

The Impact of Military Actions on the Environment of Ukraine



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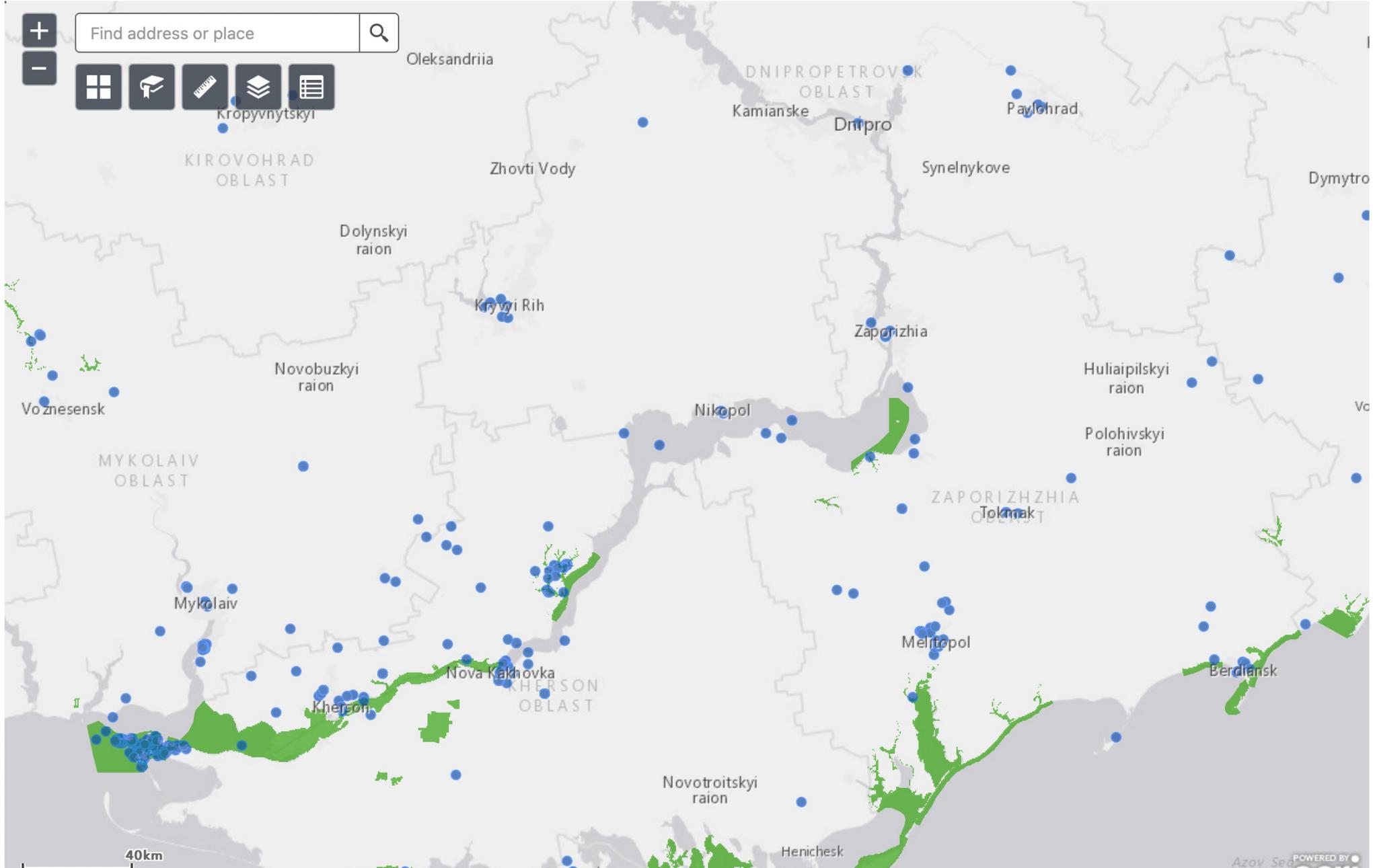


Part 1:

Objectives Work Team



EPL
Database of
impacts of
military
operations
on the
environment



EPL expeditions during 2022-2024 years.

- Liberated territories.
- Territories affected by hostilities.
- Nature conservation areas.
- Territories with natural ecosystems.

In some territories, we conduct monitoring and go there every year or several times a year.

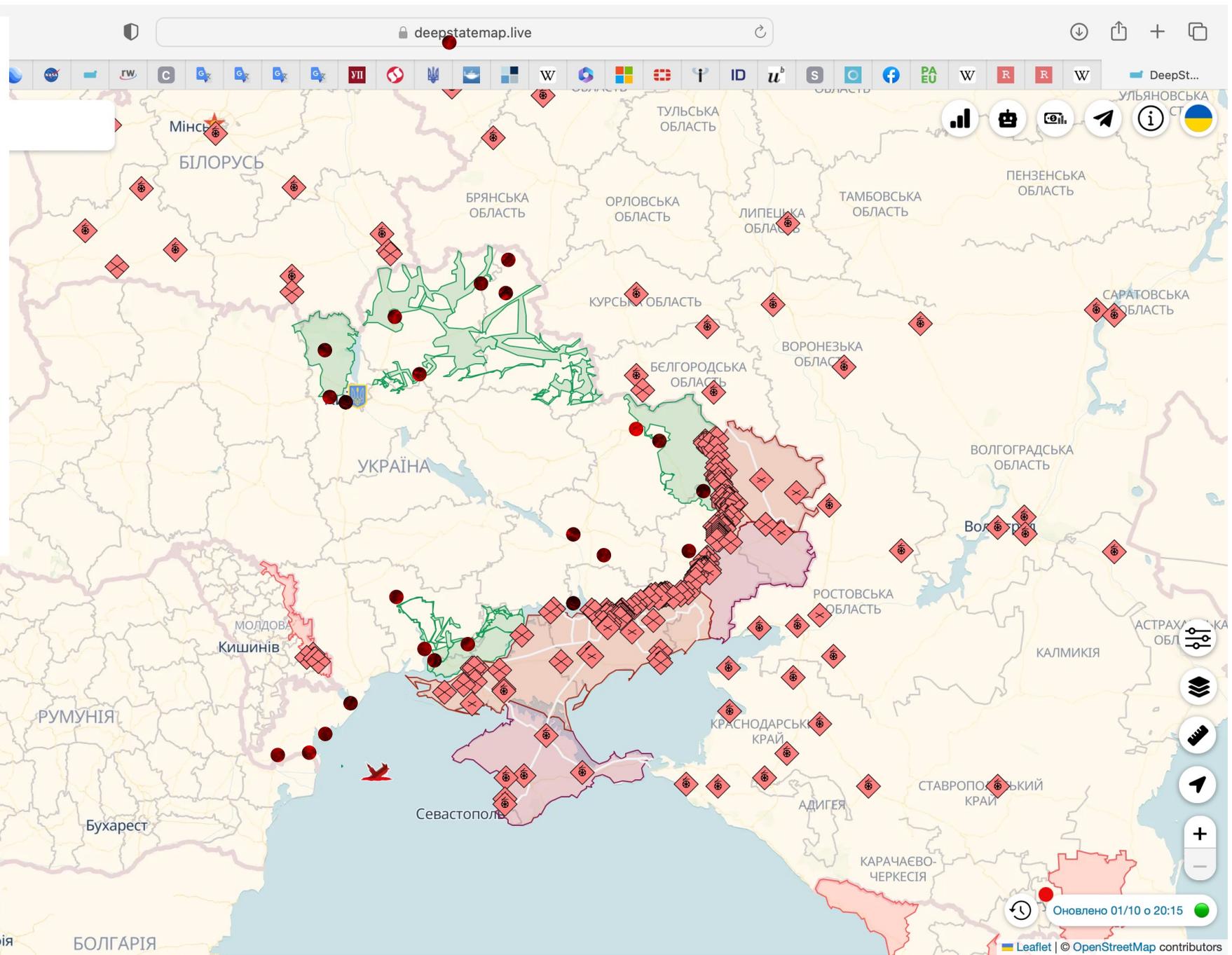




Photo from the expedition on the territory of the Kamianska Sich National Nature Park in 2023.



Serhiy Skoryk,
Director of NPP Kam'yanska Sich

Expedition in October 2024
to the territory of the island of Khortytsia
in the city of Zaporizhzhia.
Study of overgrowth of the Kakhov reservoir



Part 2:

Pollution by explosive objects

Demining

Contamination by destruction waste

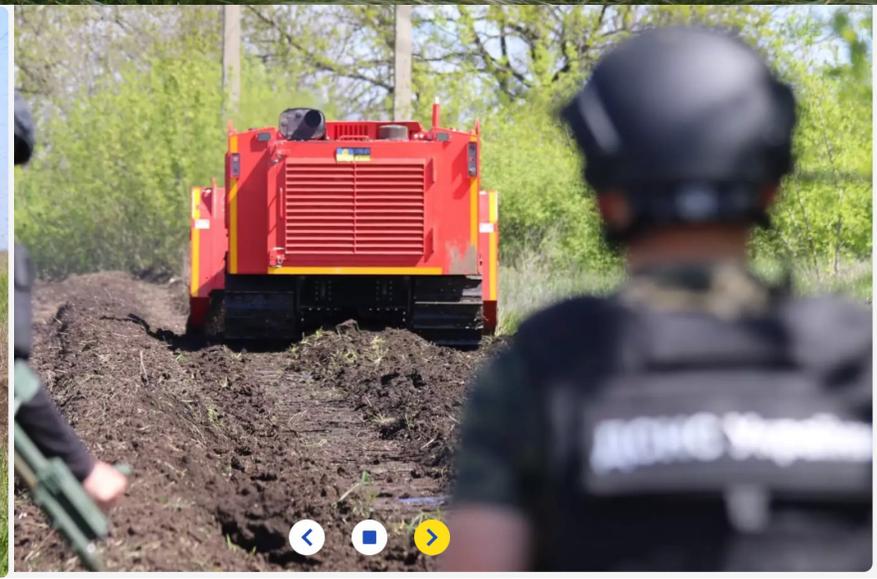
Different types of ecosystems

Difficulties in demining forests, natural steppes, nature conservation areas



Protected steppe and the MV-10 mechanized demining machine

The need to solve the question of how to demine natural areas ecologically and safely?



Забруднена територія - будь-яка територія (акваторія), що містить вибухонебезпечні предмети. Закон України «Про протимінну діяльність в Україні»



TM-62M

Забруднення вибухонебезпечними предметами. Фото з експедиції ЕПЛ



Небезпека від снаряду: ризик того що він вибухне, корозія – потрапляння небезпечних речовин в довкілля, хімічне забруднення ґрунтів та вод вплив на живі організми, закритий доступ до території, неможливість здійснення менеджменту.





Касетный боеприпас

9Н210

A crater from an aerial bomb. Donetsk region, 2022



Different types of craters Mykolaiv and Kherson region 2022-2023.



A crater from a North Korean missile. Kyiv Region 2024





CRATER FROM AN EXPLODED S-300
MISSILE (KHERSON REGION,
SEPTEMBER 2023)



Explosion products on the slopes of the crater



Remains of material
from the S-300
missile
in the crater





Shrapnel in the soil
on the slopes
of the crater

[Depending on the
model of the rocket,
there may be
4,500 - 7,500 pieces
of cubic shrapnel]



EPL conducted a study of soil contamination in 2014. From the beginning of Russia's armed aggression in eastern Ukraine. Soil samples were taken and the number of craters was counted, which made it possible to calculate the contamination of the territory.



Рис. 5. Місця обстрілів біля с. С

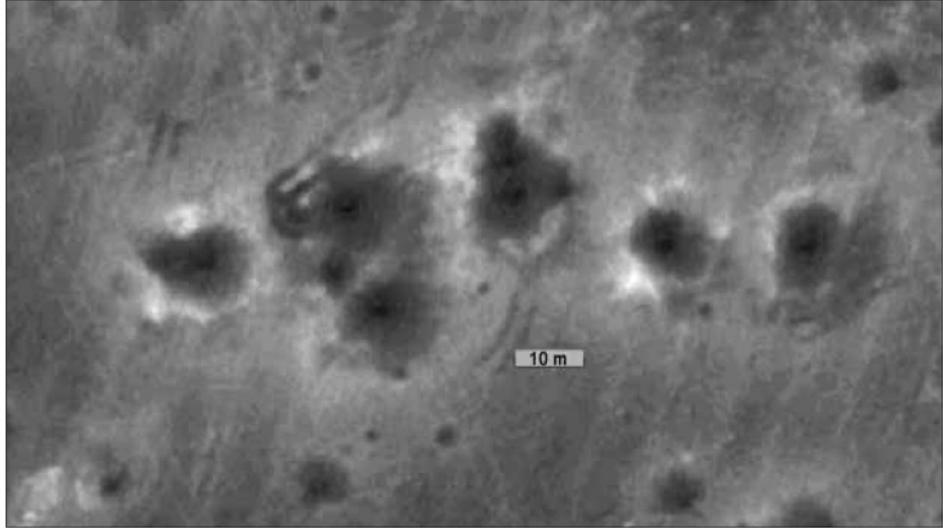
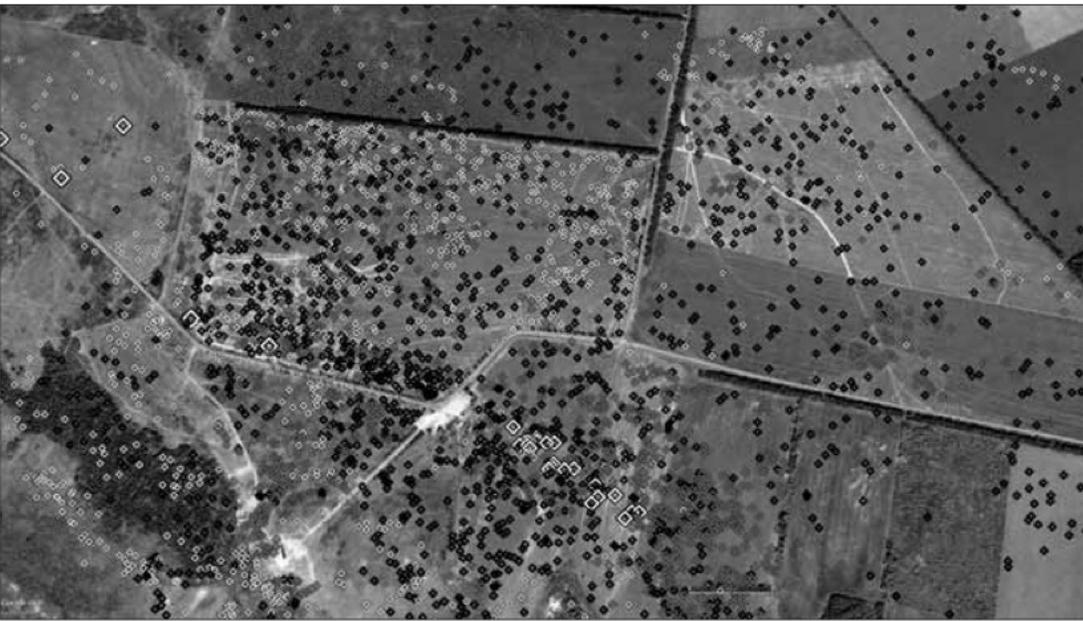


Рис. 6. Типи воронки



Частина воронки у збільшеному форматі

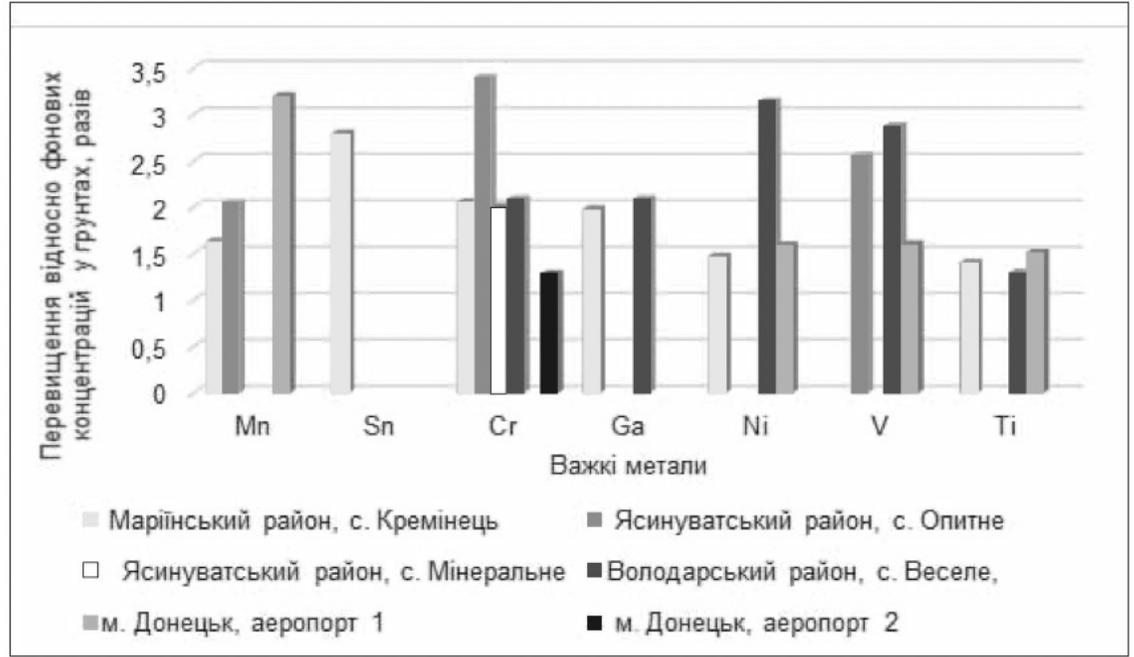


Рис. 15. Дослідження валового вмісту важких металів у ґрунтах на місці розривів снарядів внаслідок воєнних дій у Донецькій області

Soil contamination with toxic substances as a result of shelling



Space image of a field with hundreds of shell craters.
Source: MAXAR



Crater from the explosion, Mykolaiv region.
Photo by K. Polianska

Each shell crater and the area around it is potentially dangerous for the life and health of citizens and natural components. Depending on the type of projectile and explosive, as well as the type of fuel, soils and groundwater can be contaminated with heavy metals, rocket fuel, and other toxic substances.

Composition of remains from different types of projectiles.
Chernihiv, 2022. Photo: K. Polianska



Таблиця 1. Результати аналізу.

ГДК - Maximum permissible concentration

№	Показники, одиниці виміру	Результат	ГДК*
1	2	3	4
1.	pH	---	Не нормується
2.	Свинець, мг/кг Lead	581	32
3.	Кадмій, мг/кг	2.21	3.0
4.	Цинк, мг/кг	6301	Не нормується
5.	Мідь, мг/кг	12006	Не нормується
6.	Нікель, мг/кг	17	Не нормується
7.	Кобальт, мг/кг	3.8	Не нормується
8.	Марганець, мг/кг	269	1500
9.	Хром загальний, мг/кг	27	Не нормується
10.	Ртуть, мг/кг	---	2.1
11.	Миш'як, мг/кг	1.5	2
12.	Сурма, мг/кг	11	4.5
13.	Ванадій, мг/кг	19	150
14.	Амоній	---	Не нормується
15.	Нітрати	---	130
16.	Хлориди	---	Не нормується
17.	Сірка, мг/кг Sulfur	1984	160
18.	Формальдегід	---	7
19.	Феноли	---	4

29.	Залізо, мг/кг	11587	Не нормується
30.	Уран, мг/кг	---	Не нормується
31.	Магній, мг/кг	2493	Не нормується
32.	Цирконій, мг/кг	5.35	Не нормується
33.	Титан, мг/кг	271	Не нормується
34.	Тантал, мг/кг	---	Не нормується
35.	Ніобій, мг/кг	---	Не нормується
36.	Стронцій, мг/кг	76	Не нормується
37.	Барій, мг/кг Barium	1203	200
38.	Селен, мг/кг	---	0.6
39.	Бор, мг/кг	17	30
40.	Берилій, мг/кг	---	Не нормується
41.	Талій, мг/кг	---	Не нормується
42.	Фосфор, мг/кг	446	200
43.	Германій, мг/кг	---	Не нормується
44.	Олово, мг/кг	32	Не нормується
45.	Телур, мг/кг	---	Не нормується
46.	Літій, мг/кг	7.15	Не нормується
47.	Молібден, мг/кг	1.6	Не нормується
48.	Вісмут, мг/кг	141	Не нормується
49.	Галій, мг/кг	101	Не нормується
50.	Ітрій, мг/кг	---	Не нормується

(...)* - вміст менший межі визначення

Consequences for Biodiversity

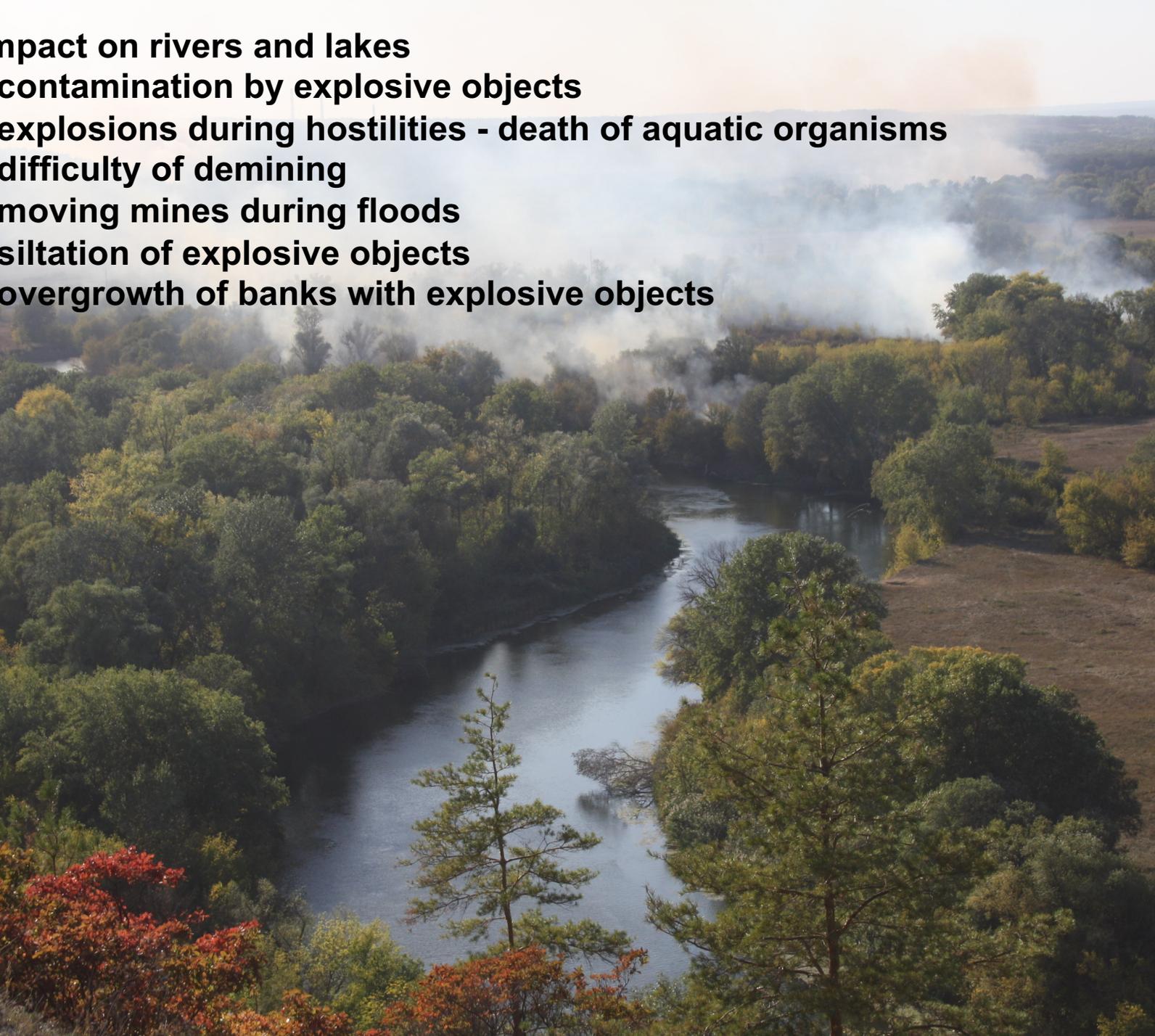
This photo shows parts of the bodies of foxes

that were blown up by anti-personnel mines in the Mykolaiv region in 2022.

- animals are blown up by mines**
- die during shelling**
- die during forest fires**
- suffer from noise and stress**
- leave their habitats**



Impact on rivers and lakes
contamination by explosive objects
explosions during hostilities - death of aquatic organisms
difficulty of demining
moving mines during floods
siltation of explosive objects
overgrowth of banks with explosive objects



Crater at the bottom of Mylivska Bay



A crater from an underwater explosion at the bottom of the Myliv Bay



The death of dolphins in the Black Sea, catastrophic consequences after the explosion of the Kakhovskaya HPP, the impact of military actions, pollution by explosives objects, the location of military boats in the water area.



Saper dog



Як врятуватися від токсичних газів під час обстрілів



Occurrence of fires in natural ecosystems.

Atmospheric air pollution from toxic gases during explosions.

Air pollution with toxic gases from ammunition containing gases (for example, chloropicrin). The use of gas shells is prohibited by international conventions such as the 1993 Chemical Weapons Convention

Fires due to shelling and the risk of explosions due to mines



Burnt steppe
in the national park
The fire occurred
on September
1, 2023
Photo by
K. Polianska

Забруднення рештками вибухонебезпечних предметів. Фото з експедиції ЕПЛ.



Pollution of the environment with the remains of destruction and military operations



Fire at the oil depot



Burnt equipment as a source of pollution



Ruined bridge

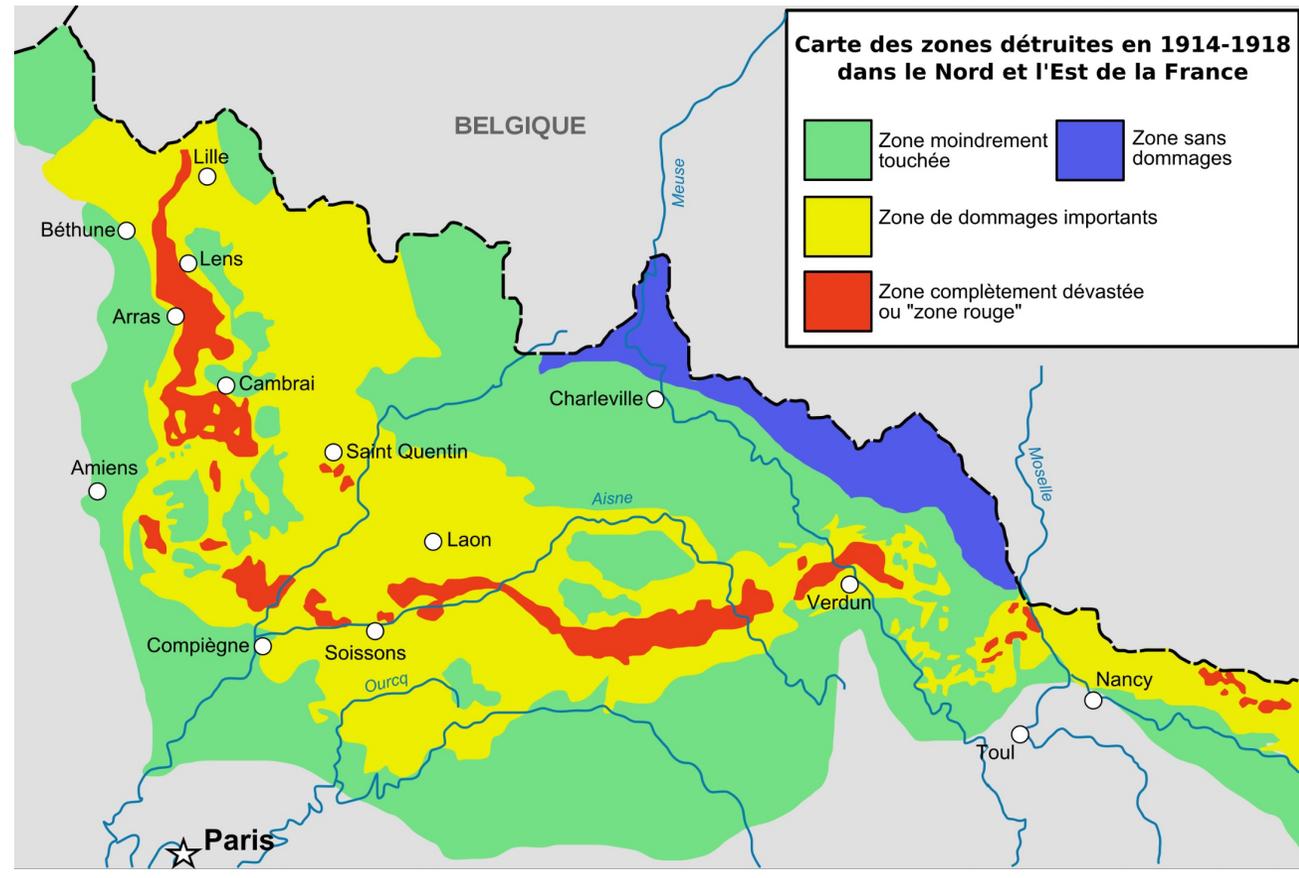


"Epicentr" shopping center, Chernihiv after a fire caused by projectiles. Remains of unburned materials. Burnt machinery





Demilitarized Zone (DMZ) between South and North Korea (width 4 km, length 241 km). Established in 1953.



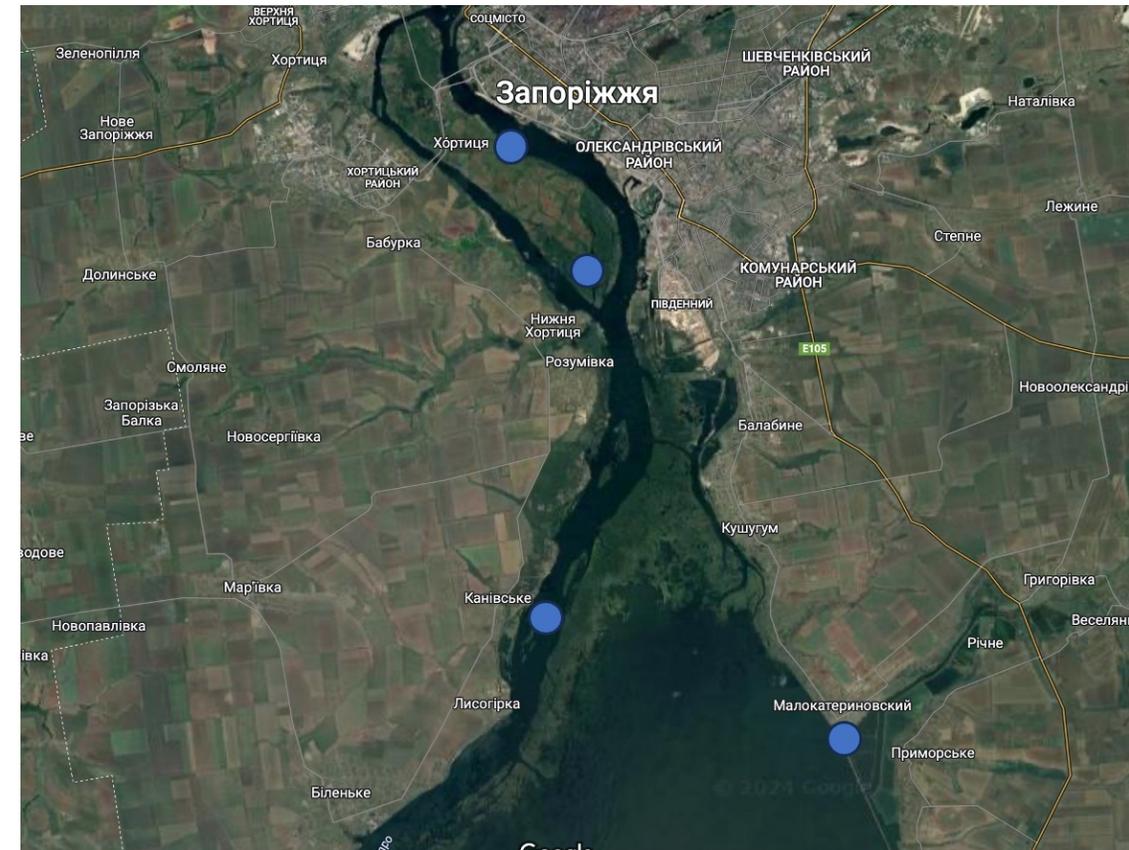
The red zone (Zone Rouge) is the territory in the north in the east of France, damaged by the battles of the First World War, in particular, the Battle of Verdun. It was deemed unsuitable for human habitation. The primary area is 1,200 square kilometers.

Part 3:
Catastrophe on the Kakhovka Reservoir
Revival "Veliky Lug"

After the explosion of the Kakhovskaya HPP dam on June 6, 2023, EPL employees began studying the consequences of the disaster on the territory of the former Kakhovskaya reservoir and its backwaters. Research was conducted remotely and by field methods. 6 research trips to Khersonsk and Zaporizhzhya regions were organized during the summer-autumn and spring periods in 2023 and 2024. Research was conducted on the territory of the Kamianska Sich National Park and adjacent areas, the Khortytsia National Reserve, and at the bottom of the reservoir near the villages of Malokaterynivske and Kanivske. Before that, in 2022 and 2023, 2 more trips were made to the territory of the Kamianska Sich NPP and to the city of Kherson. A total of 8 expeditions to this region.

Held:

observation of the overgrowth of the bottom of the reservoir and its tributary,
conditions of the bottom, the death of living organisms were recorded,
research of soils and silts from the bottom of the reservoir and eruptions from shell explosions.



July 2023 Kakhov reservoir
near the village of Novovorontsovka, Kherson region



July 2023

A whole ecosystem died. Thousands of molluscs, crayfish, fish, amphibians, natural vegetation. Although the reservoir was artificially created, in almost 70 years a different ecosystem has formed here. Therefore, we consider the issue of ecocide.





The dead
crayfish
and
cracks
on the bottom



July 2023 Mylivska Zatoka,
NPP "Kamyanska Sich"



July 2023 Mylivska Zatoka,
NPP "Kamyanska Sich"



Takir (soil)

July 2023 Republican Bay,
NPP "Kamyanska Sich"



July 2023 Republican Bay,
NPP "Kamyanska Sich"



Conditions of natural complexes before and after the disaster on the territory of the Kamianska Sich NPP



September 16
2023
Photo
K. Polianska

September 2023. Zatoka Respublikanets NPP "Kamyanska Sich"



July 2023. Zatoka Republikaniets



September 2023. Zatoka Respublikanets



October 2023. Zatoka Respublikaniets



May 2024. Kakhov reservoir
near the village of Malokaterinivka



May 2024. Kakhov reservoir
near the village of Malokaterinivka



October 2024 Kakhov reservoir
Near the village of Malokaterinivka



October 2024 Kakhov reservoir
Near the village of Malokaterinivka



The height of the willow as of October 2024
is 5 meters 37 centimeters

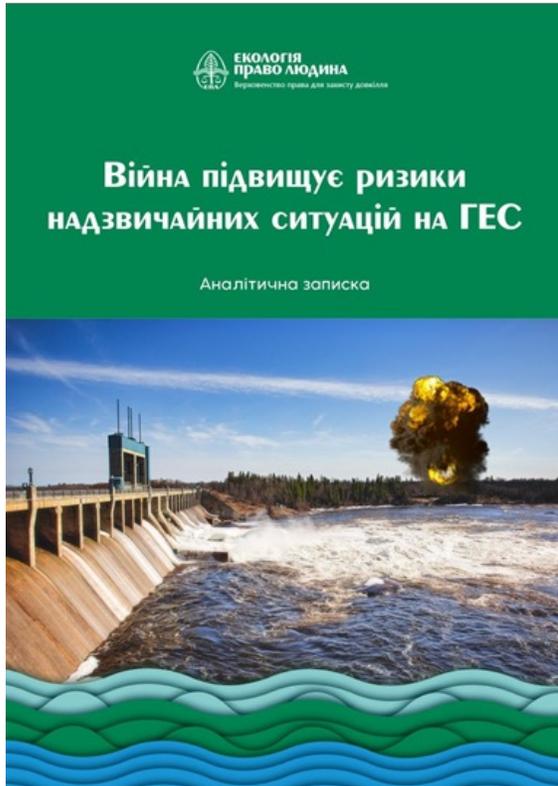


October 2024 Khortytsia Island. Zaporizhzhia





Thank you !



Risk of emergencies at
hydropower plants



Consideration of Russia's war
crimes against Ukraine by the
International Criminal Court:
legal grounds, the role of the
environment and prospects



Repair. Compensation.
Restitution



Start of consideration of
cases in international courts

**Analytical materials on the
website of our organization**
<http://epl.org.ua/en/>

