health. Armed conflicts intensify anthropogenic emissions, as military operations inherently produce far higher levels of greenhouse gases than those generated in times of peace. The urgent need to move beyond an anthropocentric interpretation of geopolitical events and to place environmental protection on an equal footing was underscored by United Nations Secretary-General António Guterres at the 27th Conference of the Parties to the UNFCCC (COP27) in Sharm el-Sheikh in November 2022, as follows:

[...] The war in Ukraine and other conflicts have caused so much bloodshed, violence, and dramatic impacts all over the world, but we cannot accept that our attention is not focused on climate change [...]; We should work together to support peace efforts and to prevent suffering, but climate change is on a different timeline, a different scale; it is the defining issue of our age; the central challenge of our century (United Nations, 2022).

With this statement, the Secretary-General emphasises that even in a world fractured by war, climate change, with its steadily rising temperatures, must remain a global top priority. It emerges here as a crisis outside of time; one that does not halt in the face of armed conflict, but is instead fueled by it, finding in war a fertile ground for further deterioration. Military activity, by nature and scale, contributes disproportionately to global greenhouse gas emissions, and is increasingly recognised as a significant non-negligible share. This environmental degradation deepens humanitarian crises by threatening access to vital resources, displacing entire populations, and compounding the vulnerabilities of the most fragile.

In this context, addressing climate change in Europe requires a comprehensive assessment of the environmental consequences of the Russian Federation's invasion of Ukraine. Since the outbreak of the war on February 24th, 2022, international attention has rightly centred on the humanitarian emergency, which has displaced over 3.7 million people. However, the conflict has also produced grave environmental damage. While the immediate toll on civilian and military lives is immense, the long-term consequences for the climate cannot be overlooked. More than three years into the conflict, mounting evidence suggests that, as in other wars, the environmental cost of the war in Ukraine is becoming a significant contributor to global warming (The Guardian, 2024).

The Initiative on GHG Accounting of War documented a clear causal link between armed conflict and greenhouse gas (GHG) emissions, bringing together climatologists to measure the environmental impact of military operations and war-related activities on the ground. The

severity of the assessment of environmental damage caused by Russia's War in Ukraine in the first seven months of the war prompted Volodymyr Zelensky and his delegates to declare that any effort to counter climate change would be in vain without an immediate ceasefire¹ (The Guardian, 2022). The assessment identified four major sources of pollution: the movement of war refugees and internally displaced peoples (IDPs), warfare-related emissions, the reconstruction of civilian infrastructure, and widespread uncontrolled fires.

Together, these factors accounted for a total of 100 million tonnes of GHG, an environmental burden equivalent to the amount of GHG released by The Netherlands over the same period (First Interim Assessment, 2022). Five months later, at the United Nations Framework Convention on Climate Change (UNFCCC) Climate Conference in Bonn, Germany, the Initiative released a second interim assessment, extending its analysis to 12 months of war and confirming 120 million tonnes of CO₂ emissions, comparable to the emissions generated by Belgium (Second Interim Assessment, 2023). The third and fourth interim assessments, which monitored GHG emissions over 18 and 24 months of warfare, respectively, brought the new totals to 150 (Third Interim Assessment, 2023) and 175 tonnes of CO₂ emissions (Fourth Interim Assessment, 2024).

According to the most comprehensive assessment to date, which covers the period from the beginning of the war to February 23rd, 2025, the environmental toll of the conflict has become increasingly evident (Preliminary Assessment, 2025). Beyond the devastating human cost –with thousands killed, injured, missing, or forcibly displaced– the war is also inflicting profound and lasting damage on the environment. Each explosion, airstrike, and fire results in an immediate discharge of GHG into the atmosphere, exacerbating the already critical effects of global warming. Total emissions attributed to the war are now estimated at 229.7 million tonnes of CO₂ equivalent, a figure that exceeds the annual GHG output of industrialised countries such as Belgium or Portugal, according to experts (Preliminary Assessment, 2025). The major sources of pollution linked to the conflict are now as follows:

1. Warfare (82.1);
2. Landscape fires (48.7);
3. Refugee movements (3.3); and
4. Reconstruction efforts (62.2).

To these, the following two categories must be added:

5. Damage to energy infrastructure (19.0); and
6. Civil aviation (14.4).

The first category –emissions originating directly from warfare– has been examined in detail. A breakdown and evaluation of daily military activities reveals their significant contribution to the rise in GHG emissions:

1. Pre-invasion accumulation of Russian forces;
2. Fossil fuel combustion by Russian troops;

¹ presented at the UN Climate Conference COP27 held in Sharm El Sheikh, Egypt in 2022.

3. Fossil fuel consumption by Ukrainian troops;
4. Use of ammunition;
5. Construction of fortifications, and other less visible emissions such as:
6. Embodied carbon emissions from the manufacturing of military equipment; and
7. Long-distance arms deliveries (0.4 MtCO₂e).

These activities collectively account for a total of 37.0 million tonnes of tCO₂ equivalent emissions (Preliminary Assessment, 2025).

The second category of air pollutants stems from wildfires, specifically the combustion of carbon-containing matter, such as biomass and construction debris generated by war-related activities, including bombing, shelling, mineral extraction, and explosions. These events have ignited landscapes and urban areas, further exacerbating the environmental crisis. The capacity to control and contain fires in conflict zones is remarkably hindered by the destruction of infrastructure, particularly road networks, which obstruct the presence and intervention of firefighters at the site of the incident.

A special protocol introduced in 2022 mapped fires sweeping through natural, agricultural, urban, and industrial lands, while the updated 2023 methodology focused exclusively on wildfires (Third Interim Assessment, 2023). Moreover, all GHG emissions from biomass burning are assumed to fall within the count of GHG emissions for the same solar year in which the fire occurs. However, in addition to the immediate emissions emanating from the spread flames, the long-term discharge of GHGs from the decomposition and dead organic matter remains a critical concern.

The assessment is also restricted to blazes affecting areas larger than one hectares, likely resulting in an underestimation of both the total number of fires (275,193), and the emissions recorded – estimated at 22.2 million tonnes of CO₂ equivalent in GHG emissions during the first eighteen months of the conflict (Third Interim Assessment, 2023). In 2024, a new assessment indicated a 113 percent increase, raising the new total of GHG emissions from wildfires to 48,7 MtCO₂e. This growth has been observed primarily along the border and in proximity to frontlines, and has been partially attributed by climatologists to the unusually arid weather conditions hitting the country throughout the same year. While naturally set fires may also be present in the region, the ongoing hostilities continue to impede timely firefighting response, highlighting the mutually reinforcing dynamic between warfare and global warming (National University of Life and Environmental Sciences of Ukraine, 2024).

The third category of war-induced environmental pollution concerns population displacement, both within Ukraine and across international borders. Since the early days of military operations, significant planet-heating emissions have been generated by: 1. Refugees fleeing Ukraine to seek protection abroad; 2. IDPs relocating within national borders; and 3. Russian nationals – potential or actual military deserters – leaving Russia to avoid mandatory conscription, repression, or persecution (Third Interim Assessment, 2023).

According to the latest update by UNHCR, approximately 17 million Ukrainian nationals have decided to leave the country since the invasion began in February 2022 (Free Network,

2024). While nearly 60 percent have returned during various phases of the conflict, 6,917,800 individuals remain officially registered under international protection across Europe and beyond (UNHCR, 2025).

Although the exact number of people currently displaced remains uncertain –partly due to the Ukrainian statistical body’s decision to suspend the publication of population data– their movement is estimated to have produced 2.77 million tonnes of CO₂ over the first 24 months of conflict (Fourth Interim Assessment, 2024), with minimal variation after 36 months (Preliminary Assessment, 2025).

As for internal displacement, the Kyiv School of Economics confirmed the presence of five million IDPs as of July 2023, with 9,845 million outbound and 4,757 million return movements. The total number of displacements stabilised at 14,602,000, with each movement covering an average distance of 400 kilometres. This produced an estimated total of 0.24 million tonnes of CO₂ emissions (Fourth Interim Assessment, 2024), with the majority of the IDPs still experiencing protracted displacement (IOM, 2025).

Finally, Russian nationals who sought refuge in countries such as Turkey, Georgia, Armenia, Serbia, Kazakhstan, the United Arab Emirates, and Finland, contributed an estimated 0.25 million tonnes of CO₂ emissions, a figure based on conservative estimates of air and land travel, averaging distances of 4,000 kilometres and 2,500 respectively (Fourth Interim Assessment, 2024).



Photo source: A building with a bunch of debris on top of it © Vony Razom / Unsplash, 2023.
Retrieved on May 10, 2025.

Among all the polluting factors, the most detrimental to environmental health is considered to be the future reconstruction of Ukrainian landscapes, which is projected to be highly

carbon-intensive (Third Interim Assessment, 2023). Since the beginning of the aggression, urban centres, villages, and residential areas have been razed to the ground, necessitating the complete rebuilding of infrastructure. The assessment identifies three reconstruction categories:



Source: a factory with smoke coming out of its stacks
© Felix Fuchs/Unsplash, 2024.

- The first category, classified as “Building”, includes the residential sector, health care, social sector, education, science, and culture. It relies heavily on carbon-intensive materials such as cement and concrete.
- The second, “Transport & Infrastructure”, encompasses agricultural machinery, vehicles, and civil engineering objects, including bridges, transport vehicles, and roads.
- The third, “Industry & Utilities”, refers to objects in the energy sector, industry, business services, digital infrastructure, and utility networks.

Although emissions are expected to accumulate at a slower pace, with projection of 24.5 MtCO₂e, 15.7 MtCO₂e, and 22.0 MtCO₂ respectively, the overarching carbon footprint of reconstruction amounts to a new total of 54.7 MtCO₂ after 36 months of fighting, making it the most severe threat to climate stability in Eastern Europe (Preliminary Assessment, 2025).

Since the onset of the full-scale war against Ukraine, the destruction of energy infrastructure has also raised serious concerns (Fourth Interim Assessment, 2024).

A key incident in this context was the sabotage of the Nord Stream 1 & 2 pipelines, which occurred on September 30th, 2022, in international waters between Sweden and Denmark. The attack,² which lasted until October 2nd, triggered two separate natural gas leaks in the Baltic Sea, reportedly releasing 14.6 million tonnes of CO₂ equivalent (Fourth Interim Assessment, 2024).

² Although not directly linked to acts of war, this event has been included in the overall GHG emissions assessment on the grounds that it wouldn't have occurred without the outbreak of the full-scale war in Ukraine on February 24, 2022.

The assessment also includes emissions associated with offshore gas infrastructure in the Black Sea, specifically the attack on Chernomorneftegaz's Odessa gas platforms. These installations – also known as Boyko Towers, located off the Crimean coast – were occupied by Russian forces in 2015 and have since been used as a surveillance and logistical base, especially since the start of the full-scale invasion on February 24th, 2022 (Ukrainska Pravda, 2023).

In June 2022, the drilling platforms, including Petro Hodovallets, Tavryda, and Syvash, were targeted in a missile strike carried out by the Defence Intelligence of Ukraine with the aim of retaking control (The Moscow Times, 2022). The attack caused significant damage and fires, leading to the uncontrolled release and prolonged flaring of natural gas, which on one of the platforms reportedly continued for several months. According to monitoring by CEOBS, the combustion involved 189.2 cubic meters of natural gas, releasing an estimated 0.34 million tonnes of CO₂ equivalent (Fourth Interim Assessment, 2024). Additionally, a seven square kilometre oil slick was observed in surrounding waters, providing credible evidence of further marine environmental degradation. These platforms remained contested, with ongoing aerial and maritime attacks triggering further explosions and plumes of smoke (Global Defence Corp, 2025).

Throughout the hostilities, frequent assaults have also targeted onshore gas production facilities, transportation pipelines, and distribution networks, provoking natural gas loss, combustion, and preventable leakage. Although the exact number of such incidents cannot be established, the overall emissions from these events are estimated to total 0.1 million tonnes of CO₂e (Fourth Interim Assessment, 2024).

Furthermore, oil depots and refineries in Ukraine have been among the top priority targets, as they represent a direct means of disrupting the adversary's capabilities at the source. A prominent example is the Kremenchuk Oil Refinery (Reuters, 2023). Beginning on April 2nd and continuing through the following weeks, the refinery –the only operational oil refinery remaining from Soviet times– was subjected to repeated attacks by Russian military forces.

A substantial number of missiles and projectiles were launched against the facility, igniting fires across at no fewer than six storage locations containing petroleum and diesel tanks. According to available data, thirteen storage tanks and four biogas bags were either destroyed or severely damaged, emitting several plumes of smoke with high concentrations of black carbon (CEOBS, 2024).

These events led to a short-term release of toxic molecules into the atmosphere, including nitrogen oxides (NO_x), nitrous acid (HONO), and carbon monoxide (CO), among others. In addition, the attacks laid the groundwork for long-term pollution risks, due to the potential migration of hazardous substances into surface and groundwaters, as well as contamination over wider areas of the country.

Secondary pollution sources may have arisen from waste and debris possibly containing hazardous materials such as asbestos, as well as from the use of firefighting foams containing phenylethylamine, “forever chemicals”, upon emergency response operations. One of the targeted sites also reportedly included an electricity substation, raising credible accusations that damaged switchgears may have released sulfur hexafluoride (SF₆), a highly potent GHG.

The environmental threat posed by SF₆ contained in the electrical equipment must also be highlighted in the broader Ukrainian context, as this compound is consistently affected by fires and explosions, which can affect electrical equipment. SF₆ is a synthetic insulating gas, commonly used in high- and medium-voltage electrical systems to prevent short circuits and overloads in electricity flow (BBC, 2019).

Despite its effectiveness, SF₆ has earned the designation as the most powerful and destructive GHG on Earth, downsized by its polluting potency. A single molecule of SF₆ has a global warming potential equivalent to 22,800 molecules of CO₂, making it nearly 24,000 times more potent than carbon dioxide. Since the beginning of the war, around 43 percent of high-voltage facilities have been hit, while 42 high-voltage switchgears have been reportedly destroyed or impaired, potentially releasing an additional one million tonnes of CO₂ equivalent.

The Fourth Interim Assessment, covering emissions up to February 23rd, 2024, estimated GHG emissions from energy infrastructure damage reaching approximately 17.16 million tonnes of CO₂ equivalent (Fourth Interim Assessment, 2024) – a sum that, a year later, recorded a cumulative total of 19.0 million tCO₂e (Preliminary Assessment, 2025).

With at least seven dozen attacks on Ukrainian oil storage facilities recorded within the first two years of the war, and a sustained campaign of strikes on power plants and electricity grids aimed at undermining civilian resilience, future emissions projections are expected to become even more alarming.

Another considerable environmental consequence of the war stems from the disruption of international civil aviation and the subsequent adaptation of flight strategy. The establishment of a no-fly zone over Ukraine, the imposition of various airspace bans by Western countries, and Russia's decision to discontinue most airlines connecting East and West have collectively forced major detours for flights between Europe and parts of Eastern and Southeastern Asia. This route change has resulted in longer flight paths and an average increase of 13 percent in fuel consumption compared to pre-war original routes (Communications Earth & Environment, 2025).

The study identified Helsinki as the most severely affected departure hub, notably for routes to Singapore and Seoul. Japanese airlines – especially Japan Airlines (JAL) and All Nippon Airways (ANA) – were also among the most disrupted.

Prior to the war, they operated approximately 60 flights per week through Russian airspace to destinations such as England, Germany, France, and Finland. After 18 months of conflict, it was estimated that these alterations in air traffic could result in up to 18 million tonnes of CO₂ equivalent of GHG emissions over the following years (Third Interim Assessment, 2023). However, updated calculations covering 36 months of war indicate a more accurate figure of 14.4 million tonnes of CO₂ (Preliminary Assessment, 2025).

Finally, another unexpected driver of climate disruption with serious global consequences for distant countries stems from the adaptation of international energy markets following the invasion. At the time of the attack, the EU was highly dependent on Russian piped gas, leading to soaring energy bills for consumers and subsequent price-control measures

implemented by foreign countries. The emergency situation prompted most European political leaders to seek alternative energy suppliers from authoritarian regimes, particularly in Africa and the Middle East, to replace Russian energy and ensure a stable fossil fuel supply (European Council on Foreign Relations, 2023).

In response, the EU signed 17 agreements with the United States to receive liquified natural gas (LNG) that would temporarily compensate for the embargoes on Russian gas. However, due to the need for liquefaction, maritime transport, and the use of fracking³ in extraction, LNG is significantly more GHG-emissive than natural gas delivered via pipeline (Cornell University, 2024).

Moreover, several European countries – including Germany, Italy, Austria, Greece, and The Netherlands – have resorted to reopening decommissioned coal plants, which has led to significantly increased emissions of carbon dioxide (CO₂) and methane (CH₄), as well as possible release of highly life-threatening toxins such as mercury (Gassvessel, 2018).

The rupture in West-Russia relations has been described by scholars as a major setback in the transition towards a sustainable global energy world, as natural gas currently represents the most feasible bridge between a coal-powered past and renewable-based future (UNEP, 2023). Natural gas is the cleanest fossil fuel, emitting significantly fewer air pollutants such as sulfur dioxide and particulate matter. It also produces the lowest CO₂ output per kilowatt-hour: 365,0 grams CO₂ per kilowatt-hour (gCO₂/kWh), compared to (564,6gCO₂/kWh for oil products and 899,9 gCO₂/kWh for coal (ISPRA, 2017).

Additionally, its relative ease of storage, the possibility of transport via pipelines or in liquid form by ship, and the speed at which it can be activated make it a highly practical energy source (IEA, n.d.). As a result, the war has not only caused widespread human suffering but has also delayed the global transition toward sustainable energy and climate justice.

In this context, the environmental impact of war extends far beyond Ukraine's borders, also affecting neighbouring and distant countries through its economic repercussions. In 2022 alone, Ukraine's Gross Domestic Product (GDP) shrank by 30.3 percent, fueling an inflation rate of 26.6 percent. While these figures may not immediately appear linked to climate change and global warming, they ultimately portray a major obstacle, as economic downturns substantially reduce the financial resources available for climate action (Chatham House, 2023).

According to Ukrainian authorities, since the beginning of the war, 90 percent of wind power capacity and 50 percent of solar energy capacity have been rendered inoperative, while 500 water infrastructure facilities, including hydroelectric dams – once symbolising Ukraine's commitment to renewable energy – have been destroyed. Their loss will inevitably affect the National Inventory Reports (NIRs) of the concerned State (Chatham House, 2023).

The assessment becomes even more alarming when considering the margin of uncertainty, which scholars – in the first 18 months of war – estimated to be of the order of +/- 22 percent

³ Fracking is a gas and oil extraction technique that comes with criticism for the potential escaping of methane, a potent GHG into the atmosphere. during drilling and extraction
<https://greenly.earth/en-gb/blog/industries/everything-you-need-to-know-about-fracking>

(Elsevier, 2024). In wartime, unpredictability and limited access to data make comprehensive analysis extremely difficult. In some cases, data is simply unavailable. For example, elements such as fossil fuel consumption, ammunition deployment, and waste decomposition from war are virtually impossible to quantify in full during ongoing military operations.

Further uncertainty surrounds the precise distribution of Russian deserters following the general mobilisation declared by Vladimir Putin in October 2022. Likewise, while refugees and internally displaced people officially registered with international bodies such as the UN Refugee Agency (UNHCR) and the International Organisation for Migration (IOM) are accounted for, no reliable figures exist for unregistered individuals.

The Paris Agreement, which sets the target of limiting global warming to 1.5°C, legally binds signatory states to phase down fossil fuels and prohibits the development of new fossil fuel infrastructure (United Nations, 2025). However, while Article 13 urges each signatory State to regularly report the anthropogenic emissions of GHG via the National Inventory Report, it fails to provide the scope of this computation, leaving it to national discretion. As a result, military-related emissions are often excluded, with governments citing political and security concerns that withhold classified data (CEOBS, 2024).

In 2023, the British Watchdog Group CommonWealth calculated that military activities may account for up to 5.5 percent of global GHG emissions (CommonWealth, 2023). This means that the current emissions accounting framework underreports a substantial portion of global emissions, thereby significantly compromising the credibility and effectiveness of climate strategies.

In conclusion, the full-scale invasion of Ukraine and its cascading consequences must not be viewed solely through the lens of humanitarian disaster or national recovery. Adversely, they must be situated within a broader environmental and legal framework, which highlights the urgent need for a shift in perspective. The war's environmental impact – ranging from emissions underreporting to the deliberate targeting of renewable infrastructure – constitutes a global threat, challenging the international community's collective commitment to human rights and climate action.

3.2.1 Destruction of renewable energy capacity

Transitioning to renewable or clean energy is key to mitigating climate change. In March 2023, the Ukrainian government, in an effort to uphold its responsibility towards global climate action, set a goal to generate 50 percent of its power from renewable energy and the remaining 50 percent from nuclear energy by 2035 (Dreves, Fall & McCan, 2023). However, under the invasion already installed capacity of renewable energy such as solar and wind has been significantly reduced.

Wind power has a significant total potential in Ukraine, exceeding 680 GW (Renewables4ukraine, n.d.). Due to its location, the country can also install offshore wind power plants, which can provide more than a third of the total wind capacity, amounting to 250 GW. Notably, wind resources are concentrated more in the southern part of the country, in regions like Crimea and Donbass, which are occupied by Russia. Moreover, the operation

of already built wind power plants located in parts of Kherson and Zaporizhzhia has been paused, due to safety concerns for personnel. Alarming, the war has damaged ten wind turbines and shut down 75 percent of the total wind energy (Renewables4ukraine, n.d.).

The generation of energy through solar panels has been affected as well. According to data from October 22nd, 2022, the country lost 45 to 50 percent of solar generation (Velyka, 2024). For example, due to the shelling by Russian forces, the biggest solar power plant in Ukraine, Tokmak Solar Energy, has been damaged, losing about 20 percent of its power.

Finally, according to the Ukraine War Environmental Consequences Work Group, financial losses from the destruction of renewable energy facilities amount to \$282 million (Hubareva, 2024). Furthermore, it is estimated that at least 1 GW of the total installed renewable energy capacity of 9.9 GW has been lost due to the war.

3.3 Human Rights at Risk in an ecologically collapsing environment

3.3.1 The right to Life and Health is endangered by environmental degradation

Traditionally, it was believed that war could only affect the population and their socio-political and economic situations, but the effects of warfare on the environment should also be examined and taken into account. In times of war, the first images that come to our minds are often of destroyed buildings or wounded civilians, but what is often forgotten or ignored in warfare is how deeply the war also damages the environment, and how that, in turn, puts human rights at severe risk. In the context of the war in Ukraine, environmental destruction is not just a side effect but also something that directly threatens the rights to life and health, which are protected by both international and European human rights law.

Additionally, as technology continues to develop, particularly with the introduction of new autonomous systems, many are concerned that environmental damage may worsen. Today's wars use both traditional weapons and modern digital or autonomous tools. This not only makes the battlefield more complex, but it also increases the harm done to the environment.

As has already been illustrated, Russia's invasion of Ukraine has caused extreme environmental damage in Ukraine, which in turn impacts the human rights of people residing there.



Source: A black and white photo of a forest
© Aleksey Demidov / Unsplash, 2022.

Russia has been using different kinds of weapons since the beginning of the war. According to research from Frontiers, military technologies, especially modern weapons and drones, cause serious harm to the environment during conflicts. Drones are often seen as more energy-efficient than traditional aircraft, but their use can still disturb ecosystems and destroy natural habitats. Even though drones might produce less carbon emissions, the explosions they cause release dangerous pollutants that can affect both people's health and the environment (Conflict and Environment Observatory, 2023). Today's weapons also pose new problems for environmental safety. For example, some munitions have heavy metals that can pollute the soil and water. This pollution can damage ecosystems, reduce soil quality, and make it harder to access. This puts food security and public health at risk in the long term. As already mentioned, war affects not just people but also nature.

One of the most serious effects is the loss of biodiversity, which is crucial for the health of ecosystems. Losing it can significantly damage the environmental balance and impact human life. Water pollution is one of the most immediate and long-lasting impacts that war can have on the environment. During warfare, states often use hazardous substances, chemicals, and heavy metals that contaminate water and affect entire ecosystems and communities that depend on these resources. For example, the chemical weapons can cause severe environmental contamination when they enter the water and, due to their toxicity, pose long-lasting risks for humans and ecosystems.

In 2023, Russia was accused of attacking and destroying the Nova Kakhovka dam, which traverses Ukraine's enormous Dnipro River and holds approximately 18 cubic kilometres of water (The Guardian, 2023). The explosion of the reservoir released more than 14 cubic

kilometres of water, killed animals, and swept away a fish farm (The Guardian, 2025). Amnesty International stated that the human and environmental cost of the destruction of the Kakhovka dam is a huge humanitarian disaster, as it endangers the lives, safety, and well-being of thousands of people living within the range of the flood waters. They also highlighted the need for a prompt, independent, and impartial investigation into the destruction of the Kakhovka dam (Amnesty International, 2023).

However, the risk is not limited only to air or water pollution. The ongoing threat to the Zaporizhzhia nuclear power plant, occupied by Russian forces, continues to be one of the most serious dangers (The Guardian, 2025). A nuclear accident in this region would not only threaten Ukrainians but could also have long-term consequences for health and life across the continent. The International Atomic Energy Agency (IAEA) has warned several times about the situation, but the risk remains (International Atomic Energy Agency, 2024).

Military technologies tend to have long-term impacts that extend beyond immediate ecological damage. Areas used for military training or hostilities often become sites of persistent environmental contamination. Those contaminations, including toxic chemicals and heavy metals, can remain in the soil, water, and air long after the military activities have ceased. Communities living near former military sites may face increased health risks due to the exposure, which can lead to serious illnesses (Lawrence, 2015). The danger, in these cases, is not only immediate but generational.

These examples and dangers clearly show that the war is not just about bombs and guns; it is also an attack on the environment that people depend on to survive. In this way, it becomes a direct threat to the right to life and health. And in some cases, it can even be argued that this environmental destruction amounts to a violation of international humanitarian law (IHL), which prohibits attacks on civilian infrastructure and actions that can cause excessive harm to the environment.

According to the UN Human Rights Committee's General Comment No. 36 on the right to life, States have a duty not only to protect people from arbitrary killing but also to take positive steps to protect life, including by addressing environmental degradation and pollution. In this case, Russia's deliberate targeting of critical infrastructure and its disregard for the environmental consequences of war are clearly in conflict with these obligations.

The right to life should not only protect people from bullets and bombs, but also from poisoned air, polluted rivers, and the collapse of ecosystems. In the Ukrainian case, the risks are even greater and more widespread. Health systems, especially hospitals, have been bombed, access to clean water is disrupted in some parts of Ukraine, and energy systems are often down, which makes it harder for people to recover or even survive. The environmental damage caused by war increases disease, trauma, and long-term health risks, but unlike the direct killing of civilians, these harms are slower and less visible. As the war continues, the world must begin to see environmental harm not just as a side effect of war, but as a serious human rights concern in its own right; otherwise, the invisible cost of war will continue to rise.

3.3.2 Environmental injustice: impact on displaced populations, rural communities, and minorities

The environmental catastrophes caused by the war in Ukraine do not affect all people equally. While entire cities suffer from bombardments and pollution, some communities face far more serious consequences. These include displaced populations, rural communities, and ethnic or national minorities. These groups often lack access to basic resources and political protection, meaning the harm they experience is both ecological and social. This is an example of environmental injustice, where vulnerable people bear the heaviest burden of environmental harm they did not cause and cannot prevent. Environmental degradation and armed conflict intersect with social inequality, compounding the suffering of already marginalised groups.

Since Russia's full-scale invasion in 2022, almost 6.9 million Ukrainians have registered as refugees. Additionally, 3.7 million are internally displaced, which means that nearly a quarter of Ukraine's pre-war population has been forced to flee their homes (UNHCR, 2024). The threats posed by the ongoing war, combined with the destruction of homes and infrastructure and the loss of livelihoods, are the key driving factors for displacement. But another emerging issue is that increasing numbers of people in Ukraine are being displaced by climate-induced extreme weather events, such as floods, wildfires, and storms. According to the Internal Displacement Monitoring Centre (IDMC), between 2020 and 2023, extreme weather events caused the displacement of 4,600 people. Of these, 60 percent were due to flooding, often worsened by damage to dams and water infrastructure, and 27 percent by wildfires, which are triggered or made uncontrollable by shelling and bombings. The war has destroyed a lot of vegetation and natural ecosystems, which has worsened droughts and left many areas exposed to soil erosion and pollution (Matsala et al., 2024). For displaced people, especially those living in temporary or informal shelters, these environmental problems create serious risks for their health and safety. With limited sanitation, clean water, and shelter, displaced communities are at heightened risk of disease and trauma.

Rural communities are particularly exposed. Much of the fighting has occurred in eastern and southern Ukraine, regions that were rich in farmland. Due to the ongoing war, Ukrainian land may be unsafe for agricultural use, contaminated by fuel and chemicals, or polluted by water. This development also affects the long-term livelihoods, and the families who depend on farming have to be displaced. Rural populations often lack the infrastructure or political visibility to demand clean-up or support. For example, the villages in the Kherson Region of southern Ukraine have been heavily affected after the Russian invasion in 2022. According to the UN, the breach of the Kakhovka Dam in 2023 caused the water levels to drop significantly, and this complicated the locals' access to clean water (UN Ukraine, 2025).

Environmental injustice becomes even clearer when we look at the ethnic and national minorities. The Roma community in Ukraine, whose roots in Ukraine trace back centuries, ranks among the most discriminated communities in Ukraine. They have long been marginalised and faced systemic exclusion from public services and basic human rights for centuries (Tondo, 2014). When Russia invaded Ukraine in 2022, more than ten million

people were displaced, including 40 percent of Ukraine's Roma population (Church World Service, 2023). Now, Roma soldiers are fighting on all fronts against Russia, but their families are displaced, and they are facing discrimination and prejudice (Powell, 2024). The Roma community had to live in harsh conditions through the years; they were attacked by ultra-nationalist groups and ignored by the government. They faced discrimination and were denied access to medical care (Ellis, 2018). It is possible that after Russia invaded Ukraine, their living conditions worsened, not only because the government ignored them and their needs, but also because their living conditions were never easy or good, and the war could have also had a huge impact on that. In many cases, Roma families live in informal housing with little legal protection or access to clean energy and water. Environmental crises deepen this exclusion and make recovery nearly impossible.

Article 25 of the Universal Declaration of Human Rights guarantees the right to adequate living conditions, including housing, health, and environmental safety. When displaced populations and minorities are excluded from these protections, it can be said that this constitutes a structural form of environmental injustice. In warfare, environmental damage can be seen as collateral, but for some communities in Ukraine, this is a permanent condition. They do not return to ruined homes; they never had homes to begin with, only makeshift shelters that are now contaminated or destroyed. The destruction of ecosystems, water systems, and agriculture during the war not only harms the earth and nature, but it also pushes the already vulnerable further into poverty and social exclusion.

In this way, environmental injustice during the Ukraine war becomes a double crisis of ecology and equality. While war harms everyone, it does not harm everyone equally. The structural neglect of certain populations means they are left to face the worst consequences, with the fewest tools for recovery or survival. Addressing this injustice requires more than environmental cleanup; it requires ensuring that human rights protections are extended to the most marginalised.

3.3.3 Intersection with the right to a safe, clean, healthy, and sustainable environment

The war in Ukraine has made it particularly clear that environmental harm is not only a consequence of conflict but also a direct threat to fundamental rights. At the heart of this lies a relatively new but increasingly recognised principle: the right of every person to live in a safe, clean, healthy, and sustainable environment. This right connects environmental protection with human dignity, aiming to ensure that people are not harmed by ecological degradation or exposed to pollution, toxic waste, or climate-related disasters. While it is not yet fully embedded in European human rights law, this right is gaining recognition at both international and national levels.

As Part 1 of this report has already demonstrated, the right to a healthy environment is not yet legally binding or widely recognised in European Human Rights Law. However, arguments in favour of recognising this right have gained momentum in recent years, and the case law of the European Court of Human Rights equally seems to support its recognition

(PACE, 2023). In war zones like Ukraine, where environmental degradation is intentional and large-scale, the urgency for such legal recognition becomes even more apparent.

In war zones, these protections are even more critical and even harder to enforce. Russia's invasion of Ukraine has not only taken lives and destroyed buildings, but it has also harmed rivers, forests, farmland, and the air people breathe. Whole ecosystems have been damaged. This kind of destruction goes against international humanitarian law, which says that nature should not be harmed without military necessity. It also affects people's ability to live with dignity. When a river is polluted or land can no longer grow food, it is not just about the environment; it is also about people losing their fundamental rights.

The right to a healthy environment is also linked to the right to reparations. Under international human rights law, states are not only expected to avoid causing harm, but they have a duty to offer remedies when harm has already been done. In Ukraine, the scale of environmental destruction is so large that discussions will likely begin soon about how to calculate and address this damage. Civil society organisations and international institutions will collect data on ecological harm, toxic pollution, and the loss of biodiversity caused by the war. This information will be crucial not only for recovery but also for accountability.

Furthermore, climate and environmental justice are deeply connected to other forms of justice, including social, economic, and political justice. When the environment is destroyed, it is always the poorest and most marginalised who suffer the most. In Ukraine, like in many other places affected by war, the conflict has made inequality worse and deepened divisions that were already there. Recognising the right to a healthy environment is not just about protecting nature but also about standing together and ensuring everyone is treated fairly.

In the end, having a safe, clean, and healthy environment is no longer just something we hope for; it is something we now urgently need to protect through laws and politics. The war in Ukraine clearly shows how conflict harms not only people but also nature. Polluted rivers and damaged farmland are more than environmental problems. These are human rights issues, too, because when the environment is destroyed, it's people who pay the price. That's why the international human rights system needs to evolve and respond to these new challenges. Europe has a special role here. It should take the lead, not just by talking about environmental rights, but by making sure they are actually respected and protected in people's everyday lives.

3.4 Accountability Mechanisms: Failure and Legal Fragmentation

3.4.1 Russia's withdrawal from the Council of Europe (2022)

One big problem in protecting the environment during war is that the legal rules are often scattered, unclear, and not well-connected. Even when rules exist, there is usually little or no real accountability for those who cause environmental harm. Although some international laws exist, they are often ineffective in practice. Sometimes, they are not adequately enforced, and at other times, they simply do not apply to the specific situations happening on the ground.

When Russia invaded Ukraine in February 2022, the Council of Europe's (CoE) committee of ministers launched the procedure for the suspension of a member's rights of representation under Article 8 of the Statute of the CoE and suspended the Russian Federation from its rights of representation in the CoE (Council of Europe, 2022). Later, in March 2022, the Parliamentary Assembly adopted an opinion which stated that the Russian Federation could no longer be a member state of the organisation (PACE, 2022). On March 16th, 2022, the Russian Federation ceased to be a member of the CoE, and then, in September the same year, Russia ceased to be a High Contracting Party to the ECHR (Csúri, 2022). It should also be noted that the ECtHR agreed to deal with applications against Russia that had taken place up until September 16th, 2022 (Emtseva, 2023). But Russia stopped enforcing the ECtHR's judgments (Skoblik, 2023).

As a result of the Russian Federation's withdrawal from the CoE and ECHR, Russian citizens and human rights activists have been deprived of the ability to apply to the ECtHR and have their decisions enforced (Skoblik, 2023).

Since the beginning of the war, Russian attacks have caused widespread destruction of forests, rivers, water systems, soil, and even nuclear risk zones. For example, when industrial sites are shelled, pipelines are blown up, or dams and power plants are targeted, the damage goes far beyond buildings. These actions cause significant harm to the environment, polluting land and water, damaging ecosystems, and compromising people's health and safety. It is not just nature that suffers; it is entire communities. Under Article 2 and Article 8 of the ECHR, individuals have the right to be protected from severe environmental degradation when it affects their well-being.

Ukrainian citizens who suffered from this kind of environmental harm before September 16th, 2022, may still bring their cases to the ECtHR, arguing that Russia violated their human rights through its actions during the armed conflict since February 2022. However, the major challenge still remains. Even if Ukrainian citizens bring their cases to the ECtHR for the crimes committed before September 2022, as mentioned above, Russia has stopped enforcing ECtHR judgments and refuses to cooperate with the Court. This creates a gap between formal legal access and actual enforcement. Even if Ukrainian citizens win the case related to environmental damage caused by Russia's hostile actions, the lack of Russian cooperation means that no reparations are likely to be paid, and no changes in state behaviour will follow. Bringing those cases can help with documenting the violations, build a legal record, or even maintain international pressure.

To sum up, Russia's exit from the Council of Europe and the European Court of Human Rights has serious consequences for holding anyone accountable for environmental damage, and these effects will only grow clearer with time. While Ukrainian victims of environmental harm that happened before September 16th, 2022, can still bring cases to the Court, the reality is that without Russia's cooperation, those rulings may mean very little in practice. At the same time, the ongoing environmental destruction caused by the war is completely out of the Court's reach, leaving many civilians with no real chance of justice. This isn't just a legal loophole; it shows a deeper failure of the international system to deal with large-scale

environmental destruction during war. Without strong tools to enforce environmental rights, the harm goes unanswered, and the people affected are left to carry the burden on their own.

3.4.2 International Humanitarian Law: Partial and Insufficient Protection

IHL is the branch of public international law that governs the conduct of hostilities during armed conflicts. It applies to both international armed conflicts (IACs) (Melzer, 2019) and, to a more limited extent, non-international armed conflicts (NIACs) (ICRC, 2016). The main aim of IHL is to limit the effects of armed conflicts for humanitarian reasons. It protects persons who are not or are no longer participating in hostilities and restricts the means and methods of warfare. The sources of IHL include the Geneva Conventions of 1949, their Additional Protocols, Hague Law, and customary international law (Diakona, no date). These rules are binding on all parties to a conflict, both state and non-state actors, and apply regardless of the legality of the use of force under *jus ad bellum*.

In terms of environmental protection, IHL offers only limited safeguards. It does not give the environment a special legal status as a civilian object. Instead, the environment is protected indirectly, either as civilian property or through general rules prohibiting unnecessary destruction and disproportionate attacks.

The most explicit IHL provisions on environmental protection can be found in 1977 Additional Protocol I (API) to the Geneva Conventions. Article 35(3) of the AP I states that it is prohibited to employ methods or means of warfare which are intended, or may be expected to cause widespread, long-term, and severe damage to the natural environment. The commentary to the AP I states that any means and methods of warfare which are planned to cause, or may be expected to cause, serious damage to the natural environment, even if this effect is incidental, are prohibited. It also highlights that this is not only a matter of protecting the natural environment against the use of weapons and techniques directed against it, but also of protecting the population against any of these effects, and protecting the natural environment itself. According to the commentary, preventative or corrective measures have to be taken to prevent this environment from harming the physical or mental health of the people (ICRC, 1987). This provision is mirrored in Article 55(1) of the AP I, which adds that care must be taken in warfare to protect the natural environment against such damage, and that attacks against the natural environment by way of reprisals are also prohibited. The commentary states that the concept of the natural environment should be understood in the widest sense to cover the biological environment in which a population is living, it does not consist only of the objects indispensable to the survival of the civilian population, like the agriculture areas, drinking water, food, etc., but also includes forests and other vegetation, flora, fauna, and other biological or climate elements (ICRC, 1987).

While these provisions sound strong, in practice, they are very difficult to apply. The threshold of “widespread, long-term, and severe” is very high. A method or a means of war does not become unlawful under Article 35 of the Protocol unless it cumulatively fulfils all three conditions included in the provision, i.e, unless it causes damage which is simultaneously widespread, long-lasting, and severe (ICRC, 1987). This makes enforcement

extremely difficult. “Widespread” can be understood and interpreted as damage extending over several hundred square kilometres. “Long-term” means effects that last for months or years and “severe” refers to serious disruption or harm to human life, natural resources, or ecosystems.

IHL is based on key principles, such as distinction, proportionality, precaution, and military necessity (Melzer, 2019). The principles of proportionality and military necessity are key in evaluating whether an attack that harms the environment is lawful.

Under Article 51(5)(b) of AP I, attacks are prohibited if they may cause incidental loss of civilian life, injury to civilians, or damage to civilian objects that would be excessive concerning the concrete and direct military advantage anticipated. The natural environment can fall under the definition of “civilian object”, but only indirectly, when damage also affects civilians. In practice, this means that the environment can be sacrificed if the expected military gain is high enough. The principle of military necessity allows the use of force if it brings a clear military advantage, even if that force results in environmental degradation. This trade-off gives states a lot of room to justify destructive actions during the war.

Some rules that protect the environment have been included in customary international humanitarian law, as defined by the ICRC’s 2005 Customary IHL Study. Rule 45 states that the use of methods or means of warfare that are intended, or may be expected, to cause widespread, long-term, and severe damage to the natural environment is prohibited. Moreover, Rule 45 states that during armed conflict, it is prohibited to cause severe damage to the natural environment if that damage does not offer a clear military advantage or causes harm that is excessive compared to the expected military gain. This rule ties into the general principle of proportionality and the duty to distinguish between military targets and everything else, including nature. Therefore, even in war, armies cannot just destroy forests, rivers, or farmland unless it is absolutely necessary for a concrete military reason, and even then, they must weigh whether the destruction is justified. This rule reflects the same high threshold as AP I and faces the same enforcement problems. Therefore, it can be said that in this case, customary international law does not resolve the gaps in treaty law.

This legal framework results in the fact that most environmental destruction caused by war is not illegal under IHL unless it crosses a very high threshold or clearly affects civilians. For example, bombing a forest to target enemy fighters is not unlawful unless it also causes civilian harm or meets the strict criteria outlined in Article 35(3). Similarly, damage to rivers, farmland, or soil may be treated as collateral if it is “necessary” to achieve military advantage. This legal reality creates a protection gap, where acts of environmental destruction are tolerated as side effects of military activity. In a war like the one in Ukraine, where dam explosions, pollution of rivers, and attacks near nuclear plants occurred, the damage might still fall outside IHL’s current enforcement range unless it can be shown to be excessive or targeted without justification.

In conclusion, while IHL provides some level of protection for the natural environment during armed conflicts, it is clearly insufficient. The main treaty provisions, especially those in AP I, set a legal threshold that is too high to apply in most real-life situations. Many acts of environmental destruction are seen as lawful when they are linked to military objectives,

even if their long-term consequences for ecosystems and civilian populations are serious. In non-international armed conflicts, the situation is even worse, with almost no specific legal protection at all. Although customary international law reiterates some of these rules, it does not resolve the enforcement issues. As a result, IHL fails to prevent or punish most cases of environmental harm in war, and this creates a dangerous legal gap at a time when armed conflicts are becoming more destructive for the environment than ever before.

3.4.3 Movement for Recognition of Ecocide



Source: End Climate Injustice on LED Screen © Jon Tyson / Unsplash, 2018.

The growing concern over large-scale environmental destruction caused by war, industry, and climate change has led to increased calls for the recognition of ecocide as an international crime (Moloney, 2023). The term "ecocide" is not new, but in recent years, legal scholars, environmental activists, and some states have started to seriously push for its inclusion as the fifth core international crime under the Rome Statute of the International Criminal Court (ICC), alongside genocide, crimes against humanity, war crimes, and the crime of aggression (Sharma, 2025).

What is ecocide? The word "ecocide" means the massive destruction of the environment, whether during peacetime or armed conflict. It refers to acts that severely harm ecosystems, biodiversity, or natural resources, often in ways that are irreversible. The proposed legal definition focuses on acts committed knowingly, with awareness that they will likely cause serious and widespread environmental harm. In 2021, an Independent Expert Panel for the Legal Definition of Ecocide, co-chaired by international lawyers Philippe Sands and Dior Fall Sow, released a proposed definition of ecocide. It states:

Ecocide means unlawful or wanton acts committed with knowledge that there is a substantial likelihood of severe and either widespread or long-term damage to the environment being caused by those acts (Stop Ecocide Foundation, 2021).

The terms “widespread,” “long-term,” and “severe” are probably inspired by language already present in IHL (such as Article 35(3) of Additional Protocol I), but with a slightly more flexible and inclusive approach.

There are several reasons and motivations behind the push for recognising ecocide. For example, the accountability, current international law does not effectively punish those who cause serious environmental harm unless it also involves harm to humans. It is believed that ecocide can close that gap. Moreover, making ecocide a crime could serve as a deterrent, discouraging states and companies from taking destructive actions. It also has a symbolic value; recognising ecocide would reflect the idea that nature itself has legal value, not just because of how it affects humans, but as something worth protecting in its own right. As shown earlier, IHL and human rights law offer limited protection for the environment, and many harmful acts fall outside this scope. Recognising ecocide could help fill this legal gap.

If ecocide is recognised and adopted, it can become the fifth crime under the Rome Statute. This would give the ICC jurisdiction to investigate and prosecute individuals, including political leaders and corporations, for environmental crimes that meet the legal definition. However, the amendment process will not be simple. According to Article 121 of the Rome Statute, amendments need to be proposed by a state party, adopted by a two-thirds majority, and ratified by at least seven-eighths of the state parties to become binding. So far, no state has formally submitted the ecocide amendments to the assembly of State Parties, but countries like Vanuatu, France, and Belgium have expressed interest in this idea (Crhák, 2023).

Despite strong support from civil society, there are some major legal and political obstacles to the recognition of ecocide. Many states worry that the definition is too vague and may be misused politically. In contrast, others fear that military operations, especially in active conflicts like Ukraine, could be prosecuted as ecocide even if they were seen as “necessary” by the state. Adding ecocide to the ICC’s mandate would require clear guidelines, strong political will, and resources to investigate complex environmental damage cases.

The war in Ukraine shows how modern conflicts can cause massive environmental destruction, such as forest fires from shelling, water pollution from bombed industrial sites, and risks to nuclear safety. Many of these acts do not fit neatly into existing categories of war crimes but might qualify as ecocide if the crime were recognised. Ukrainian officials and legal experts have started to discuss ecocide in public statements, especially after the Kakhovka Dam destruction in 2023. Ecocide could become an important legal tool in future international efforts to address the environmental consequences of this war.

The movement for the recognition of ecocide as an international crime reflects a growing awareness that the destruction of nature must be treated with the same seriousness as violence against people. While the legal process for amending the Rome Statute is long and politically sensitive, the campaign for ecocide is building global support and legal momentum. If adopted, it could fill a critical accountability gap and offer victims of

environmental harm, including those in Ukraine, a path to justice. Even if not yet a law, the ecocide debate is already influencing how the international community views the relationship between war, law, and the environment.

3.4.4 Lack of Enforceable International Environmental Rights

Despite the growing awareness of environmental crises and the impact of pollution, deforestation, and armed conflict on ecosystems, international law still does not recognise a clearly enforceable right to a healthy environment at the global level. While there are many soft law instruments and non-binding declarations, very few legal frameworks provide individuals with the opportunity to claim environmental rights before international courts. This situation leaves victims of environmental destruction, including those in conflict zones like Ukraine, without clear legal remedies.

There has been some progress in recognising environmental rights in recent years. Most international treaties relating to the environment, such as the Paris Agreement on Climate Change or the Convention on Biological Diversity, focus on state obligations and cooperation, not individual rights. They do not include mechanisms for individuals to file complaints or seek justice for environmental harm.

In some cases, environmental harm can be addressed through human rights law, especially when it has a direct impact on life, health, housing, or private life. For instance, Article 6 of the International Covenant on Civil and Political Rights (ICCPR) protects the right to life, and the Human Rights Committee has interpreted this right to include situations where environmental degradation creates serious risks to human life. This interpretation is reflected in General Comment No. 36, which recognises that environmental harm can threaten the effective enjoyment of the right to life. Other regional human rights systems have also recognised the connection between environmental harm and human rights. Both the Inter-American and African systems have developed jurisprudence in this area, sometimes even more progressively than the European system.

However, these rights are usually interpreted indirectly. They are not seen as environmental rights in themselves, but rather as rights that are violated when environmental harm affects human well-being. This means that damage to nature alone, without a strong link to human suffering, is not enough. In armed conflict situations, where civilians already face many challenges in accessing courts or gathering evidence, meeting this legal standard becomes even more difficult.

Even where international human rights law applies, enforcement is weak, especially in war zones. As mentioned earlier, the ECtHR no longer accepts new cases against Russia after September 16th, 2022, and Russia is refusing to enforce past judgments. The International Criminal Court (ICC) can only investigate cases that meet the threshold of war crimes or crimes against humanity. Without a direct link to other crimes, environmental damage alone often falls outside its jurisdiction.

UN treaty bodies, like the Human Rights Committee or the Committee on Economic, Social and Cultural Rights, permit some individual communications, but only from states that have

accepted this procedure, and their decisions are not binding. There is no international environmental court where civilians affected by environmental destruction in armed conflict can file a complaint and seek reparations.

Another major issue is that many developing countries and conflict-affected populations suffer the most from environmental harm, but have the least access to justice. International law still affords more power to states than to individuals, and environmental law relies heavily on state responsibility and diplomacy, rather than direct enforcement. As a result, the people most affected by climate change, deforestation, toxic waste, and wartime environmental destruction often have no legal remedy at all.

Although the right to a healthy environment is increasingly recognised in political declarations and soft law, no enforceable global legal framework protects individuals from serious environmental harm, especially in times of war. International human rights law can offer some protection, but only when human life or private life is affected. Nature itself is not yet a legal subject under international law. For people living through armed conflicts, including in Ukraine, this means that even when the environmental damage is severe and long-lasting, they often have no path to justice. Bridging this gap will require stronger legal recognition of environmental rights and mechanisms to ensure accountability even when the destruction takes place during war.

CONCLUSION

The Russia-Ukraine war has shown the world how damaging contemporary warfare is to the environment. It made apparent the need to strengthen the protection of the right to a clean and healthy environment within the European human rights system. There are many ways in which war influences the environment of the region and the world in general. Attacks on critical infrastructure, such as dams, nuclear facilities, and chemical plants, lead to immediate disasters as well as lasting consequences. The destruction and contamination of water sources have severely affected people's access to clean water, as well as negatively affected wildlife and biodiversity in the region. Widespread air pollution caused by shellings and explosions has contributed to the worsening of air quality in regions of active warfare.

In addition to air and water pollution, land degradation has also become a concern not only in Ukraine but in Europe in general. Ukraine is home to 35 percent of European biodiversity, which deteriorates day by day due to forest fires caused by the warfare and landmines that kill wildlife. Moreover, agricultural activities that heavily affect the economies of both the country and the region were made extremely difficult due to battles, shellings and mining of vast surfaces of the land. In addition, environmental degradation, as well as warfare in general, always leads to the displacement of people who happen to live on affected lands. The ones who are more affected are usually people in rural areas, as well as marginalised groups such as ethnic minorities.

Compounding these issues is the complicated nature of available accountability mechanisms. Russia's withdrawal from the Council of Europe made it immune to any possible litigation under the European Court of Human Rights, blocking one of the few avenues for the victims of environmental harm to hold the aggressor accountable. Moreover, current international humanitarian law is not equipped to handle the complex nature of the right to a safe environment, especially in wartime.

However, it is still important to advocate for the formal recognition of the right to a clean and healthy environment. There are ways to incorporate stricter environmental protections into both national and EU-level legislations. To demonstrate it, in the concluding part of the report, the gaps in international environmental protections will be discussed, and possible policy solutions will be proposed.

BOOKS

Melzer N, *International Humanitarian Law: A Comprehensive Introduction* (ICRC 2019).

ARTICLES

Dannet G, Bellouin N and Boucher O, 'Airspace Restrictions Due to Conflicts Increased Global Aviation's Carbon Dioxide Emissions in 2023' (2025) 6 *Communications Earth & Environment* 52

Drapaliuk A, Vasyliuk O and Kuzemko A, 'How the War Has Affected Ukrainian Protected Areas' (2024) *Nature Conservation Journal* 30 May
<<https://www.casopis.ochranaprirody.cz/en/international-nature-conservation/ukrainian-protected-areas-war/>> accessed 20 May 2025.

Kvach Y, Stepien CA, Minicheva GG and others, 'Biodiversity Effects of the Russia–Ukraine War and the Kakhovka Dam Destruction: Ecological Consequences and Predictions for Marine, Estuarine, and Freshwater Communities in the Northern Black Sea' (2025) 14 *Ecological Processes* 22.

Lawrence MJ and others, 'The Effects of Modern War and Military Activities on Biodiversity and the Environment' (2015) 23(4) *Environmental Reviews* 449.

Malytska L, Galytska E, Savenets M, Ladstätter-Weissenmayer A and Krajčovičová J, 'The Impact of Fires on Air Quality in Ukraine During Two Years of Military Conflict (2022–2023): Analyzing Satellite, Ground-Based Observations of NO₂, CO, and Aerosols' (SSRN, 19 March 2025) <<https://doi.org/10.2139/ssrn.5185870>>.

Matsala M, Odruzhenko A, Sydorenko S and Sydorenko S, 'War Threatens 18% of Protective Plantations in Eastern Agroforestry Region of Ukraine' (2024) *Forest Ecology and Management* <<https://www.sciencedirect.com/science/article/pii/S037811272400673X>> accessed 15 May 2025.

Meng X, Lu B, Liu C, Zhang Z, Chen J, Herrmann H and Li X, 'Abrupt Exacerbation in Air Quality over Europe after the Outbreak of Russia-Ukraine War' (2023) 178 *Environment International* 108120.

Rovira J, Nadal M, Schuhmacher M and Domingo JL, 'Environmental Impact and Human Health Risks of Air Pollutants Near a Large Chemical/Petrochemical Complex: Case Study in Tarragona, Spain' 787 (2021) *Science of the Total Environment* 147550.

Savenets M, Osadchyi V, Komisar K, Zhemera N and Oreshchenko A, 'Remotely Visible Impacts on Air Quality after a Year-Round Full-Scale Russian Invasion of Ukraine' (2023) 14(11) *Atmospheric Pollution Research* 101912.

Snizhko S, Didovets I and Bronstert A, 'Ukraine's Water Security Under Pressure: Climate Change and Wartime' (2024) 23 Water Security 100182.

Shumilova O, Tockner K, Sukhodolov A, Khilchevskiy V, Meester D, Stepanenko S and others, 'Impact of the Russia–Ukraine Armed Conflict on Water Resources and Water Infrastructure' (2023) 6(5) Nature Sustainability 578.

Wirtu Y D and Abdela U, 'Impact of War on the Environment: Ecocide' (2025) 13 Frontiers in Environmental Science 1539520.

Zalakeviciute R, Mejia D, Alvarez H, Bermeo X, Bonilla-Bedoya S, Rybarczyk Y and Lamb B, 'War Impact on Air Quality in Ukraine' (2022) 14(21) Sustainability 13832.

BLOGS

Bychkovska Y, 'Ukraine's Grain Exports Are Crucial to Africa's Food Security' (Atlantic Council, 5 April 2024)
<<https://www.atlanticcouncil.org/blogs/econographics/ukraines-grain-exports-are-crucial-to-africas-food-security/>> accessed 20 May 2025.

Conflict and Environment Observatory, 'Downstream Impact: Analysing the Environmental Consequences of the Kakhovka Dam Collapse' (Conflict and Environment Observatory, July 2023)
<<https://ceobs.org/analysing-the-environmental-consequences-of-the-kakhovka-dam-collapse/>> accessed 19 May 2025.

Emtseva J, 'The Withdrawal Mystery Solved: How the European Court of Human Rights Decided to Move Forward with the Cases Against Russia' (EJIL: Talk!, 8 February 2023)
<<https://www.ejiltalk.org/the-withdrawal-mystery-solved-how-the-european-court-of-human-rights-decided-to-move-forward-with-the-cases-against-russia/>> accessed 23 May 2025.

Martsynkevych V, 'Destruction of the Kakhovka Dam: Civil Society Calls on International Community to Respond to Act of Ecocide' (Bankwatch, 15 June 2023)
<<https://bankwatch.org/blog/destruction-of-the-kakhovka-dam-civil-society-calls-on-international-community-to-respond-to-act-of-ecocide>> accessed 19 May 2025.

Sharma R, 'Ecocide as the Fifth International Crime' (Völkerrechtsblog, 16 January 2025)
<<https://voelkerrechtsblog.org/ecocide-as-the-fifth-international-crime/>> accessed 23 May 2025.

Skoblik K, 'The Human Rights Backlash in Criminal Justice: The Case of Russia's Exit from the European Convention on Human Rights' (EJIL: Talk!, 1 August 2023)
<<https://www.ejiltalk.org/the-human-rights-backlash-in-criminal-justice-the-case-of-russias-exit-from-the-european-convention-on-human-rights/>> accessed 23 May 2025.

Sushchuk M, 'Life After Kakhovka Dam Destruction: A New Beginning' (EOS Data Analytics, 7 November 2024)
<<https://eos.com/blog/life-after-kakhovka-dam-destruction-a-new-beginning/>> accessed 19 May 2025.

WEBSITES

Amnesty International, 'Ukraine: Destruction of Kakhovka Dam Requires Urgent International Response as Thousands Face Humanitarian Disaster' (Amnesty International, 6 June 2023)
<<https://www.amnesty.org/en/latest/news/2023/06/ukraine-destruction-of-kakhovka-dam-require-s-urgent-international-response-as-thousands-face-humanitarian-disaster/>> (accessed 22 May 2025).

Bechev D, 'Tackling the Russia-Ukraine War's Environmental Damage in the Black Sea' (Carnegie Endowment for International Peace, 24 February 2025)
<<https://carnegieendowment.org/posts/2025/02/tackling-the-russia-ukraine-wars-environmental-damage-in-the-black-sea?lang=en>> accessed 20 May 2025.

Bun R, Marland G, Oda T et al., Tracking unaccounted greenhouse gas emissions due to the war in Ukraine since 2022, *Science of the Total Environment* 914 169879 (Elsevier, 2024)
<<https://www.sciencedirect.com/science/article/pii/S0048969724000135>> accessed 16 March 2025.

Caputo A, Fattori di Emissione Atmosferica di CO₂ e Altri Gas a Effetto Serra nel Settore Elettrico (ISPRA – Istituto Superiore per la Protezione e la Ricerca Ambientale, 2017)
<https://www.isprambiente.gov.it/files2017/pubblicazioni/rapporto/R_257_17.pdf> accessed 27 May 2025.

Church World Service, 'Breaking the Cycle: Supporting Ukrainian Roma Communities' (CWS Global, 12 April 2023)
<<https://cwsglobal.org/blog/breaking-the-cycle-supporting-ukrainian-roma-communities/#:~:text=Despite%20their%20rich%20cultural%20heritage,40%25%20of%20Ukraine%27s%20Roma%20population>> accessed 15 May 2025.

Conflict and Environment Observatory, 'Global Messages Marking #EnvConflictDay 2023' (CEOBS, 6 November 2023)
<<https://ceobs.org/global-messages-marking-envconflictday-2023/>> accessed 15 May 2025.

Crhák A, 'Ecocide: The Fifth International Crime?' (Centrum pro lidská práva a demokracii, 26 January 2023) <<https://www.centrumlidskaprava.cz/blog/ecocide-fifth-international-crime>> accessed 23 May 2025.

Csúri A, 'Russian Federation Ceases to be a Member of the CoE' (EUCRIM, 31 March 2022)
<<https://eucrim.eu/news/russian-federation-ceases-member-of-coe/>> accessed 23 May 2025.

- Dreves H, Fall S and McCan I, ‘Ukraine Fights to Build More Resilient, Renewable Energy System in Midst of War’ (National Renewable Energy Laboratory, 27 July 2023)
<<https://www.nrel.gov/news/detail/features/2023/ukraine-fights-to-build-a-more-resilient-renewable-energy-system-in-the-midst-of-war>> accessed 20 May 2025.
- Ellis G and Kolchyna V, ‘Attacked and Abandoned: Ukraine’s Forgotten Roma’ (Al Jazeera, 23 November 2018)
<<https://www.aljazeera.com/features/2018/11/23/attacked-and-abandoned-ukraines-forgotten-roma>> accessed 15 May 2025.
- EurekAlert!, ‘The War in Ukraine Led to the Destruction of Almost 1,600 Square Kilometers of Forests’ (EurekAlert!, 6 March 2025)
<<https://www.eurekalert.org/news-releases/1076045>> accessed 20 May 2025.
- Follorou J, ‘Who Killed Ukraine’s Seym River? Investigation into Accusations of Ecocide’ (Le Monde, 5 November 2024)
<https://www.lemonde.fr/en/environment/article/2024/11/05/who-killed-ukraine-s-seym-river-investigation-into-accusations-of-ecocide_6731683_114.html> accessed 19 May 2025.
- FREE Network, ‘Ukrainian Refugees: Who Returns and Why?’ (FREE Network, January 2024)
<<https://freepolicybriefs.org/2024/01/29/ukrainian-refugees-returns/>> accessed 27 May 2025.
- Friedlander B and Cornell C, ‘Liquefied Natural Gas Carbon Footprint Is Worse than Coal’ (Cornell University, 3 October 2024)
<<https://news.cornell.edu/stories/2024/10/liquefied-natural-gas-carbon-footprint-worse-coal>> accessed 15 May 2025.
- Gasvessel Project, ‘Natural Gas vs. Coal – A Positive Impact on the Environment’ (Gasvessel, 24 September 2018)
<<https://www.gasvessel.eu/news/natural-gas-vs-coal-impact-on-the-environment/>> accessed 27 May 2025.
- Glanz J and others, ‘Why the Evidence Suggests Russia Blew Up the Kakhovka Dam’ (The New York Times, 16 June 2023)
<<https://www.nytimes.com/interactive/2023/06/16/world/europe/ukraine-kakhovka-dam-collapse.html>> accessed 20 May 2025.
- Global Defence Corp, ‘Ukraine’s Kamikaze Drone Destroyed Russia’s Radar on Black Sea’s Boyko Towers’ (Global Defence Corp, 22 May 2025)
<<https://www.globaldefensecorp.com/2025/05/22/ukrainian-kamikaze-drone-destroyed-russian-radar-on-black-seas-boyko-towers/>> accessed 9 May 2025.
- Harvey F, Lakhani N and Carrington D, ‘Cop27: Ending War in Ukraine Necessary to Tackle Climate Crisis, Zelenskiy Says’ (The Guardian, 8 November 2022)

<<https://www.theguardian.com/environment/2022/nov/08/cop27-climate-summit-volodymyr-zelenskiy-ukraine-president-speech>> accessed 20 May 2025.

Hubareva V, 'Prospect for Renewable Energy in Wartime: How Ukraine Plans to Ensure Energy Independence Using "Green Generation"' (UWEC Work Group, 26 December 2024) <<https://uwecworkgroup.info/prospect-for-renewable-energy-in-wartime-how-ukraine-plans-to-ensure-energy-independence-using-green-generation/>> accessed 20 May 2025.

International Organization for Migration, Ukraine Internal Displacement Report – General Population Survey Round 20 (April 2025), (IOM, April 2025) <https://dtm.iom.int/sites/g/files/tmzbd11461/files/reports/IOM_UKR_Internal%20Displacement%20Report_GPS%20R20_April%202025.pdf?iframe=true>

Kardas S, Keeping the Lights On: The EU's Energy Relationships Since Russia's Invasion of Ukraine (European Council on Foreign Relations, 4 May 2023) <<https://ecfr.eu/publication/keeping-the-lights-on-the-eus-energy-relationships-since-russias-invasion-of-ukraine/>> accessed 15 May 2025.

Kassam A, 'My Example Can Change Minds: Roma Fighting for Place in Postwar Ukraine' (The Guardian, 29 April 2024) <<https://www.theguardian.com/world/2024/apr/29/roma-postwar-ukraine>> accessed 27 May 2025.

Kateryna M, 'How Russia's war against Ukraine affects animals and the environment' (Ukrainer, 4 February 2024) <<https://www.ukrainer.net/en/war-affects-animals/>> accessed 16 May 2025.

Knox J, 'Why Is Ukraine Known as the "Breadbasket of Europe"? Here's What It Produces and Exports' (Farming Life, 24 February 2022) <<https://www.farminglife.com/country-and-farming/why-is-ukraine-known-as-the-breadbasket-of-europe-heres-what-it-produces-and-exports-3584361>> accessed 19 May 2025.

Kravchuk V, 'Russia's War Destroys 80% of Ukrainian "Holy Mountains" National Park in Donetsk Oblast' (Euromaidan Press, 5 August 2024) <<https://euromaidanpress.com/2024/08/05/russias-war-destroys-80-of-ukrainian-holy-mountains-national-park-in-donetsk-oblast/>> accessed 20 May 2025.

Kullab S and Novikov I, 'At Least Hundreds Died in Floods after Ukraine Dam Collapse, Far More than Russia Said' (AP News, 28 December 2023) <<https://apnews.com/article/russia-ukraine-war-dam-collapse-kakhovka-kherson-daacdc431f42912dfb91548794f03a3c>> accessed 19 May 2025.

McGrath M, 'Climate Change: Electrical Industry's "Dirty Secret" Boosts Warming' (BBC, 13 September 2019) <<https://www.bbc.com/news/science-environment-49567197>> accessed 2 May 2025.

- Moloney A, 'Ecocide: Should Destroying Nature Be an International Crime?' (Context, 12 December 2023)
<<https://www.context.news/nature/ecocide-should-destroying-nature-be-an-international-crime>> accessed 23 May 2025.
- New York State Department of Health, 'Particle Pollution and Health' (health.ny.gov, no date)
<https://www.health.ny.gov/environmental/indoor/air/pmq_a.htm> accessed 19 May 2025.
- Niranjan A, 'Destruction of Ukraine Dam Caused "Toxic Timebomb" of Heavy Metals, Study Finds' (The Guardian, 13 March 2025)
<<https://www.theguardian.com/world/2025/mar/13/destruction-of-ukraine-kakhovka-dam-caused-toxic-timebomb-in-rivers-study-finds>> accessed 19 May 2025.
- Peace Research Institute Frankfurt, 'PRIF: Attacks on Life – The Targeting of Infrastructure in Armed Conflicts' (PRIF.org, no date)
<<https://www.prif.org/en/research/projects/attacks-on-life>> accessed 19 May 2025.
- Platt JR, 'In Ukraine, Saving Wildlife Harmed by War' (The Revelator, 21 February 2023)
<<https://therevelator.org/ecocide-ukraine/>> accessed 20 May 2025.
- Powell N, 'Roma in Ukraine: From Fighting Against Russia to Becoming Part of the Reconstruction' (The Brussels Times, 7 April 2024)
<<https://www.brusselstimes.com/1004696/roma-in-ukraine-from-fighting-against-russia-to-becoming-part-of-the-reconstruction>> accessed 15 May 2025.
- Ptak G, 'Toxic Waters: How Not to Phase Out Coal' (DW.com, 21 December 2021)
<<https://www.dw.com/en/toxic-waters-in-war-torn-ukraine-how-not-to-phase-out-coal/a-60084288>> accessed 19 May 2025.
- Ratushna M, 'War Against Nature: The Environmental Damage of Russia's Full-Scale Invasion of Ukraine' (Russia's War in Ukraine, 17 June 2022)
<<https://war.ukraine.ua/articles/war-against-nature-the-environmental-damage-of-russia-s-full-scale-invasion-of-ukraine/>> accessed 19 May 2025.
- Reuters, 'Russia Hits Ukrainian Kremenchuk Oil Refinery in Drone Attack, Governor Says' (Reuters, 20 September 2023)
<<https://www.reuters.com/world/europe/russia-hits-ukrainian-kremenchuk-oil-refinery-drone-attack-governor-2023-09-20/>> accessed 9 May 2025.
- Roshchina O, 'Ukraine Regains Control of Boyko Towers in Black Sea' (Ukrainska Pravda, 11 September 2023) <<https://www.pravda.com.ua/eng/news/2023/09/11/7419294/>> accessed 10 May 2025.
- Stop Ecocide Foundation, 'Legal Definition of Ecocide' (Stop Ecocide International, June 2021)
<<https://www.stopecocide.earth/legal-definition>> accessed 23 May 2025.
- The Guardian, 'Ukrainian Town Told to Shelter after Shelling Causes Ammonia Leak at Chemical Factory' (The Guardian, 21 March 2022)

<https://www.theguardian.com/world/2022/mar/21/ukrainian-town-told-to-shelter-after-shelling-causes-ammonia-leak-at-chemical-factory>> accessed 19 May 2025.

The Guardian, 'Nova Kakhovka Dam: Everything You Need to Know about Ukraine's Strategically Important Reservoir' (The Guardian, 6 June 2023) <https://www.theguardian.com/world/2023/jun/06/nova-kakhovka-dam-everything-you-need-to-know-about-ukraines-strategically-important-reservoir>> accessed 15 May 2025.

The Guardian, 'Scars on the Land: How Two Years of War Have Devastated Ukraine's Environment – in Pictures' (The Guardian, 24 February 2025) <https://www.theguardian.com/world/2025/feb/24/ukraine-war-impact-on-environment-nature-photo-essay>> accessed 15 May 2025.

The Guardian, 'Unsafe for Russia to Restart Zaporizhzhia Nuclear Plant, Energoatom Says' (The Guardian, 6 April 2025) <https://www.theguardian.com/world/2025/apr/06/unsafe-for-russia-to-restart-zaporizhzhia-nuclear-plant-energoatom-says>> accessed 15 May 2025.

The Moscow Times, 'Ukraine Strikes Offshore Gas Drilling Rig – Crimean Official' (The Moscow Times, 20 June 2022) <https://www.themoscowtimes.com/2022/06/20/ukraine-strikes-offshore-gas-drilling-rig-crimean-official-a78046>> accessed 9 May 2025.

Tondo L '“We Lost Everything”: Roma in Postwar Ukraine Left in Limbo' (*The Guardian*, 29 April 2024) <https://www.theguardian.com/world/2024/apr/29/roma-postwar-ukraine>> accessed 15 May 2025.

Velyka A, 'How Many Ukrainian Wind Farms and Solar Power Plants Have Been Stolen or Destroyed by Russia? Map, Photo' (ЕкоПолітика, 5 August 2024) <https://ecopolitic.com.ua/en/news/how-many-ukrainian-wind-farms-and-solar-power-plants-have-been-stolen-or-destroyed-by-russia-map-photo/>> accessed 20 May 2025.

Wageningen University & Research, 'Bombs, Mines and Chemicals: How Agricultural Soils in Ukraine Have Been Ravaged by War' (*WUR*, no date) <https://www.wur.nl/en/article/bombs-mines-and-chemicals-how-agricultural-soils-in-ukraine-have-been-ravaged-by-war.htm>> accessed 19 May 2025.

World Nuclear Association, 'Cooling Power Plants' (World Nuclear Association, 2020) <https://world-nuclear.org/information-library/current-and-future-generation/cooling-power-plants>> accessed 20 May 2025.

REPORTS

Belis C and others, Status of Environment and Climate in Ukraine (Publications Office of the European Union 2025) <https://doi.org/10.2760/6292177>> accessed 27 May 2025.

Brown O, Froggatt A, Gozak N, Katser-Buchkovska N and Lutsevych O, The Consequences of Russia's War on Ukraine for Climate Action, Food Supply and Energy Security (Chatham House – The Royal Institute of International Affairs, 13 September 2023)
<<https://www.chathamhouse.org/2023/09/consequences-russias-war-ukraine-climate-action-food-supply-and-energy-security>> accessed 27 May 2025.

Conflict and Environment Observatory, 'Joint Investigation into the Environmental Costs of Attacks on Ukraine's Kremenchuk Oil Refinery, Part 1' (Conflict and Environment Observatory, June 2024)
<<https://ceobs.org/joint-investigation-into-the-attacks-on-kremenchuk-oil-refinery-ukraine/>> accessed 18 May 2025.

Initiative on GHG Accounting of War, Climate Damage Caused by Russia's War in Ukraine: First Interim Assessment (October 2022)
<<https://en.ecoaction.org.ua/climate-damage-caused-by-russias-war.html>> accessed 27 May 2025.

Initiative on GHG Accounting of War, Climate Damage Caused by Russia's War in Ukraine: Second Interim Assessment (April 2023)
<<https://en.ecoaction.org.ua/climate-damage-by-russia-12-months.html>> accessed 27 May 2025.

Initiative on GHG Accounting of War, Climate Damage Caused by Russia's War in Ukraine: Third Interim Assessment (December 2023)
<<https://en.ecoaction.org.ua/climate-damage-by-russia-18-months.html>> accessed 27 May 2025.

Initiative on GHG Accounting of War, Climate Damage Caused by Russia's War in Ukraine: Preliminary Assessment (24 February 2022 – 23 February 2025) (February 2025)
<https://en.ecoaction.org.ua/wp-content/uploads/2025/02/20250224_ClimateDamageWarUkraine36monthsENprelim-1> accessed 27 May 2025.

International Atomic Energy Agency, Two Years of IAEA Continued Presence at the Zaporizhzhya Nuclear Power Plant (IAEA, March 2024).

LEGISLATION

European Convention on Human Rights (adopted 4 November 1950, entered into force 3 September 1953).

International Covenant on Civil and Political Rights (adopted 16 December 1966, entered into force 23 March 1976) 999 UNTS 171.

Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 8 June 1977, 1125 UNTS 3.

Rome Statute of the International Criminal Court, adopted 17 July 1998, entered into force 1 July 2002 (latest amendment adopted and circulated 2024).

SOFT LAW

International Committee of the Red Cross, 'Commentary of 1987: Article 35 – Basic rules' (ICRC, 1987).

International Committee of the Red Cross, 'Commentary of 1987: Article 55 – Protection of the natural environment' (ICRC, 1987).

International Committee of the Red Cross, 'Commentary of 2016: Article 3 – Conflicts not of an international character' (ICRC, 2016).

International Committee of the Red Cross, 'Rule 43: Application of General Principles on the Conduct of Hostilities to the Natural Environment' (ICRC Customary IHL Database) <<https://ihl-databases.icrc.org/en/customary-ihl/v1/rule43>> accessed 23 May 2025.

International Committee of the Red Cross, 'Rule 45: Causing Serious Damage to the Natural Environment' (ICRC Customary IHL Database) <<https://ihl-databases.icrc.org/en/customary-ihl/v1/rule45>> accessed 23 May 2025.

UN Human Rights Committee, 'General Comment No. 36, Article 6: Right to life' (30 October 2018) UN Doc CCPR/C/GC/36.

Universal Declaration of Human Rights, UNGA Res 217 A (III) (10 December 1948)

COUNCIL OF EUROPE OFFICIAL STATEMENTS AND REPORTS

Council of Europe, 'Emerald Network of Areas of Special Conservation Interest - Convention on the Conservation of European Wildlife and Natural Habitats' (no date) <<https://www.coe.int/en/web/bern-convention/emerald-network>> accessed 20 May 2025.

Council of Europe, 'The Russian Federation is excluded from the Council of Europe' (Council of Europe, 16 March 2022).

Parliamentary Assembly of the Council of Europe, 'Consequences of the Russian Federation's aggression against Ukraine – Opinion 300 (2022)' (15 March 2022) Doc 15506.

Parliamentary Assembly of the Council of Europe (PACE), 'PACE Welcomes Draft Convention on Environmental Crime but Calls for Stronger and More Balanced Provisions' (26 April 2023).

UN BODIES OFFICIAL STATEMENTS AND REPORTS

United Nations Development Programme, 'Soul of Soil 2.0' (no date) <<https://www.undp.org/ukraine/soul-of-soil-2>> accessed 19 May 2025.

- United Nations Environment Programme, 'Is Natural Gas Really the Bridge Fuel the World Needs?' (12 January 2023) UNEP
<<https://www.unep.org/news-and-stories/story/natural-gas-really-bridge-fuel-world-needs>> accessed 27 May 2025.
- United Nations High Commissioner for Refugees, 'Explainer: The War in Ukraine, the Human Cost and the Humanitarian Response' (UNHCR, 6 March 2024)
<<https://www.unhcr.org/news/stories/explainer-war-ukraine-human-cost-and-humanitarian-response>> accessed 15 May 2025.
- United Nations High Commissioner for Refugees, Ukraine Refugee Situation – Operational Data Portal (n.d.) <<https://data.unhcr.org/en/situations/ukraine>> accessed 27 May 2025.
- United Nations, 'How Conflict Impacts Our Environment' (no date)
<<https://www.un.org/en/peace-and-security/how-conflict-impacts-our-environment>> accessed 19 May 2025.
- United Nations International Children's Emergency Fund, '1.4 Million People Without Running Water Across War-Affected Eastern Ukraine' (15 April 2022)
<<https://www.unicef.org/press-releases/14-million-people-without-running-water-across-war-affected-eastern-ukraine>> accessed 19 May 2025.
- United Nations in Ukraine, 'Restoring Access to Water for Communities Affected by the War in Ukraine' (UN Ukraine, 15 May 2025)
<<https://ukraine.un.org/en/291380-restoring-access-water-communities-affected-war-ukraine>> accessed 15 May 2025.
- United Nations Satellite Centre, 'Cumulative Satellite Detected Waters and Impact over Khersonska Oblast in Ukraine between 06 and 09 June 2023' (UNOSAT, 9 June 2025)
<<https://unosat.org/products/3616>> accessed 19 May 2025.

MISCELLANEOUS

- Common Wealth & Climate and Community Project, A Reparative Approach to US and UK Military Ecological Damages (2023)
<https://assets-global.website-files.com/62306a0b42f386df612fe5b9/6543bc046810de2fe759cf8d_military%20emissions%20final> accessed 27 May 2025.
- Diakonia, 'Sources of International Humanitarian Law'
<<https://www.diakonia.se/ihl/resources/international-humanitarian-law/sources-international-humanitarian-law/>> accessed 18 June, 2025.
- Mykolaiv Hidden Treasures, 'Kinburn Spit' (Travelinmykolaiv.com.ua, no date)
<<https://travelinmykolaiv.com.ua/landing-page/kinburn.php>> accessed 20 May 2025.

National University of Life and Environmental Sciences of Ukraine, Landscape Fire and Safety Advisories During the War in Ukraine (2024) <<https://nubip.edu.ua/node/9087/2>> accessed 18 May 2025.

Renewables4ukraine, 'Wind Power' (#Renewables4ukraine, no date)
<<https://www.renewables4ukraine.org/wind/>> accessed 20 May 2025.

Secretariat of the Convention on Biological Diversity, 'Ukraine – Country' (no date)
<<https://www.cbd.int/countries/profile?country=ua>> accessed 20 May 2025.