

A large plume of black smoke rises from an industrial facility, likely a power plant or refinery, over a town. The smoke is thick and billowing, filling much of the sky. In the foreground, there are several industrial buildings, including a large white one with a blue roof and another with a blue roof. A power line tower is visible on the right. The town below is densely packed with buildings and trees. The overall scene is one of environmental devastation.

The ENVIRONMENTAL CONSEQUENCES of the war against Ukraine

Preliminary twelve-month assessment
(February 2022 – February 2023)

SUMMARY AND RECOMMENDATIONS

Russia's war against Ukraine is having devastating humanitarian, social, economic and environmental consequences. This report contributes to response and recovery planning in Ukraine by providing a preliminary assessment of the environmental damage and risks caused between February 2022 and February 2023. The report covers the following thematic areas: the environmental context before February 2022; military conduct; the impacts of the war on industrial and energy infrastructure, nuclear facilities and other radioactive sources, the built environment, the rural environment, freshwater resources and infrastructure, the coastal and marine environment, and on the global climate and Ukraine's climate objectives; as well as the evolving legal and regulatory frameworks.

The consequences of environmental destruction and degradation can take months or years to materialize, risks often compound and escalate when multiple and interrelated incidents take place. Transboundary impacts extending beyond war-affected areas can also prove significant. The Kakhovka dam and reservoir break and other recent environmental incidents did not fall within the timeframe covered by the report. Capturing the full extent of the environmental consequences of the war will require continuous monitoring and regular reviews, also taking into account the specific impacts of the war on gender.

The report and its visualisations were produced by the Conflict and Environment Observatory and Zoï Environment Network, with contributions from the OSCE's expert network.



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Starokostyantyniv, Khmelnytska Oblast,
July 2016. A vast field of sunflowers.

© Tim Dirven/Panos Pictures

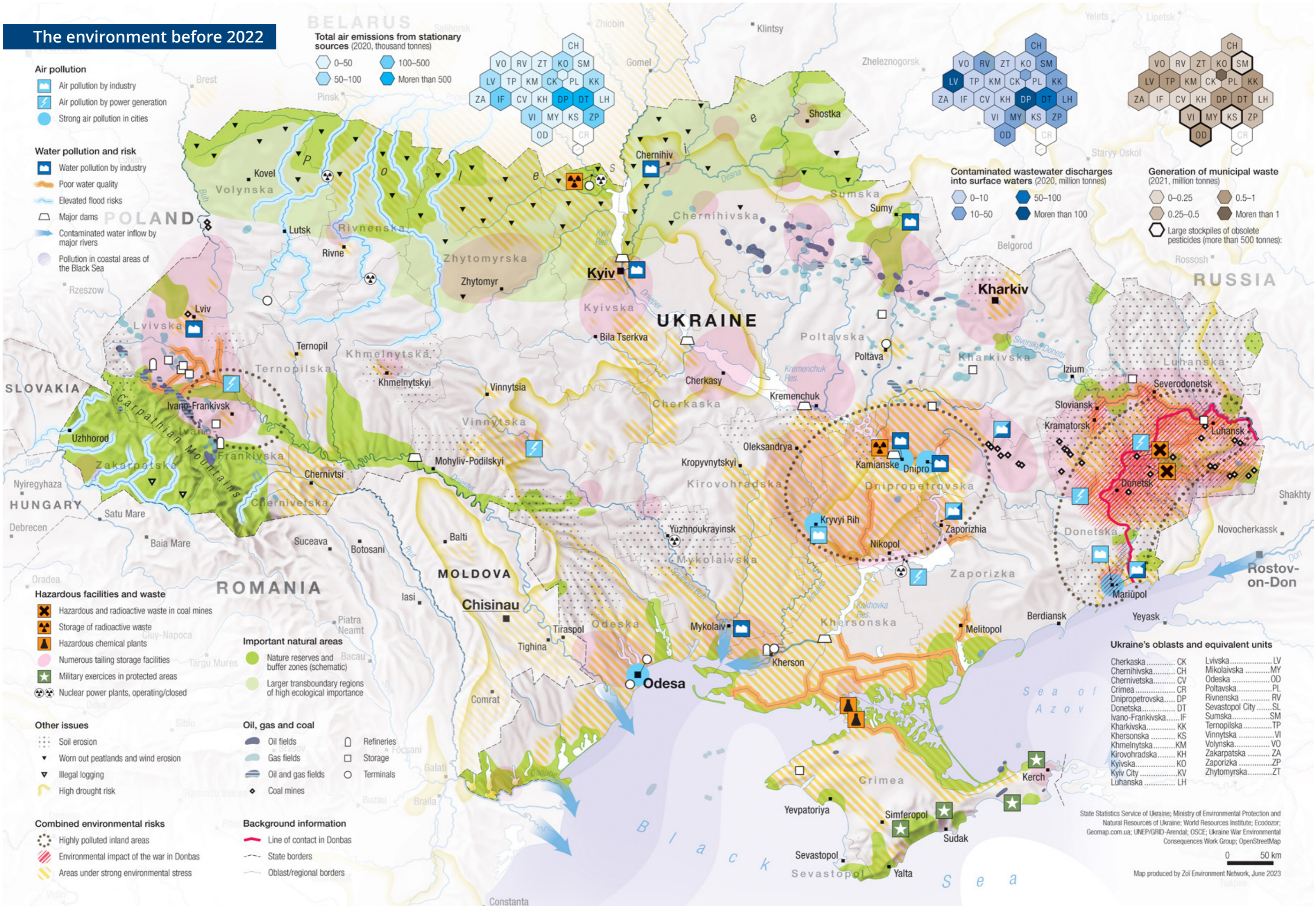
THE ENVIRONMENT BEFORE FEBRUARY 2022

Before February 2022, four environmental themes dominated in Ukraine: the many polluting industries reliant on dated technologies; the underresourcing of domestic environmental policies; ongoing efforts to transition to a green economy; and the increasing effects of climate change. Ukraine's top three pre-war environmental concerns were water pollution and scarcity, industrial and household waste management, and poor air quality.

Since 2014, environmental policy has been largely defined by the EU-Ukraine Association Agreement. Despite progress in some areas, implementation gaps remained across the environmental sector, gaps that would likely have grown wider due to expanded obligations under the European Green Deal. Traditionally strong environmental civil society organizations had become increasingly influential, and Ukraine had been assessed as performing well regionally on environmental governance. It scored highly on transparency and citizens' access, although poorly on policy coherence.

Environmental governance in Crimea and in other areas of Ukraine that are under the temporary military control of the Russian Federation had diverged from the rest of Ukraine. The war had exacerbated pre-existing stresses, and created new problems, including water crises, industrial emergencies and military pressures. In areas outside of government control, environmental cooperation across the contact line was minimal. The Ukrainian government had developed some policies to address environmental threats from these areas, but had no oversight or control of the environmental situation within them.

The environment before 2022



Lymany, Mykolaiv Oblast, July 2022
Residents and fire fighters try to extinguish a fire from a missile hit.
© Iva Zimova/Panos Pictures

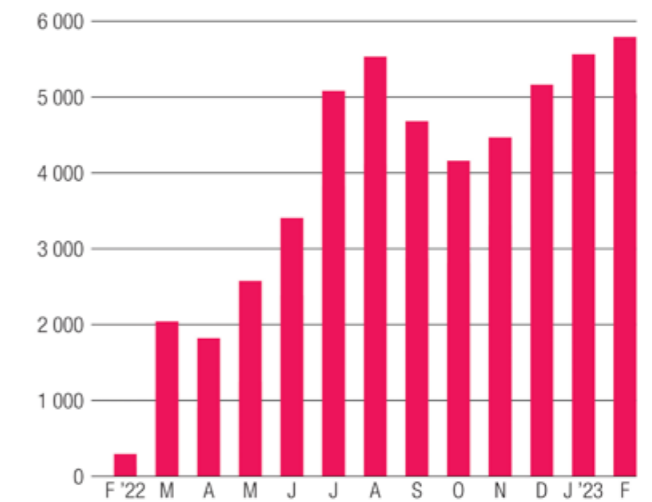


THE MILITARY ENVIRONMENT

How and where wars are fought strongly influences their impact on the environment. The dynamics of the Russian war against Ukraine varied throughout the year, but it remained a high-intensity armed conflict characterized by severe damage to settlements, environmentally hazardous infrastructure and landscapes. Long-range weapons affected sites nationwide, while the indiscriminate use of explosive force devastated areas along mobile and static front lines.

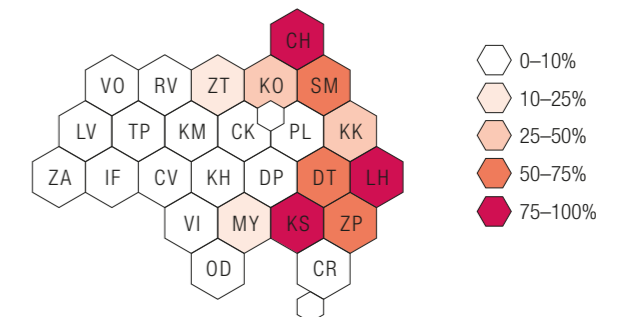
Alongside the environmental damage linked to the fighting itself, natural resources and geographical features proved strategically important to the conflict parties. This included woodlands and forestry, rivers, canals, reservoirs and coasts, offshore islands and infrastructure, agricultural shelter belts and industrial spoil heaps. The use, targeting and militarization of these features contributed to environmental harm.

Direct damage to infrastructure in cities
Number of incidents aggregated per month



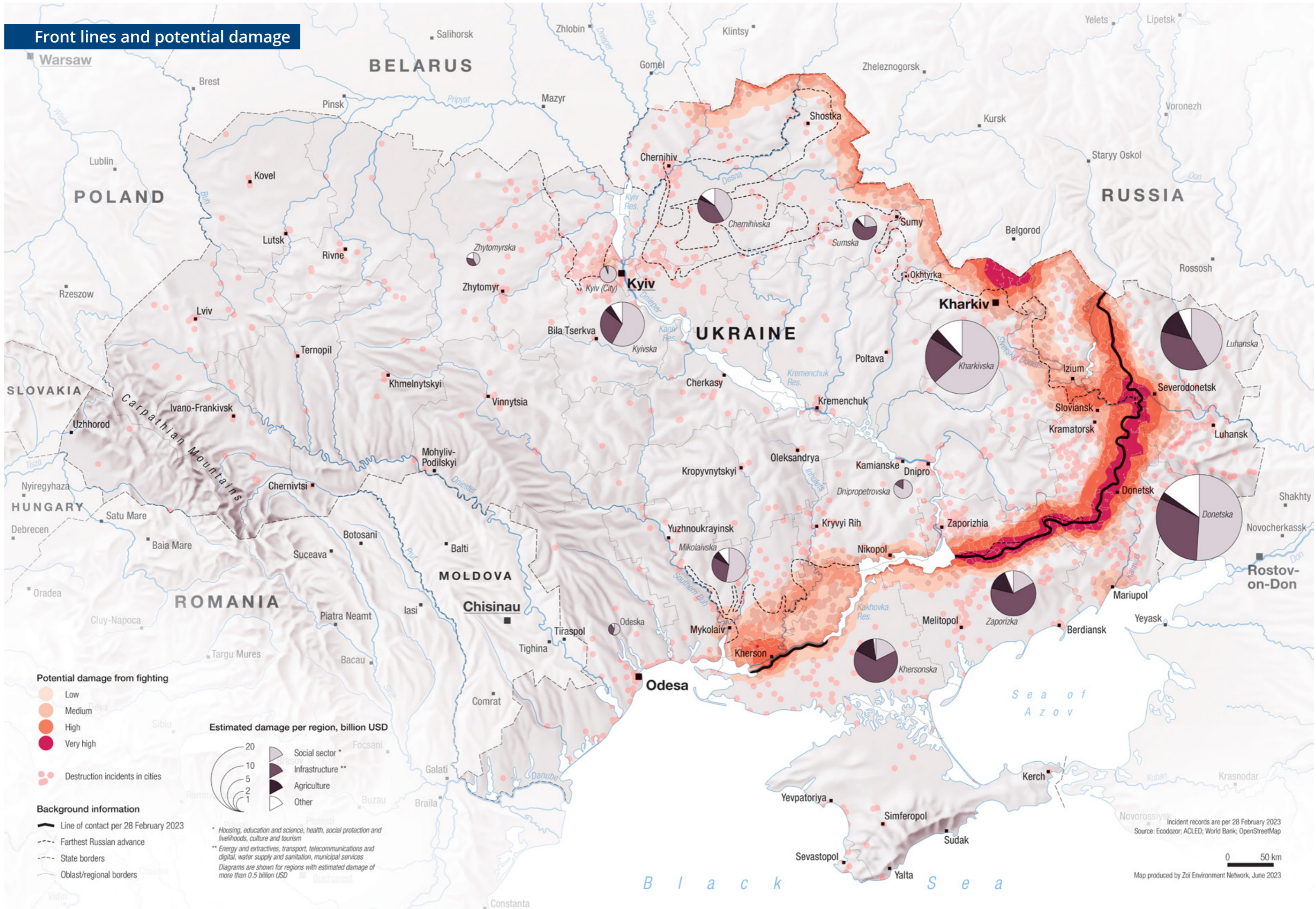
Data: www.ecodozor.org

Oblast exposure to war
(percentage of the affected area)



Please see full oblast names on page 51.
Data: The World Bank

Front lines and potential damage



THE INDUSTRY AND ENERGY ENVIRONMENT

Rivnenska Oblast, March 2022
 Firefighters at an oil depot, one of dozens of oil storage sites targeted since February 2022.
 © Rivnenska Oblast Military Administration

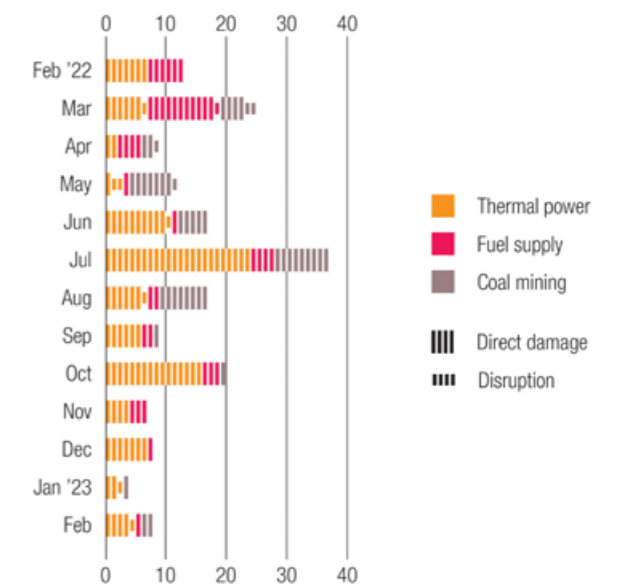


Ukraine has an extensive industrial sector, and the war caused potentially harmful incidents at hundreds of industrial facilities. These included deliberate and incidental damage, as well as disruptions due to loss of energy or water supplies. The conflict also impeded the management and monitoring of industrial facilities, as well as longer-term efforts to improve their environmental performance. Assessment and remedial activities will be complicated by the presence of legacy contamination, mines and unexploded ordnance.

Ukraine has a high fossil fuel dependency, with large gas reserves, onshore and Black Sea oil fields, and extensive coal deposits. In spite of the war, it remained a transit route for Russian gas and oil. Early attacks on fuel storage facilities in towns and cities, and at military bases, transitioned to the autumn and winter campaign against civilian energy-generating and transmission infrastructure. Deliberate and indirect damage to coal, oil and gas infrastructure led to air, soil and water pollution. The war also triggered shifts in energy exploration, generation, distribution and consumption, both domestically and internationally, with environmental ramifications that will take years to play out.

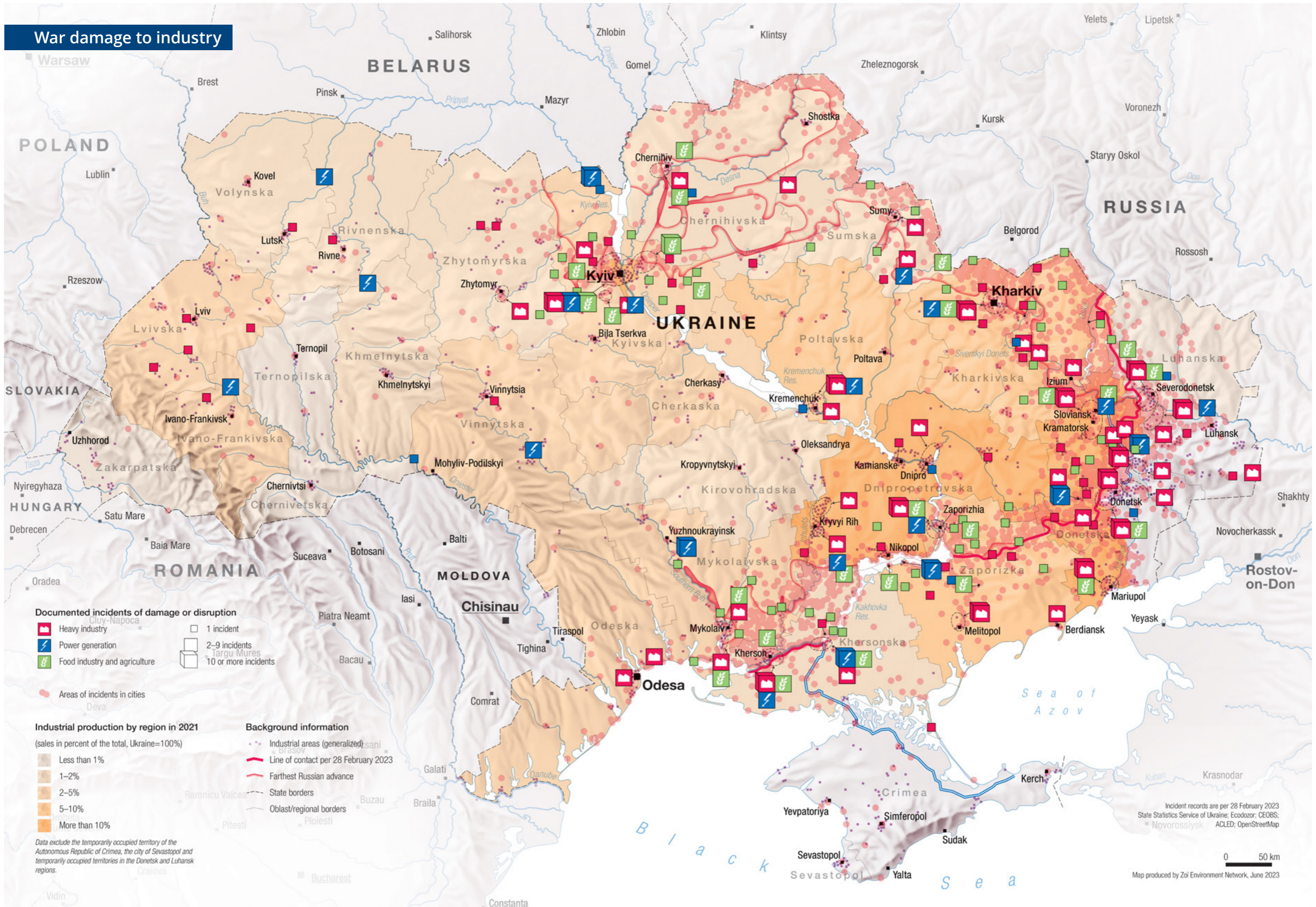
Renewable energy-generating sites, including large hydropower plants, have been impacted. Military forces have been present at major hydropower facilities, with facilities also attacked, and many of Ukraine's solar and wind energy sites are still subject to military presence.

Disruption to fuel-related infrastructure Reported incidents aggregated per month



Data: www.ecodozor.org

War damage to industry



Slavutych, Chernihivska Oblast, April 2022. Staff from the Chornobyl nuclear plant hold candles as they visit the Chornobyl Memorial

© Iva Zimova/Panos Pictures



NUCLEAR FACILITIES AND OTHER RADIOACTIVE SOURCES

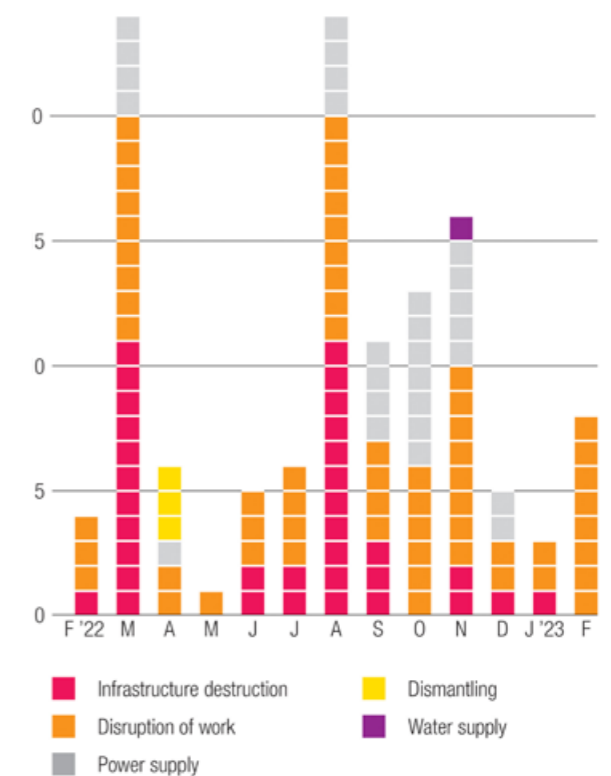
The unprecedented presence of military actors over current and former nuclear energy-generating sites has drawn attention to the range of direct and indirect threats that armed conflicts can create for nuclear and radiation safety, and to nuclear security. In turn this has posed profound challenges to the international nuclear safety architecture, and to the legal frameworks that seek to prevent facilities being drawn into hostilities.

Many other nuclear installations, and sites with radioactive materials, have also been affected. These include research reactors, interim and long-term nuclear storage facilities, uranium production and legacy sites, and industrial facilities handling or processing naturally occurring radioactive materials. Many potentially hazardous radioactive sources remain unaccounted for.

Damage or disruption from military attacks, power disruption, or organizational breakdown, may lead to risks of radioactive contamination, potentially affecting large areas of Ukraine as well as neighbouring countries. Breaches of safety systems are of key concern, as are barriers to managing pre-existing radiological contamination. Efforts have been made to repair and reinstate Ukraine's radiation monitoring network following disruption and damage.

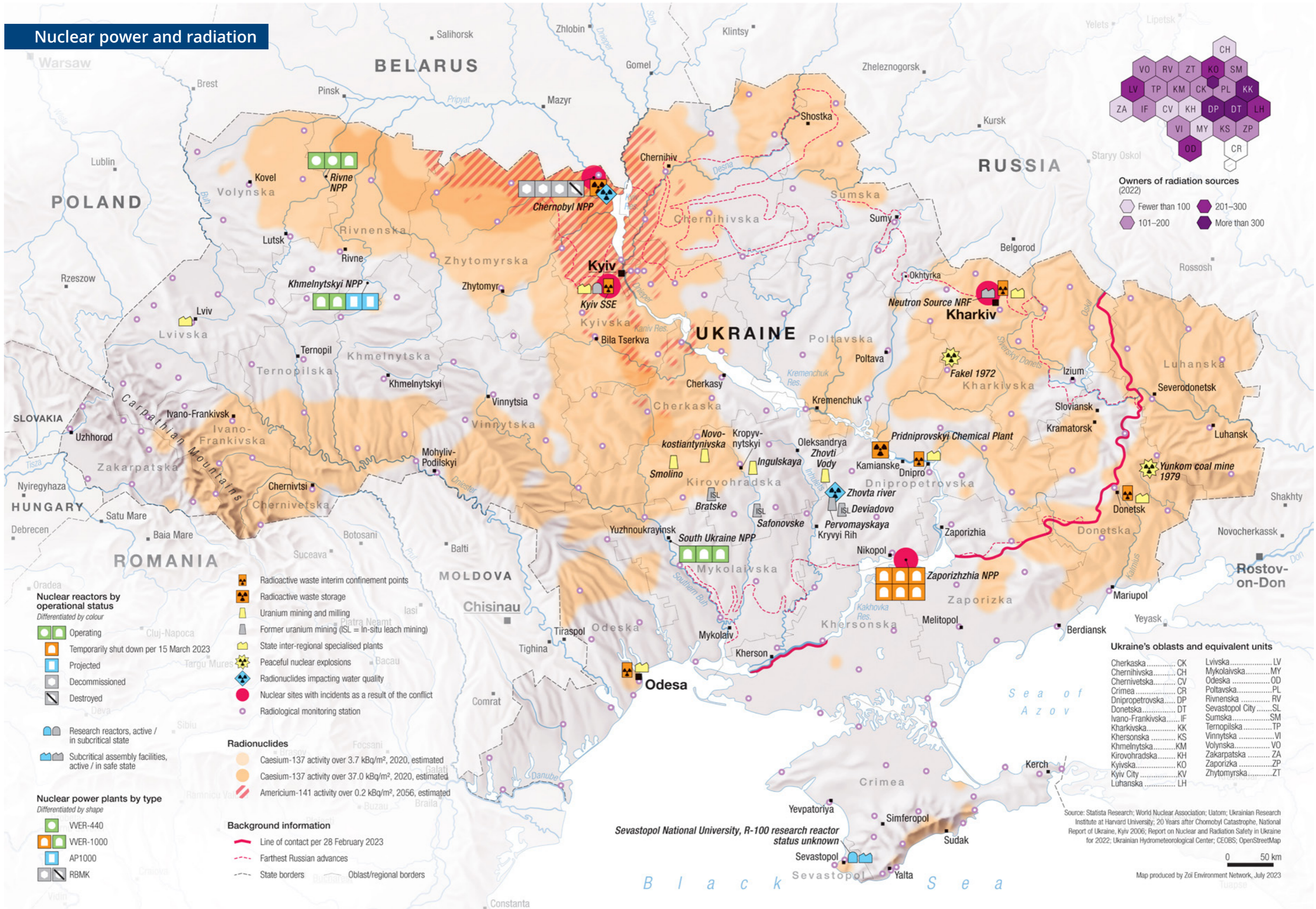
Incidents at nuclear facilities

Aggregated per month

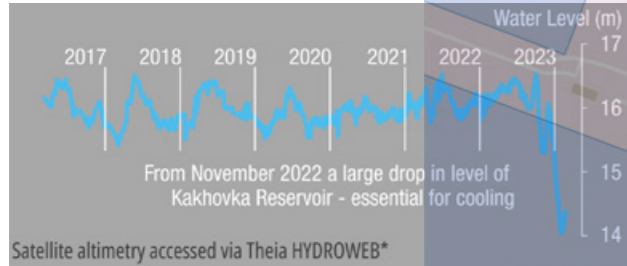


Data: www.ecodozor.org

Nuclear power and radiation



Incidents at the Zaporizhzhia Nuclear Power Plant



1. Hole in roof
29.08.2022
2. Armoured vehicles on site
05.08.2022
3. Damaged distilled water tank
20.11.2022
4. Armoured vehicles "hidden"
29.08.2022
5. Crater and UXO near spent fuel storage
07.08.2022
6. Damaged and leaking cooling pipeline
20.09.2022
7. Damaged spray pond
20.11.2022
8. Damage from loitering drone attack
20.07.2022
9. Nearby grassland fires
23.08.2022
10. Firefight as Russian troops attack plant
04.03.2022
11. Substation fire
05.08.2022



Image sources: original or modified satellite data (©MAXAR, Copernicus Sentinel-2), Daily Mail, Jurnalul Național, Nuclear Engineering International, The Insider, «Българската национална телевизия», «Запорізька АЕС», «Радіо Свобода».



Irpin, Kyivska Oblast, January 2023
An apartment building shelled and blackened by smoke during fighting in February-March 2022.

© Iva Zimova/Panos Pictures

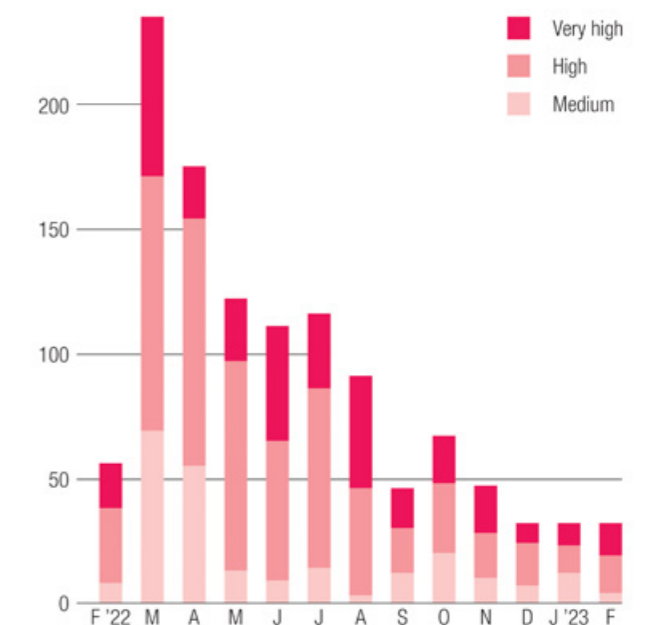
THE BUILT ENVIRONMENT

The intensive use of explosive weapons has devastated urban areas, impacting water and sanitation networks, air and land quality, and generating huge volumes of debris. Pollution and environmental concerns extend across the built environment, and are not restricted to industrial complexes and primary pollution sources. Debris volumes have placed overwhelming pressure on Ukraine's solid waste management capacity. Unexploded ordnance and hazardous materials such as asbestos are mixed in with building debris, complicating the management of waste.

The war caused localized and highly polluting air quality events and episodes, even as air quality at the city and country scale improved due to reduced economic activity. Fires affected a range of building types and industries, and human exposure to airborne pollutants has been widespread. Rural landscape fires also contributed to poor urban air quality. There have been emissions to the air from chemical facilities, and dust from conflict debris. Contaminants from smoke and chemical plumes have been deposited onto vegetation, soils and water.

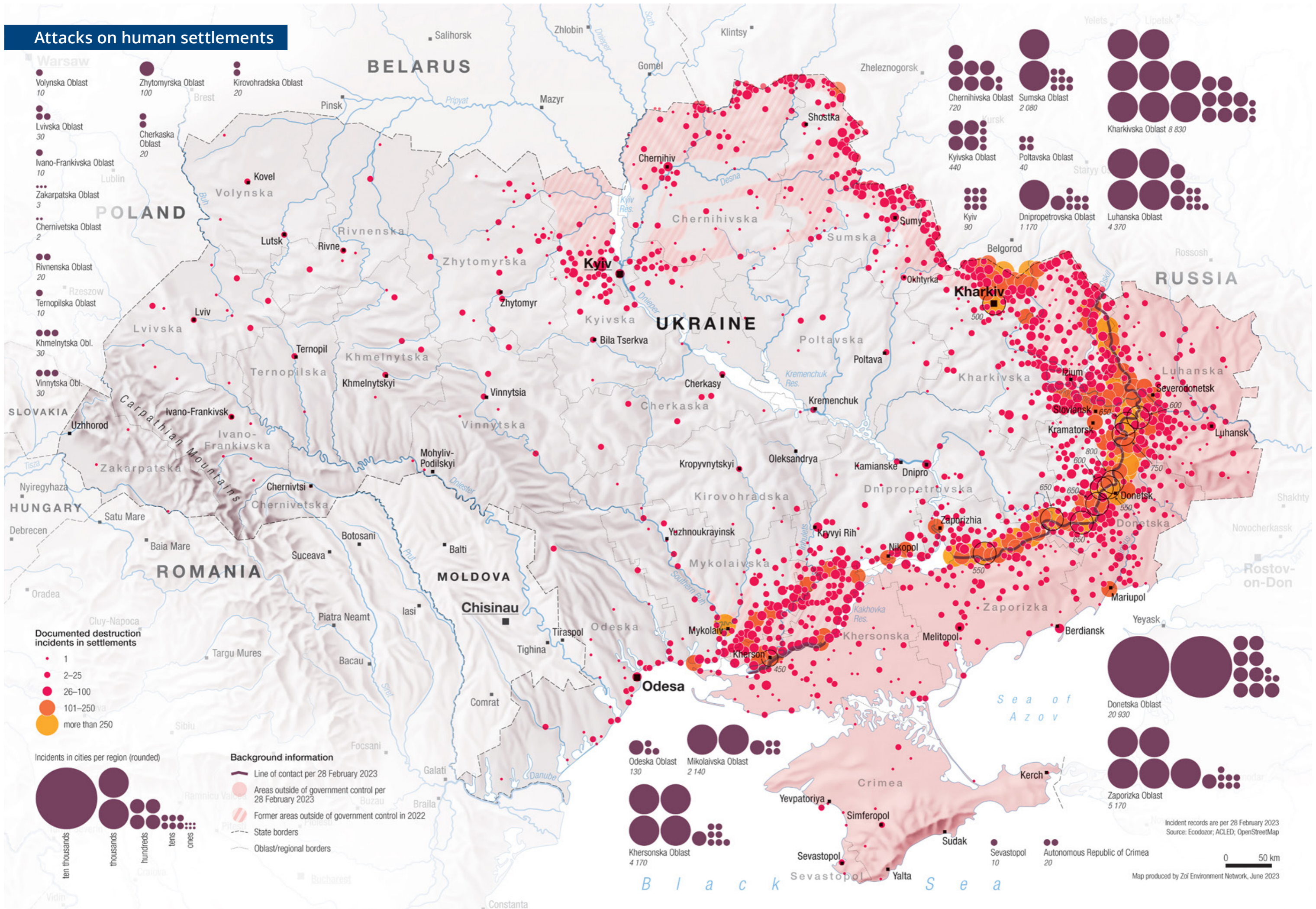
Incidents at industrial and infrastructure facilities with potential impact on air quality

Number of incidents aggregated per month



Data: www.ecodozor.org

Attacks on human settlements





Posad-Pokrovske, Khersonska Oblast,
February 2023

A bomb casing in a field near houses.

© Iva Zimova/Panos Pictures

THE RURAL ENVIRONMENT

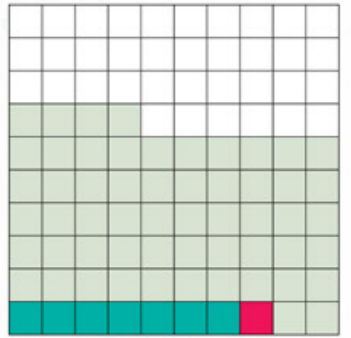
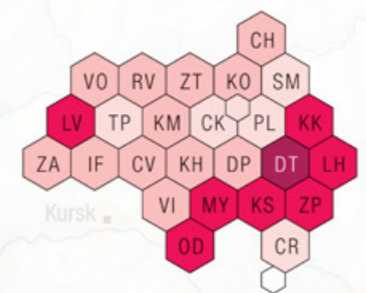
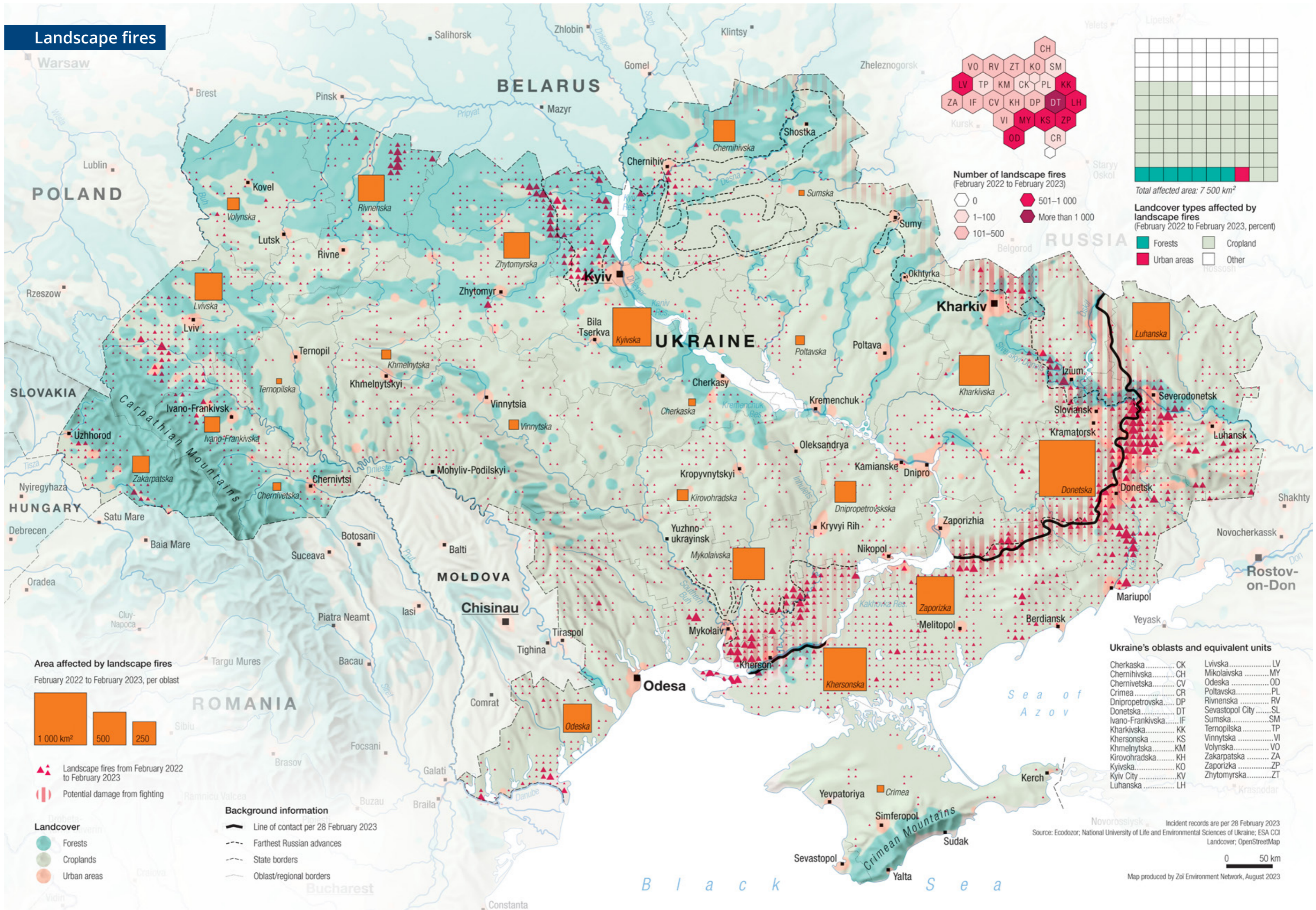
Since the beginning of the war and up until the end of February 2023, landscape fires affected an area equivalent to around one million football pitches. Two thirds of these fires were in proximity to the shifting front lines, likely a result of shelling and other military activities. While most were in agricultural areas, 12 per cent occurred in Emerald Network protected areas. Landscape fires kill wildlife and vegetation, and contaminate water bodies, disrupting ecosystems, and increasing soil erosion. Recovery is often slow. The war drove increased incidence of fires, and reduced the ability of firefighters to tackle them. It also increased future fire risks by impeding land and forest management practices, reducing firefighting capacity and increasing the prevalence of unexploded ordnance – a leading source of fires.

Widespread and severe damage to soils, crops, irrigation systems, buildings and equipment along front lines impacted both agriculturally dependent livelihoods and international food security. Damage to fertilizer, pesticide and other agrochemical storage facilities caused direct releases of pollutants into the environment. Livestock facilities have been damaged and de-energized, leading to mass animal deaths, in turn threatening microbiological pollution. Ukraine's existing problems with soil erosion and degradation have been exacerbated by damage from shelling, the movement of heavy equipment, and the construction of earthworks. Military pollution from vehicles, waste and weapon residues is expected to be widespread along front lines.

Fighting affected nationally and regionally important habitats and protected areas, with a wide range of direct and indirect impacts reported. Explosive weapons damaged trees and vegetation, and cratering left soils susceptible to erosion and disrupted fragile habitats. Wooded areas and scrub have been used for cover, and fires triggered by munitions and initiated at the firing points of heavy weapons affected wooded areas. Park buildings and infrastructure have been destroyed and equipment looted. Contamination by mines and unexploded ordnance is widespread and impeding efforts to survey damage to habitats. The war has heavily impacted existing conservation programmes and research.

The war impacted forests and forest management. Military actions and fires caused direct, physical damage, contamination by mines and unexploded ordnance, and destroyed properties and forestry equipment. Even under the best scenarios, estimates for the return of Ukrainian forestry to its pre-war condition fall in the range of at least 60-80 years.

Landscape fires



Number of landscape fires
(February 2022 to February 2023)

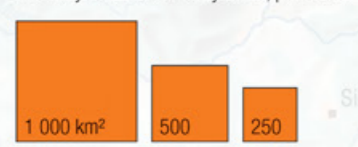
- 0
- 1-100
- 101-500
- 501-1 000
- More than 1 000

Total affected area: 7 500 km²

Landcover types affected by landscape fires
(February 2022 to February 2023, percent)

- Forests
- Cropland
- Urban areas
- Other

Area affected by landscape fires
February 2022 to February 2023, per oblast



- ▲ Landscape fires from February 2022 to February 2023
- ▨ Potential damage from fighting

Landcover

- Forests
- Croplands
- Urban areas

Background information

- Line of contact per 28 February 2023
- - - Farthest Russian advances
- - - State borders
- - - Oblast/regional borders

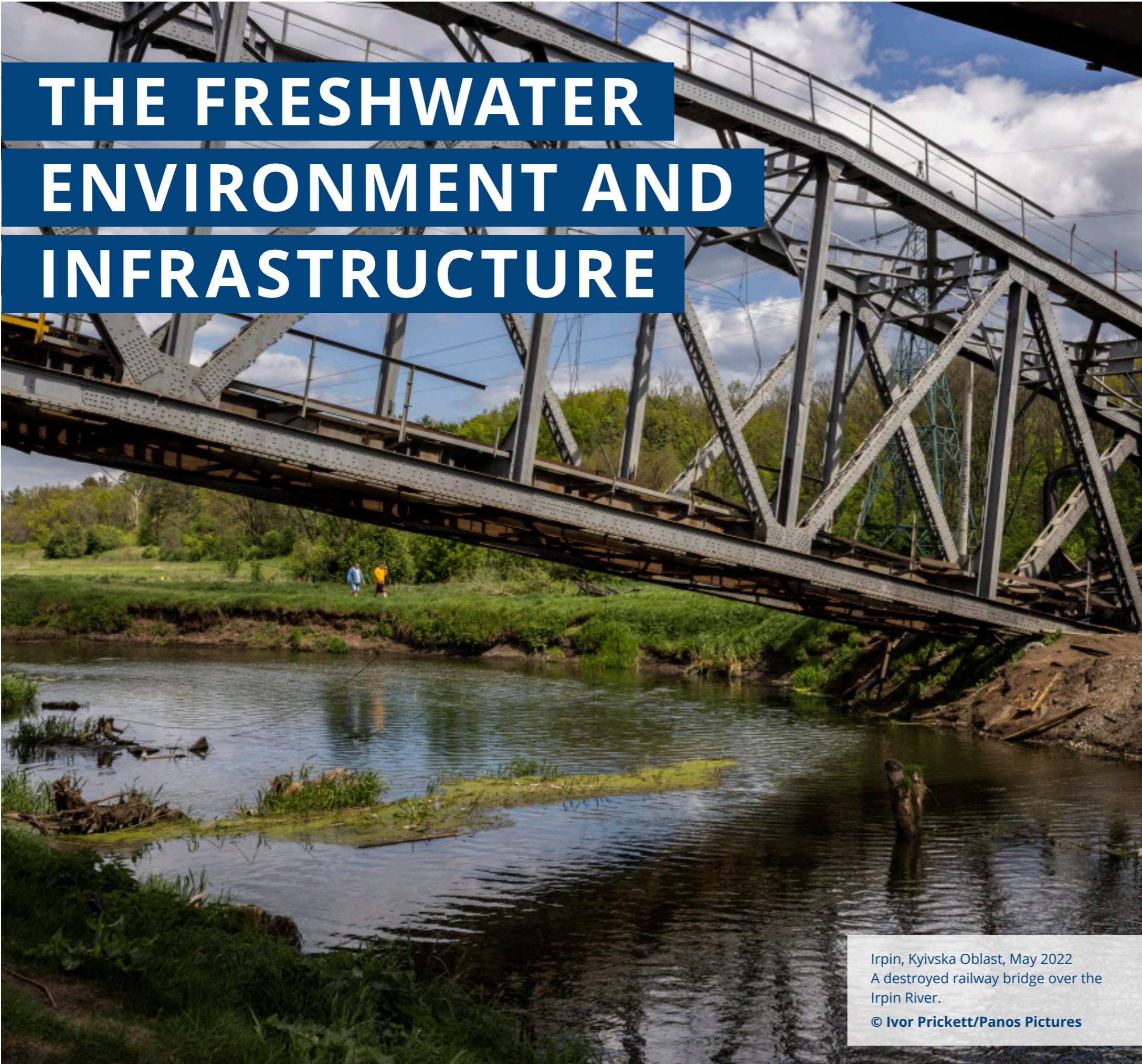
Ukraine's oblasts and equivalent units

Cherkaska	CK	Lvivska	LV
Chernihivska	CH	Mikolaiivska	MY
Chernivetska	CV	Odeska	OD
Crimea	CR	Poltavska	PL
Dnipropetrovska	DP	Rivnenska	RV
Donetska	DT	Sevastopol City	SL
Ivano-Frankivska	IF	Sumska	SM
Kharkivska	KK	Ternopil'ska	TP
Khersonska	KS	Vinnitska	VI
Kirovohradska	KH	Volynska	VO
Kyivska	KO	Zakarpatska	ZA
Kyiv City	KV	Zaporizka	ZP
Luhanska	LH	Zhytomyrska	ZT

Incident records are per 28 February 2023
Source: Ecodozor; National University of Life and Environmental Sciences of Ukraine; ESA CCI
Landcover: OpenStreetMap

0 50 km

Map produced by Zoi Environment Network, August 2023



THE FRESHWATER ENVIRONMENT AND INFRASTRUCTURE

Irpin, Kyivska Oblast, May 2022
 A destroyed railway bridge over the Irpin River.
 © Ivor Prickett/Panos Pictures

The war has caused widespread damage and disruption to water and energy infrastructure, causing pollution and flooding and cutting off water supplies to communities. Physical damage and de-energization impacted water supply and treatment systems, and triggered discharges to the environment. Pollution and run-off from damaged industrial and energy infrastructure and urban areas is widespread. Some water bodies were used or manipulated for military or strategic purposes. The risks from pollution remain particularly acute in the Donbas region, where access to water for conflict-affected communities has been a long-standing issue. Damage to urban water infrastructure impacted district heating systems, while human displacement increased pressure on water services in some areas.

Damage to hydraulic infrastructure and pollution impacted water quality, but reduced monitoring capacity means that many short-term pollution events went undetected. In addition to physical damage and de-energization, water provision has been affected by the loss of staff, finance and chemical inputs, and by the disruption of planned improvement works.

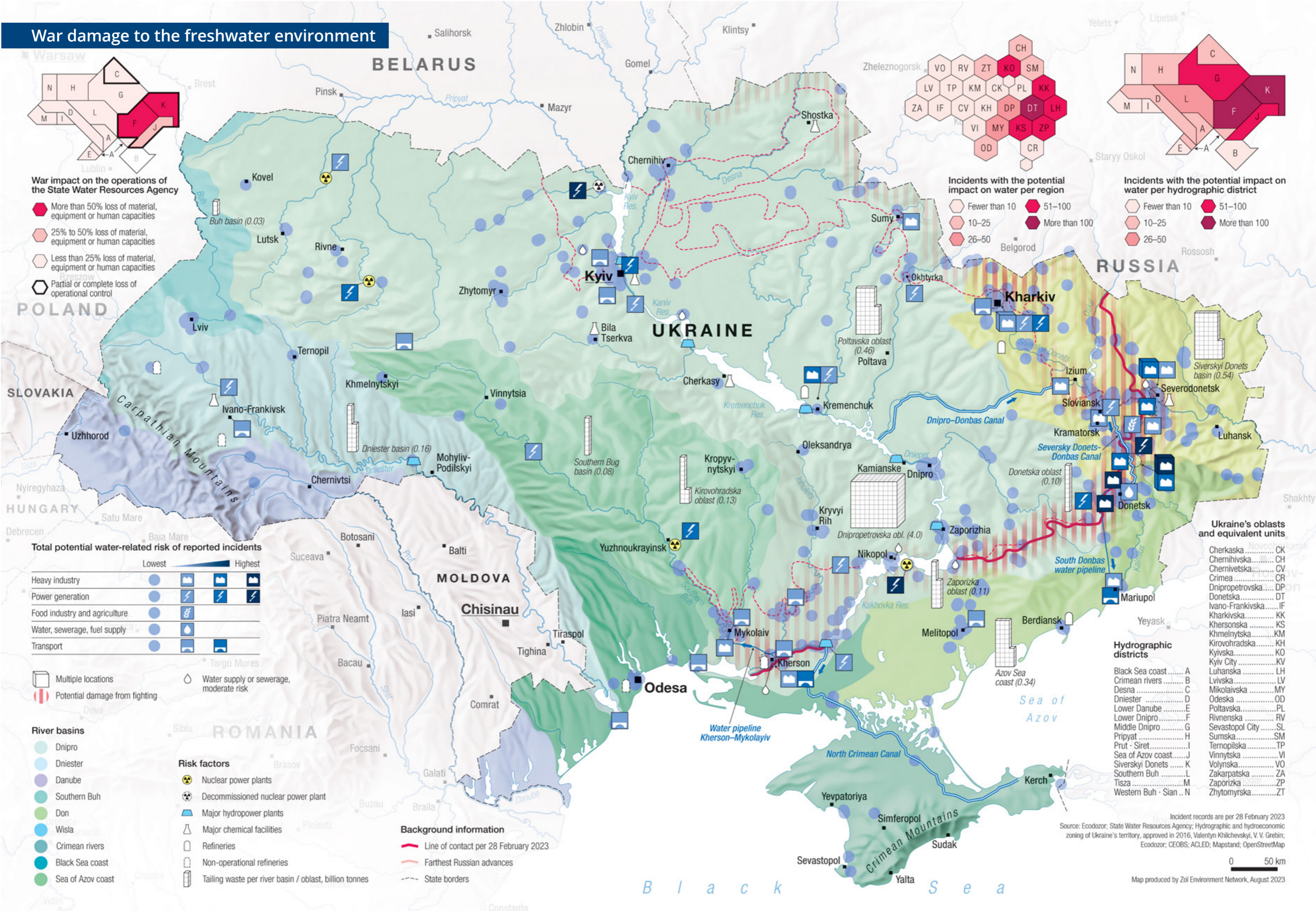
Disruption to water-related infrastructure

Number of incidents aggregated per month



Data: www.ecodozor.org

War damage to the freshwater environment



War impact on the operations of the State Water Resources Agency

- More than 50% loss of material, equipment or human capacities
- 25% to 50% loss of material, equipment or human capacities
- Less than 25% loss of material, equipment or human capacities
- Partial or complete loss of operational control

Incidents with the potential impact on water per region

- Fewer than 10
- 10-25
- 26-50
- 51-100
- More than 100

Incidents with the potential impact on water per hydrographic district

- Fewer than 10
- 10-25
- 26-50
- 51-100
- More than 100

Total potential water-related risk of reported incidents

	Lowest	High	Highest
Heavy industry	●	⚡	☢
Power generation	●	⚡	☢
Food industry and agriculture	●	⚡	☢
Water, sewerage, fuel supply	●	⚡	☢
Transport	●	⚡	☢

- Multiple locations
- Potential damage from fighting
- Water supply or sewerage, moderate risk

River basins

- Dniro
- Dniester
- Danube
- Southern Buh
- Don
- Wisa
- Crimean rivers
- Black Sea coast
- Sea of Azov coast

Risk factors

- Nuclear power plants
- Decommissioned nuclear power plant
- Major hydropower plants
- Major chemical facilities
- Refineries
- Non-operational refineries
- Tailing waste per river basin / oblast, billion tonnes

Background information

- Line of contact per 28 February 2023
- Farthest Russian advances
- State borders

Ukraine's oblasts and equivalent units

- Cherkaska.....CK
- Chernihivska.....CH
- Chernivetska.....CV
- Crimea.....CR
- Dnipropetrovska.....DP
- Donetska.....DT
- Ivano-Frankivska.....IF
- Kharkivska.....KH
- Khersonska.....KS
- Khmelnitska.....KM
- Kirovohradska.....KH
- Kyivska.....KO
- Kyiv City.....KV
- Luhanska.....LH
- Lvivska.....LV
- Mikolaivska.....MY
- Odeska.....OD
- Poltavska.....PL
- Rivnenska.....RV
- Sevastopol City.....SL
- Sumska.....SM
- Ternopilka.....TP
- Vinnitska.....VI
- Volynska.....VO
- Zakarpatska.....ZA
- Zaporizka.....ZP
- Zhytomyrska.....ZT

Hydrographic districts

- Black Sea coast.....A
- Crimean rivers.....B
- Desna.....C
- Dniester.....D
- Lower Danube.....E
- Lower Dniro.....F
- Middle Dniro.....G
- Pripyat.....H
- Prut - Siret.....I
- Sea of Azov coast.....J
- Siverskyi Donets.....K
- Southern Buh.....L
- Tisza.....M
- Western Buh - Sian.....N

Incident records are per 28 February 2023
 Source: Ecodozor; State Water Resources Agency; Hydrographic and hydroeconomic zoning of Ukraine's territory, approved in 2016, Valentyn Khilchevskiy, V. V. Grebin; Ecodozor; CE0BS; ACLED; Mapstand; OpenStreetMap

0 50 km

Map produced by Zoi Environment Network, August 2023



THE COASTAL AND MARINE ENVIRONMENT

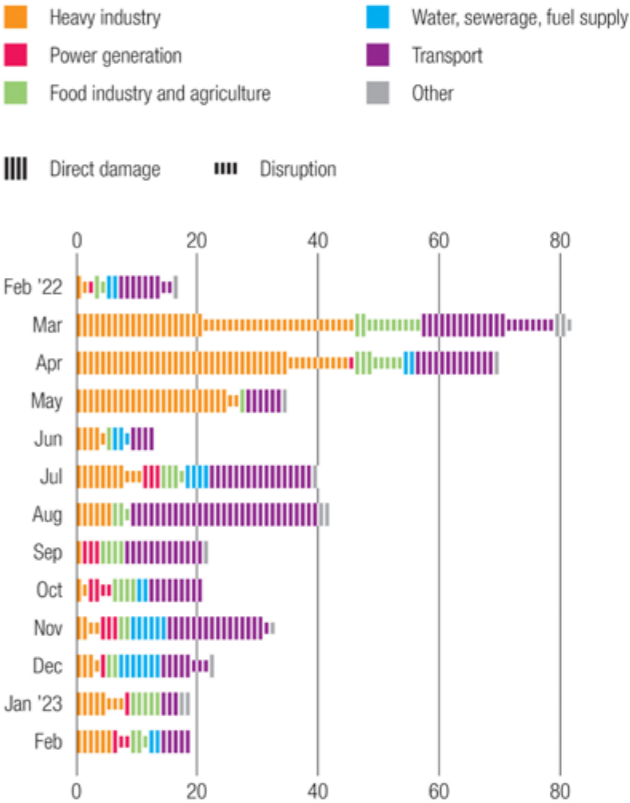
Zatoka, Odeska Oblast, September 2022
 A landmine warning sign on a beach.
 © Petrut Calinescu/Panos Pictures

Many of Ukraine's coastal and marine ecosystems have been put at risk. Threats include chemical and acoustic pollution, physical damage to sensitive habitats and the loss of management and monitoring systems, with likely transboundary consequences and impacts on Black Sea littoral countries. Meanwhile, the security context altered shipping areas and the pattern of fisheries. Attacks on naval facilities and vessels, civilian shipping and coastal settlements and port facilities have caused pollution incidents.

Sensitive coastal habitats suffered cratering and fires from explosive weapons, and have been damaged by military fortifications. The intense use of active naval sonar systems is known to harm marine life, and may be associated with the deaths of dolphins and porpoises in the Black Sea since the beginning of the war. Changes in shipping routes and fishery activity influenced pre-existing pressures on coastal and marine ecosystems.

Damage or disruption to industry and infrastructure in Ukraine's coastal areas

Number of incidents aggregated per month



Data: www.ecodozor.org

Impacts on the Black Sea and the Sea of Azov

Oil, gas and coal

- Oil fields
- Gas fields
- Oil and gas fields
- Oil pipelines
- Gas pipelines

Protected areas

- Major
- Smaller

Grain export

- Major ports for grain export or transit from Ukraine
- Grain export corridor (Black Sea Grain Initiative Shipping Route)

Background information

- Line of contact per 28 February 2023
- Areas outside of government control per 28 February 2023
- Former areas outside of government control in 2022
- State borders / exclusive economic zone (Black Sea)
- Sea depth in metres

Impacts on the marine and coastal environment

- Cetacean (dolphins, porpoises) sightings, dead or injured, on the coast between February and July 2022 *
- Impact on the marine biota due to military activities (e.g. sonar) in the Black Sea, approximate delimitation *
- Military exercises in protected areas (marine and land)
- Main areas of natural and man-made fires in 2022
- Potential oil spills between March and September 2022

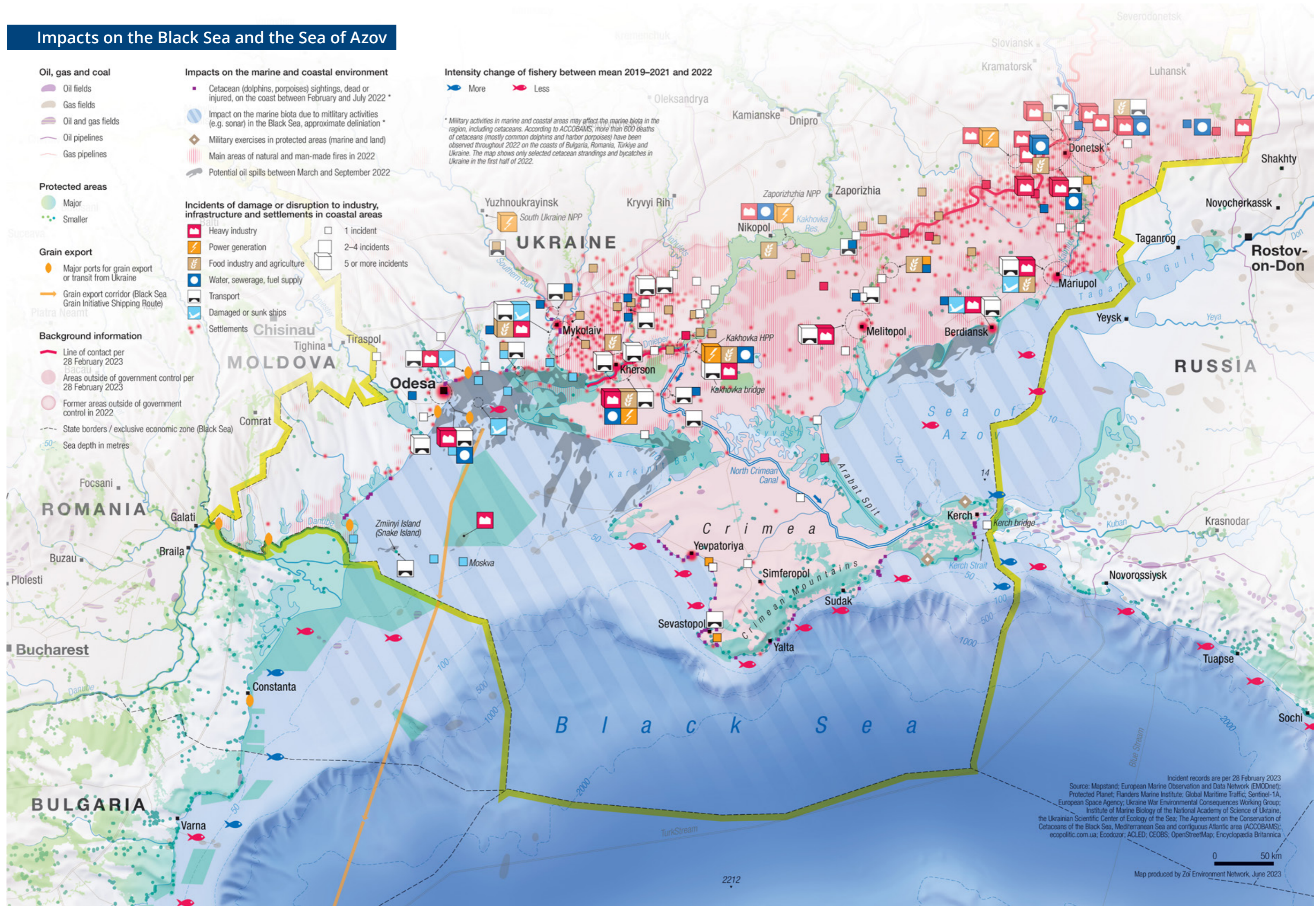
Incidents of damage or disruption to industry, infrastructure and settlements in coastal areas

- Heavy industry
- Power generation
- Food industry and agriculture
- Water, sewerage, fuel supply
- Transport
- Damaged or sunk ships
- Settlements

Intensity change of fishery between mean 2019–2021 and 2022

- More
- Less

* Military activities in marine and coastal areas may affect the marine biota in the region, including cetaceans. According to ACCOBAMS, more than 600 deaths of cetaceans (mostly common dolphins and harbor porpoises) have been observed throughout 2022 on the coasts of Bulgaria, Romania, Türkiye and Ukraine. The map shows only selected cetacean strandings and bycatches in Ukraine in the first half of 2022.



Incident records are per 28 February 2023
 Source: Mapstand; European Marine Observation and Data Network (EMODnet); Protected Planet; Flanders Marine Institute; Global Maritime Traffic; Sentinel-1A; European Space Agency; Ukraine War Environmental Consequences Working Group; Institute of Marine Biology of the National Academy of Science of Ukraine, the Ukrainian Scientific Center of Ecology of the Sea; The Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area (ACCOBAMS); ecopolitic.com.ua; Ecodozor; ACLED; CEOS; OpenStreetMap; Encyclopaedia Britannica

0 50 km
 Map produced by Zoi Environment Network, June 2023

Yampil, Donetsk Oblast, January 2023
Damaged solar panels in the town of Yampil.

© Oleg Petrasjuk/EPA-EFE



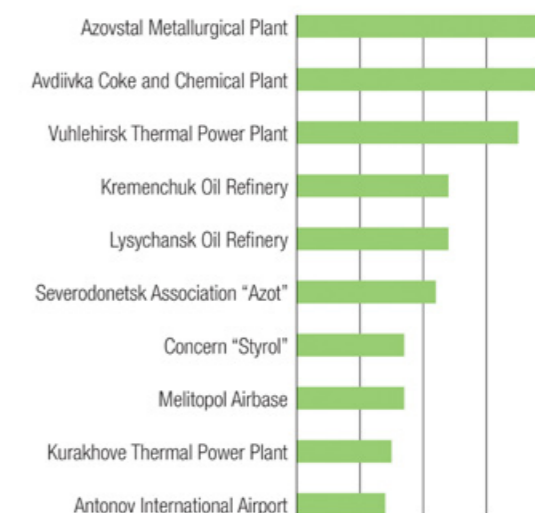
THE GLOBAL CLIMATE

Coming at a time of intensifying concern around climate change, the war focused unprecedented attention on how armed conflicts can generate emissions. And because it exposed domestic and regional fossil fuel insecurity, it created reverberating policy effects that have influenced decarbonization policies globally.

Emissions dynamics during conflicts are complex, and calculating overall emissions is methodologically in its infancy. Reduced industrial and economic activity may lower emissions, while fires, military fuel use and landscape degradation can all contribute to them. The war influenced climate policies and emissions beyond Ukraine. These extra-territorial factors included the weaponization of oil and gas supplies; the impact of airspace closures on the fuel consumption of civil aviation; and the carbon cost of sharp increases in military operations and procurement.

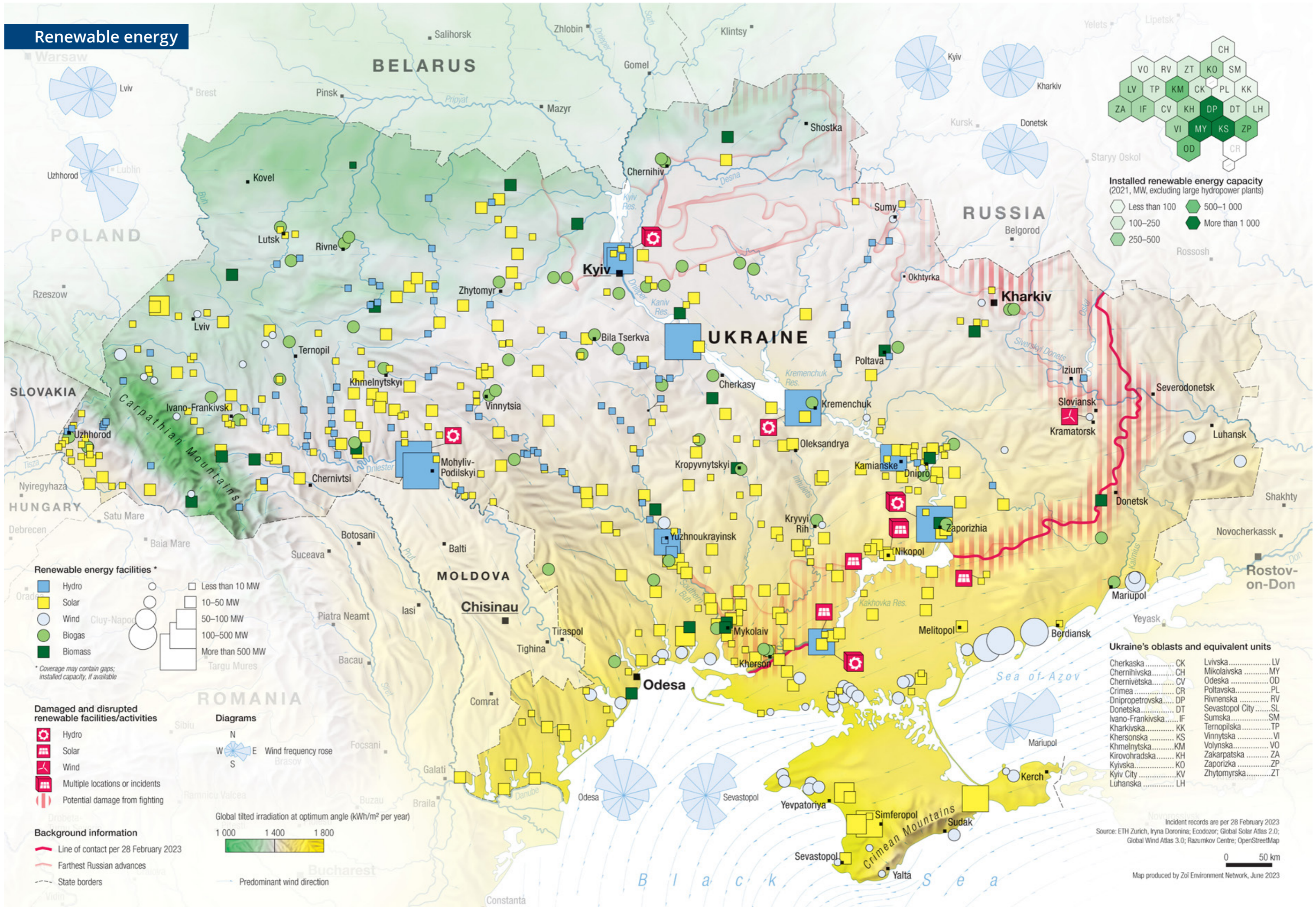
Ukraine has the most energy intensive economy in Europe, a high dependence on fossil fuels, ageing industrial and energy infrastructure, a devastated economy, and vast reconstruction needs. Nevertheless, there are expectations that its recovery will integrate response and adaptation to climate change. Priority areas include urban planning, industrial modernization, transport, energy generation and the recovery of forestry, agriculture and ecologically important areas.

Total potential climate impact of incidents by facility (top ten)



Data: www.ecodozor.org

Renewable energy



THE LEGAL AND REGULATORY ENVIRONMENT

Zatoka, Odeska Oblast, September 2022
Seaside in ruins: the environment needs stronger rights.

© Petrut Calinescu/Panos Pictures

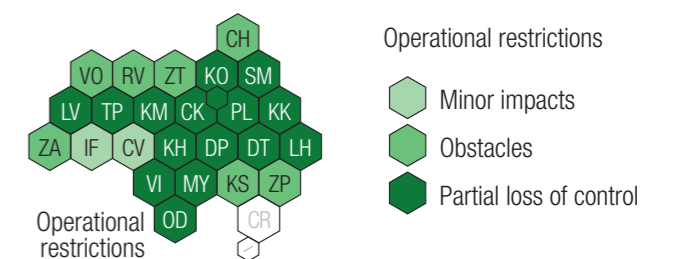


The war is accepted by many states and commentators to constitute an international armed conflict, meaning that the 1949 Geneva Conventions and their Additional Protocol I apply, as does the customary IHL applicable in international armed conflicts. IHL contains both environment-specific and general rules that afford protection to the environment, including the principles of distinction, proportionality and precautions. Specific rules are also in place regarding attacks on dams and nuclear energy facilities, and objects indispensable to the civilian population. Further protections can be sourced from Human Rights and Environmental Law, and a suite of principles on the protection of the environment in relation to armed conflicts, which were agreed in 2022. Even though accountability for environmental damage in conflicts is underdeveloped, potential avenues for compensation are available to Ukraine.

The war triggered rapid changes in Ukraine's domestic environmental law and institutional frameworks. Activities focused on three areas: efforts to protect the environment from damage caused by the war; the potential risk of neglecting the environment during the period of martial law; and developing frameworks for criminalization and reparations.

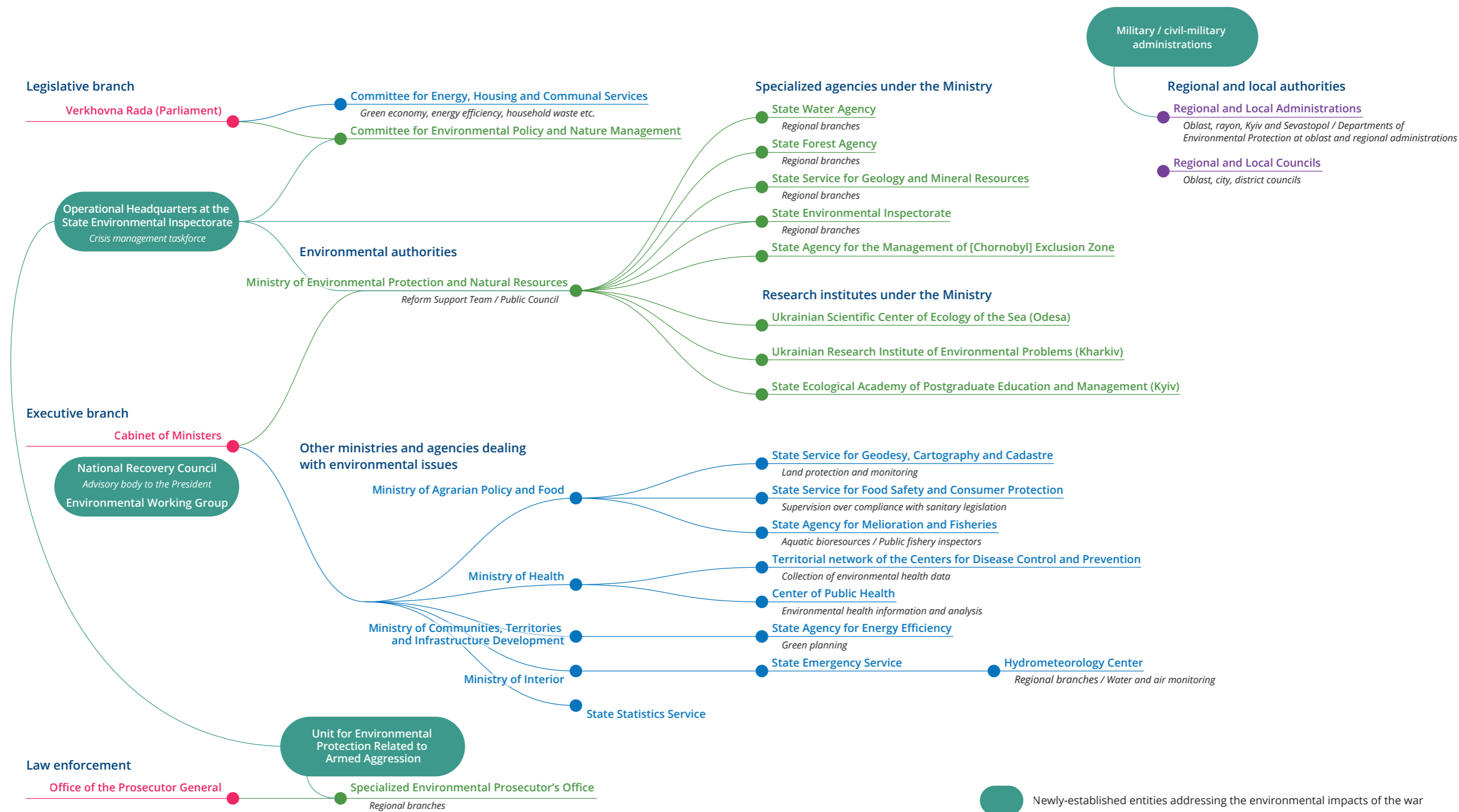
Two specific environmental governance priorities were pursued: establishing mechanisms for environmental damage assessment, with a view to legal claims for damages, and future recovery strategies; and sustaining work to deepen integration with EU environmental frameworks and policies. EU integration remained largely on course in spite of the constraints caused by the war, but the war significantly affected the day-to-day functions and capacities of the authorities, and forced adaptive changes to institutional structures.

War impact on the operations of the State Environmental Inspectorate



Please see full oblast names on page 51.
Data: State Environmental Inspectorate

Environmental institutions in Ukraine



The chart is simplified and does not show all the entities, some agency names are shortened.

Chart produced by Zoi Environment Network, September 2023.

RECOMMENDATIONS

Cost

- \$
- \$\$

Time scale

- Short-term
- Mid-term

Category of action

- Data collection
- Capacity building
- Environmental recovery
- Environmental mainstreaming

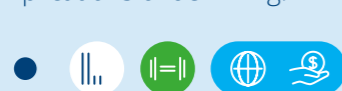
Actors*

- International community
- Civil society and academia
- Private sector

* Besides the indicated actors, the Government of Ukraine is key to implementing all the recommendations.

OVERARCHING RECOMMENDATIONS

Urgently review and update Ukraine's emergency preparedness planning and capacity in nuclear, industrial and critical infrastructure safety, working with site operators to mitigate potential risks from specific facilities, including the implications of demining.



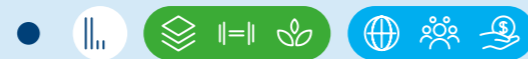
Review and enhance Ukraine's domestic capacity for environmental sampling and analysis, as well as other environmental activities, including through the provision of relevant training, laboratories, and equipment such as chemicals, vehicles, drones and PPE.



Identify priority sites for early assessment or intervention using remote and local data collection, regulatory datasets and owner consultations, and historical pollution profiles.



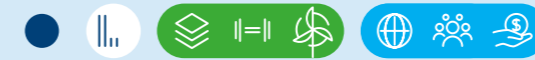
Strengthen co-ordination in environmental monitoring and data management in line with international standards, supported by international donors and partners and committed to the long-term response to the environmental consequences of the war.



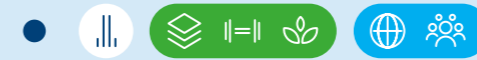
Raise public awareness of the environmental dimensions of the conflict and of the importance of a sustainable recovery, integrating the involvement of diaspora expertise in the design of programmes and activities.



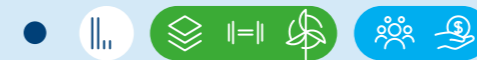
Encourage the expansion of community-based, low-cost participatory environmental monitoring of air, water and land quality to support state monitoring and increase public environmental engagement.



Create a network of models to compensate for data gaps, and relate these to observational data from government and other sources.



Regularly review laws and policies to identify areas where public access to environmental information and public participation in decision-making can be restored in order to strengthen cooperation with civil society, the private sector and public.



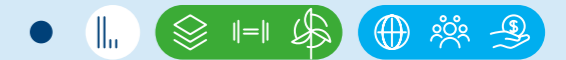
Ensure early engagement and coordination with donors and financial stakeholders to support environmental recovery over the medium to longer term.



Develop a comprehensive environmental assessment and recovery plan, committing to strengthened environmental governance in Ukraine in order to facilitate post-conflict recovery and EU regulatory alignment, also taking into account the specific impacts of the war on gender.

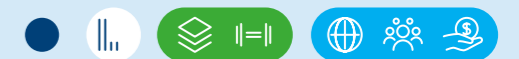


Ensure that the environment along with climate and health considerations are fully addressed and integrated in response, recovery and reconstruction planning.



HEAVY INDUSTRY

Restore environmental monitoring in proximity to damaged and polluting sites.

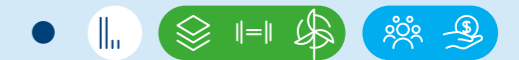


Develop policies to guide financing and responsibility for the long-term management and remediation of damaged industrial sites.



ENERGY: fossil fuels

Assess and minimize the environmental consequences of shifts in domestic fossil fuel production caused by the war.



Leverage the crisis in fossil fuel supplies to accelerate the domestic clean energy transition.



Address fire risks and extinguish fires at offshore production platforms.



ENERGY: nuclear and radioactive

Undertake an inventory of licensed facilities that held or employed radioactive sources.



Increase capacity for radiation and nuclear emergency preparedness, including the review and updating of site-specific action plans.



ENERGY: renewable energy

Adjust policies and explore new financing models to facilitate the rollout and expansion of decentralized renewable energy generation to boost energy security and reduce emissions, while ensuring that environmental impact assessments are undertaken.



Review the benefits of the permanent removal of hydropower infrastructure for riparian ecosystems prior to reconstruction or rebuilding.

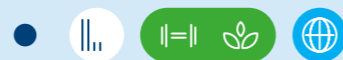


Provide training on EU standards on renewable electricity, heat and energy efficiency to facilitate the energy transition.



BUILT ENVIRONMENT: debris and waste

Estimate debris volumes and support capacity planning for waste management infrastructure and protocols, setting recycling and zero-waste-to-landfill targets for non-hazardous wastes and provisions for the assessment and treatment of hazardous waste.



Enhance capacities for the monitoring and management of asbestos-containing waste.



Identify vulnerable residential areas and environmental assets in proximity to damaged industrial and other high-risk facilities.

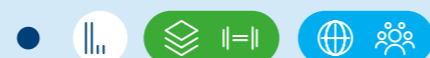


Ensure the appropriate assessment of ground conditions prior to reconstruction or land-use changes, including consideration for any occupancy or new structures on potentially contaminated land.



BUILT ENVIRONMENT: air quality

Conduct a more granular analysis of the air quality data currently available, including satellite and ground data, and investigate relevant hospital admissions records.



Restore and expand air quality monitoring, with measurements of a broader range of pollutants and with greater temporal frequency and spatial coverage.



RURAL ENVIRONMENT: ecologically important areas

Ensure that ecologically important areas are demined, and that demining is undertaken in an ecologically sensitive manner.



Provide capacity-building and training for park, local government and ministry staff on nature-positive ecological restoration.



Pursue the nature-positive management or rewilding of heavily impacted terrestrial areas, integrating this with pre-existing plans to expand the protected area network.



RURAL ENVIRONMENT: agriculture

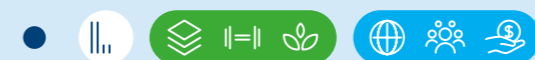
Where possible, minimize the use of mechanical demining to reduce the risks of soil erosion or contamination from toxic munition components.



Assess any secondary environmental risks arising from informal demining undertaken by farmers.



Ensure that remediation assessments extend to rural communities, including shelled fields, agricultural infrastructure, and agrochemical stores, and develop soil management protocols for the reinstatement of craters and exposed soils.



Incentivize the adoption of sustainable agricultural practices and support well-planned land restoration, rewilding or afforestation in liberated areas where soils have been severely impacted.



Replant, restore or expand agricultural shelter belts.

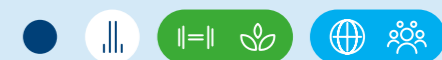


RURAL ENVIRONMENT: forestry

Develop and sustain a remote monitoring system for forests and inventories in the conflict-affected areas.



Conduct explosive ordnance risk education for forestry staff and local communities, and train and equip firefighters for tackling the risks from unexploded ordnance.

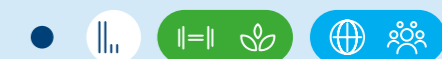


RURAL ENVIRONMENT: fires

Support training in international best practice on fighting wildfires, and establish a national incident management system.



Strengthen voluntary rural fire services and local community-based teams for wildfire defense, and study the challenges created by the war, climate change and socio-economic changes.



Complete the National Landscape Fire Management Strategy, including any adjustments to EU directives.



THE FRESHWATER ENVIRONMENT AND INFRASTRUCTURE

Identify the areas most at risk and sensitive to groundwater pollution, including areas with pre-existing contamination.



Assess the extent of damage and disruption to the water supply and to wastewater networks.



Support integration of the assessment of the impact of the armed conflict in river basin management plans.



Update the risk assessment for coal mine flooding.



THE COASTAL AND MARINE ENVIRONMENT

Map all shipwreck sites in order to facilitate future monitoring.

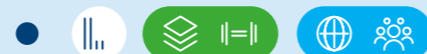


Assess and, where possible, minimize the environmental consequences associated with changes in shipping and fisheries patterns.



THE GLOBAL CLIMATE

Support further assessment of the long-term climatic consequences of the war, and communicate the findings through UNFCCC-related processes.



Ensure that climate resilience and the green energy transition are fully embedded in recovery planning, and across all sectors.



LEGAL AND REGULATORY

Provide instruction and training in the international legal rules protecting the environment in relation to armed conflicts, such that the rules are integrated into operational military planning, as well as cultures and values.



Pursue accountability for environmental damage linked to the conflict through the enforcement of state responsibility and the prosecution of criminal conduct.



Ensure that evidence of conflict-linked environmental harm in Ukraine is accepted in the Hague-based Register of Damage.



Review Ukraine's environmental policy and regulatory framework to ensure that it has the capacity and tools necessary to implement an environmentally sound reconstruction and recovery that aligns with EU integration.



Abbreviations used in inset maps

CK	Cherkaska Oblast
CH	Chernihivska Oblast
CV	Chernivetska Oblast
CR	Autonomous Republic of Crimea
DP	Dnipropetrovska Oblast
DT	Donetska Oblast
IF	Ivano-Frankivska Oblast
KK	Kharkivska Oblast
KS	Khersonska Oblast
KM	Khmelnyska Oblast
KH	Kirovohradska Oblast
KO	Kyivska Oblast
KV	Kyiv City
LH	Luhanska Oblast
LV	Lvivska Oblast
MY	Mykolaivska Oblast
OD	Odeska Oblast
PL	Poltavska Oblast
RV	Rivnenska Oblast
SL	Sevastopol City
SM	Sumska Oblast
TP	Ternopil'ska Oblast
VI	Vinnytska Oblast
VO	Volynska Oblast
ZA	Zakarpatska Oblast
ZP	Zaporizka Oblast
ZT	Zhytomyrska Oblast

Cover photo:

Odesa, April 2022.

Smoke is visible due to the missile hit at a storage facility with petroleum products.

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