

U W

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**Ukraine War
Environmental
Consequences
Work Group**

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Dear Friends!

Russia's war in Ukraine has now moved into a phase of positional warfare, in which holding back enemy offensives and building fortifications is becoming a central strategy. Few, however, are writing about the effect that trenches and dugouts have on the environment. Their construction requires the use of high-quality wood, and fortifications also have a negative impact on the soil cover, which is destroyed both by engineering work and by constant shelling. In creating lines of defense, armies also create problems for the animal world. In the opening article of this issue, **Oleksiy Vasyliuk**, a UWEC Work Group expert and head of the Ukrainian Nature Conservation Group, analyzes the main problems for the environment caused by the active construction of fortifications. Problems that, as the experience of World War I, infamous for becoming bogged down in positional battles, shows, may plague Ukraine for years to come:

- [**Military fortifications in Ukraine – what comes next?**](#)

The war has affected protected areas across Ukraine either directly or indirectly. Some of them, including the famous **Askania-Nova Biosphere Reserve**, are under occupation. Others have suffered significant damage during the fighting, with administrative buildings destroyed and injuries to staff. The war has also had an impact on reserves some distance away from the frontlines. On one hand, reserves have seen cuts to funding. On the other, restrictions have been placed on visits to conservation areas located in Ukraine's western or northern border zones or in the immediate vicinity of military training areas. For a report on how Ukraine's reserves and national parks are coping with the war, read the article by UWEC journalist **Viktoriya Hubareva**, who visited a number of reserves and national parks, interviewed their management and saw how these conservation areas operate in wartime with her own eyes:

- [**Wartime challenges for Ukraine's protected areas**](#)

The territories of **Ukraine's nature reserve fund (NRF)**, including zoos and botanical gardens, can only survive in such conditions with the support of foundations and civil society volunteers. Since the beginning of the full-scale invasion, the NRF has received both financial and volunteer support, which has made it possible to preserve unique collections and continue the work of reserves, even in the occupied territories. Find out more in this article by **Oleksiy Vasyliuk**:

- [**Protected areas and war: two years of humanitarian aid**](#)



Our work group is continuing to study aspects of Ukraine's recovery and involve civil society in these processes. The future of not only the country, but also the entire region depends on how environmentally friendly and sustainable this process is. One particularly thorny question today is whether the Kakhovka reservoir and the entire infrastructure of the lower Dnieper will be rebuilt, and if so, how. The UWEC Work Group, like other environmentalists, is completely opposed to the reconstruction of the Kakhovska HPP in its former, Soviet dimensions. This work involves detailed expert analysis, which we are doing and publishing in our articles. You can read about the role of international banks and the importance of including civil society in the recovery processes in this article by our experts Eugene Simonov and Oleksiy Vasyliuk:

- [**International banking projects and restoring the Lower Dnieper's ecosystems**](#)

Work on analyzing environmental consequences and supporting projects for Ukraine's green recovery is currently ongoing in many areas. It is not possible for us to cover all of these in individual texts. So as not to miss out on important and most interesting projects we have decided to publish a monthly digest, in which we will cover such initiatives and studies. We have already prepared the first edition, and you can read it in this issue:

- [**Environmental consequences of Russia's war in Ukraine: January 2024 Digest**](#)



In addition, on February 1 we held our latest webinar as part of the series we are running in collaboration with [Reporters Without Borders](#) and the [Svea Green Foundation](#). You can watch the video, as well as recordings of previous webinars, on our [YouTube channel](#).

We will continue to monitor the environmental consequences of the invasion on our website, as well as on [Twitter](#) (X), [Facebook](#) and on [Telegram](#).

We wish you strength and peace!

Alexej Ovchinnikov, editor of UWEC Work Group



Military fortifications in Ukraine – what comes next?

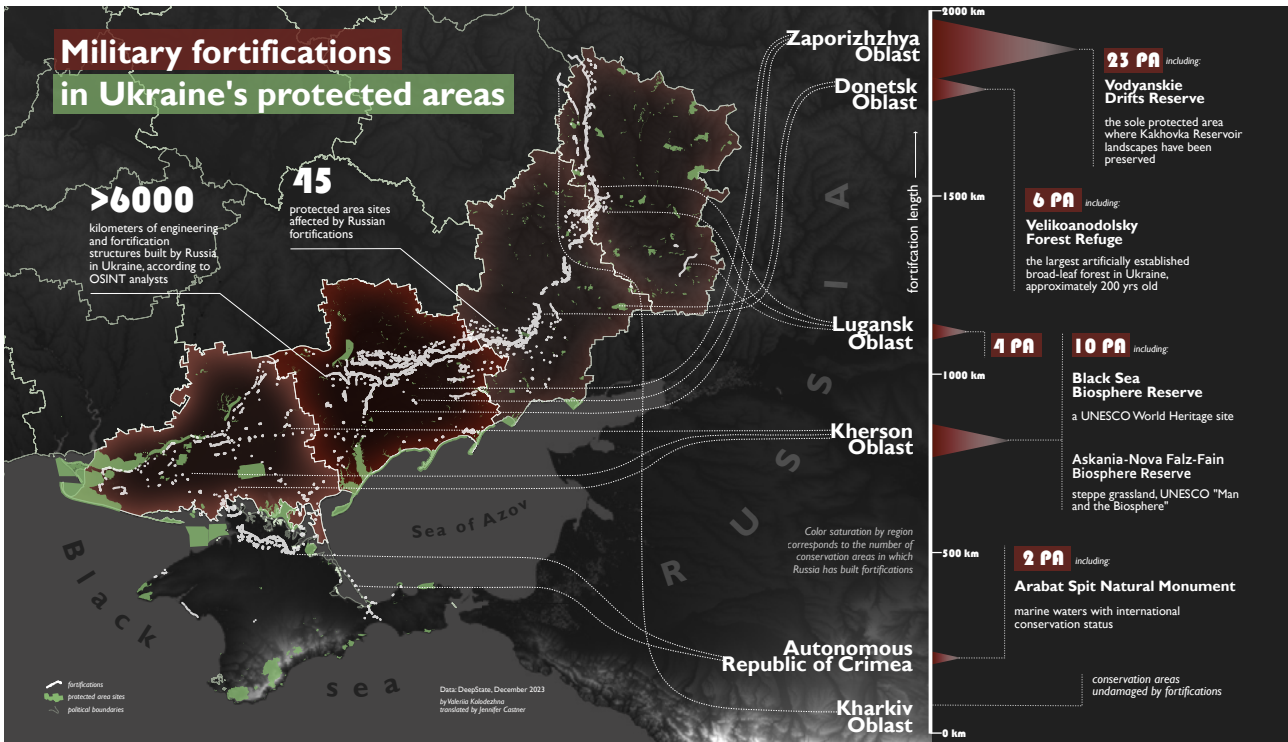
Oleksiy Vasyliuk

Translated by Jennifer Castner

One of the most widespread consequences of military impacts on natural landscapes is the construction of fortifications. We have already written that the consequences of the construction of walls and fences along state borders (1, 2, 3) creates serious restrictions on the movement of land-based animals and results in high mortality and disrupted life cycles. However, much greater environmental damage is caused by trenches and bunkers, the construction of which has grown to enormous proportions as the Russian war in Ukraine gradually becomes trench warfare. This article will discuss the impact of underground shelters

on the environment: trenches, bunkers, and other fortifications.

UWEC authors and editors understand the logic of Ukraine's top leadership including President Volodymyr Zelenskyy himself in strengthening Ukraine's defense line. Ultimately, stopping aggression against Ukraine is the only means to ending this environmental destruction. As with any other consequences of this war, international law states that the construction of defensive structures by Ukrainian troops is a forced measure and any consequences are solely the



Military fortifications in Ukraine's protected areas. Infographic by Valeria Kolodezhna

fault of the aggressor. We hope that after hostilities end this article will help Ukraine to assess the consequences of building fortifications and develop a rational plan for the rehabilitation of damaged territories.

Russian fortifications have significantly changed Ukraine's landscape

While a range of defensive fortifications have been built in Ukraine over the past two years, we are primarily discussing trenches and other underground shelters (bunkers) used by the Russian army.

There are several reasons for this approach. An analysis is necessary to assess the consequences of Russia's unauthorized engineering

activities within Ukraine that result in deterioration of Ukraine's environment. There is no publicly-available statistical or cartographic information about fortifications on the Ukrainian side of the front. Satellite data analysis shows that the volume of Russian fortifications significantly exceeds Ukraine's.

Russia's lengthy preparations to attack Ukraine included detailed plans to construct fortifications requiring the use of a large amount of equipment and specialized army engineering units. Over almost two years of war, changes to the frontline have occurred in such a way that mostly areas without fortifications have been liberated from temporary occupation. The area currently temporarily occupied by the Russians is saturated with the most



significant line of fortifications ever built on Ukrainian territory. In addition, large-scale minefields surrounding areas damaged by construction of trenches may remain in place for many decades after the war is over.

Use of open source data to study fortifications

Open source intelligence (OSINT) analysts collaborating with DeepState, a Ukraine-based project to map and document military operations during Russia's invasion of Ukraine in real-time, were the first to prepare a quantitative assessment of Russian fortifications in Ukraine.

According to data released by DeepState, over 6,000 kilometers of fortifications were documented on the Russian side of the front line as of the end of 2023, information about which is publicly available on their website.

After analyzing satellite images, OSINT analysts calculated the surface area of Russian military fortifications in Ukraine and divided them by type.

The most fortified regions are in Zaporizhzhya Oblast - 1,869 km (length of fortification within the region) and in Donetsk Oblast - 1,865 km, where the largest number of military clashes have been concentrated for over six months. Luhansk Oblast also has fortifications stretching 1,140 km. 886 km of fortifications were identified in Kherson Oblast, mainly along the Dnieper River

and stretching from Novaya Kakhovka to Heroysky. Russian troops have also hardened approaches to the Crimean Isthmus. In Crimea itself "just" 265 km of fortifications have been dug.

Trench construction has partially damaged 46 protected areas, including Askania-Nova Biosphere Reserve and Azov National Park.

Many fortifications were planned remotely and lacked detailed information of the terrain. As a result, some trenches are currently flooded with water and not usable without drainage. Additionally, the entire defense line built by the Russian Armed Forces along the left bank of the Dnieper was completely destroyed when the Kakhovka hydropower plant's dam was blown up on 6 June 2023.

It is also important to note that the Russian army seeks to conceal some fortifications entirely underground. If it weren't for the dynamic analysis carried out by DeepState specialists, we might assume that they were simply backfilled; by fall grass had already grown there.

What does fortification building mean for the environment and climate?

Along with munitions explosions, fires, and heavy equipment maneuvers, construction of fortifications is one of the largest factors negatively

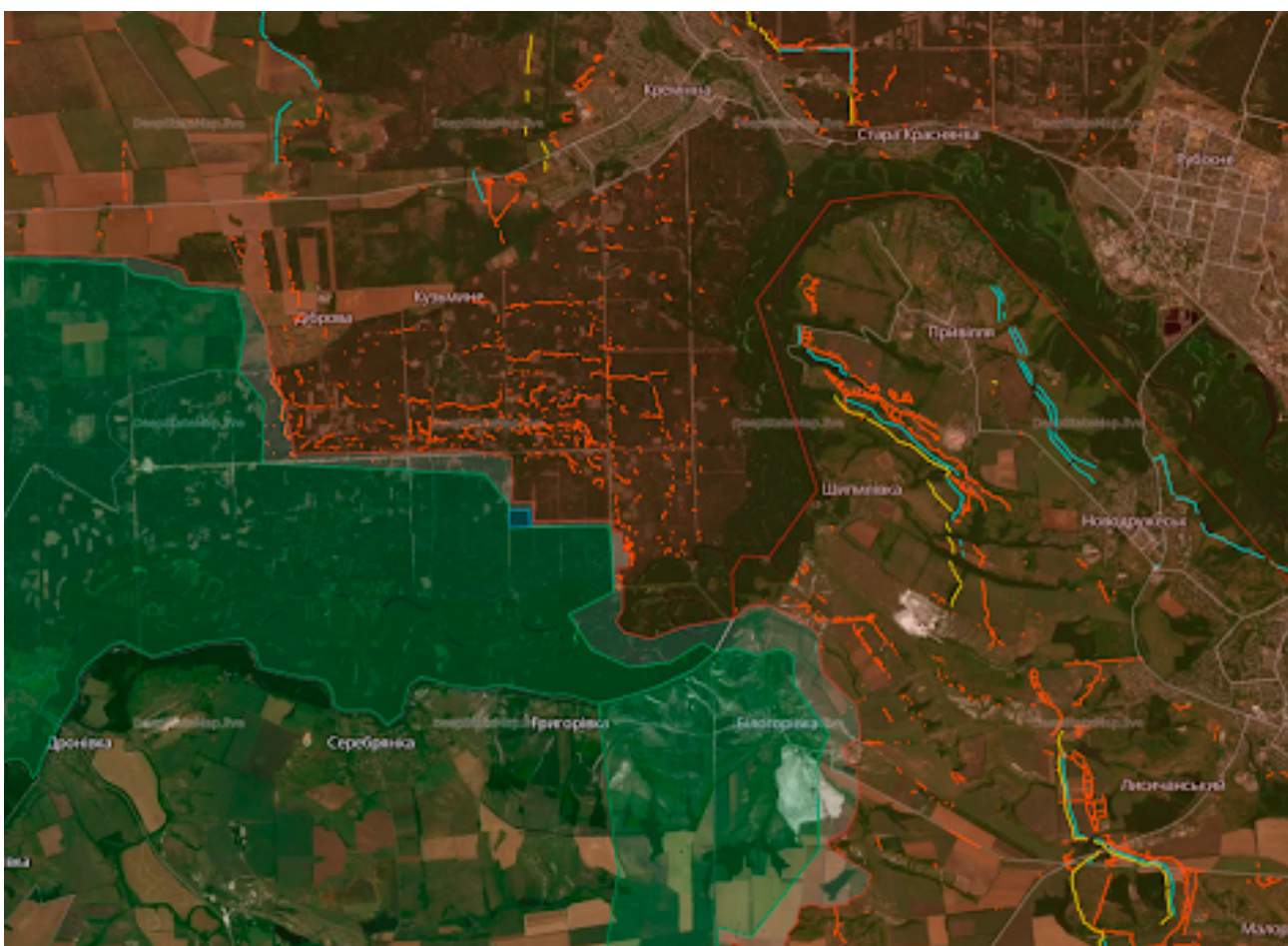
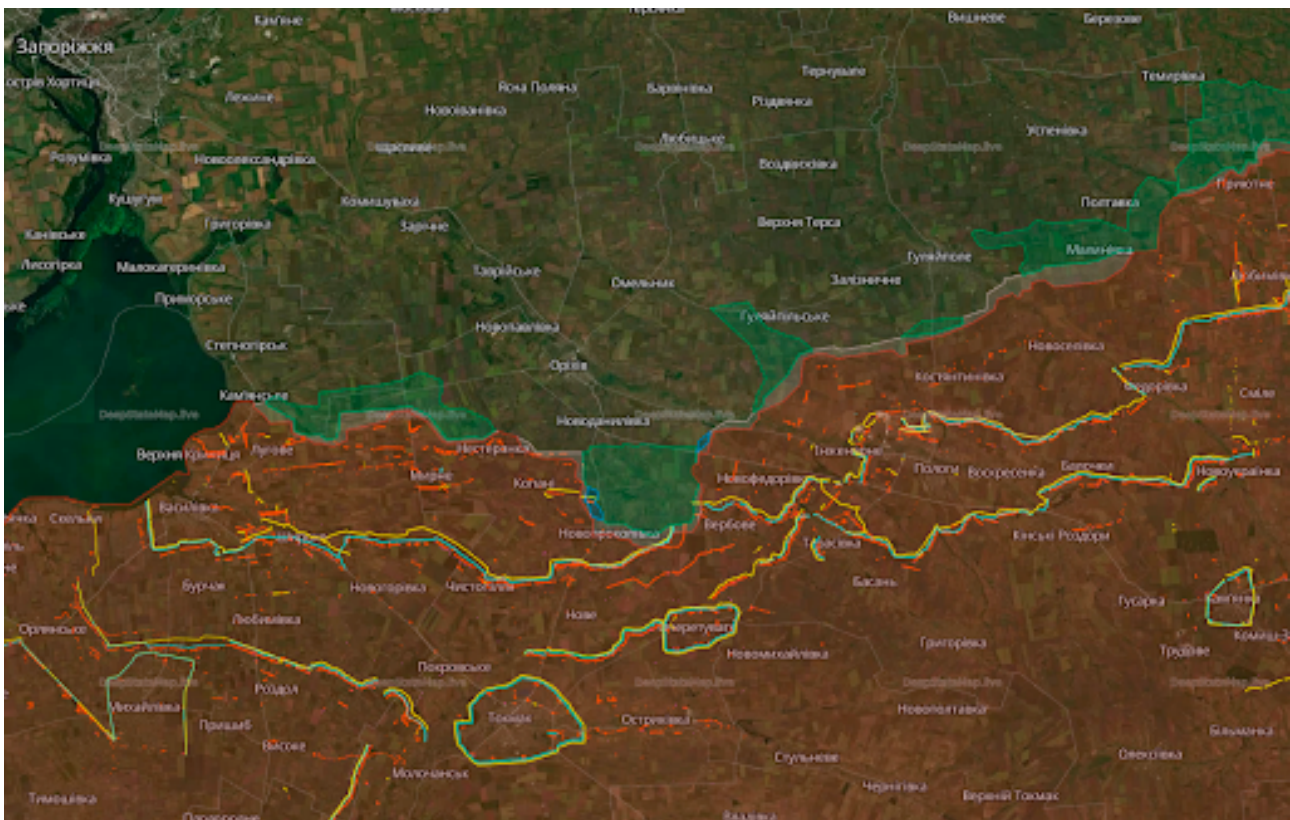


Fig 1-2. Examples of the scale of the Russian army's fortifications (red indicates occupied territories, green – liberated, other areas were not occupied). Source: [DeepState](#).



Fig. 3. Landscape around trenches littered with trash and non-topsoil layers. Photo: A. Veresenko.

impacting landscapes. For soils, military installation of fortifications is arguably second in consequences after munitions explosions. In more than a few locations they co-occur, further exacerbating environmental consequences.

The construction of fortifications does not share the chemical impacts of munitions explosions, generally causing only engineered landscape changes. Despite that, they are accompanied by other negative environmental consequences, for example, waste pollution and violation of public health guidelines.

At the same time, the construction of fortifications is significant and often destructive for flora and fauna. In combination, vegetation destruction,

disruption of topsoil, disturbing the hydrological balance of groundwater, reduction of natural humidity, and desertification have the most tangible impacts for wildlife. Missing from this list is chemical pollution, but that pollution is usually more important in economic and human land use terms and less consequential for wildlife.

During construction of defensive structures both above and underground (dugouts, trenches, bunkers, tunnels, storage facilities for fuel and lubricants and materiel), soil layers are mixed and soil structure is destroyed. These factors are the main drivers of soil erosion and destruction.



Fig. 4. Fortification construction using equipment. Photo: pravda.com.ua



Fig. 5. Dragon's teeth fortification in Crimea. Photo: Informator.us.

The thin fertile layer of topsoil breaks down, revealing the undersoil and scattering it across the surrounding area.

Winds, precipitation, and temperature changes further scatter soil layers (sand, loess, etc.). Vegetation is consequently



Fig. 6. Use of rare plant species (two species of feathergrass) to camouflage Russian bunkers in Kamianska Sich National Park, 2023. Photo: I. Moisienko.

suppressed over a large area, and upper soils are buried beneath overlying rock and lower soils. From a soil formation perspective, this can readily be described as desertification. In current conditions, these negative factors are further intensified by more frequent drought and other extreme events caused by global climate change.

When constructing fortifications, groundwater level is not always considered. As a result, some fortifications disrupt the hydrological regime and cause water to rise to the surface, waterlogging areas and raising soil salinity.

Deep saline aquifer water can also be brought to the surface and spread beyond the immediate boundaries of defensive structures.

Lastly, all fortifications inevitably attract concentrated artillery attacks.

All of these factors disturb soil processes over much larger areas, where, among other changes, landslides, inundation, and soil subsidence can occur. The zone of influence of a single trench, ditch, or bunker ranges from 20 to 100 meters or more. Assuming such estimates, then areas with disturbed or destroyed soils experiencing active erosive processes caused by the



construction of Russian trenches can range from 800 to 1,000 sq. km.

That amount is comparable in size to the drained former bed of Kakhovka Reservoir and is easily visible even at the scale of a world map.

Another threat identified during 2022 expeditions to liberated Kamianska Sich National Park in Kherson Oblast was the use of rare plant vegetation by Russian soldiers to camouflage combat positions. We believe that this does not represent deliberate destruction of rare species, but rather Russian soldiers cutting turf containing several types of feather grass and other steppe plants to camouflage bunkers. The national park was specifically created to protect such species.

Bunkers: cemeteries for large trees

The majority of bunkers built for long-term use are reinforced by tree trunks, resulting in the consumption of a large amount of high-value lumber. They are usually built using the trunks of Common Pine and other pine species, valued for having the straightest trunks and few branches.

Dugout walls are lined with these trunks, and the top is covered with a triple-layer roof, also made from trunks. It is thought that such a structure can withstand a hit by a 152-155 mm caliber projectile. 20-50 tree trunks are required to build a fortified bunker for 5-10 people.

Endless changes in the front line and shelling damage means that there is a constant need to build more and more new fortifications.

All pine forests within the territory temporarily occupied by Russian troops are artificial plantations and small in area. Given the changing climate, it will probably no longer be possible to rapidly grow new coniferous forests here. As a result, construction of fortifications using timber on the Russian side of the front essentially constitutes the direct destruction of the last (admittedly artificial) forests in Ukraine's steppe zone, forests with tremendous environmental significance.

Almost all such forests are located within nature refuges, national parks, and other protected areas, and some of them have existed for more than 100-120 years. This applies, in particular, to Beloberezhye Svyatoslava, Sviati Hori, and Siversky Donetsk National Parks, Black Sea Biosphere Reserve, and at least 50 other nature refuges. In other words, any logging in such forests is unacceptable.

In addition to using trees for construction, life in bunkers also demands a constant supply of firewood for heating and cooking, creating additional pressure on the ecosystem.

As for the Ukrainian military, fortification building by law uses only legally-harvested wood obtained with permission in Ukrainian forests where



forest restoration is not complicated by climatic conditions. Ukraine has even introduced a special procedure for the supply of wood for defensive purposes.

Although “selective” logging occurs more often, it is not any better for nature

Smooth pine trunks are used for engineering bunker structures. This means that only the most suitable trees are logged for building fortifications – a form of selective logging.

Such analysis is supported by the fact that to date we have been unable to find evidence of large-scale clear-cutting. There are a few known exceptions in the Oleshkovsky Forestry Enterprise in Kherson Oblast (foreign media [mistakenly assumed](#) this to be proof of Ukraine-sourced timber exports to Russia, and the Ukrainian media subsequently widely [reprinted](#) their foreign colleagues’ error).

Although most of this logging is selective, it is nevertheless not good news for pine plantations in Ukraine’s steppe zone. Pines have shallow root systems and such forests persist only thanks to dense canopies that conserve moisture and maintain cool temperatures. Logging individual trees exposes the roots of other trees to the sun’s rays, quickly drying soil and

causing further aridity in those forests. In the coming years, we can anticipate large-scale aridity in pine plantations damaged by logging and munitions explosions.

Other dangers to forests along the front line

There are also conflicting issues for trees growing in areas with trenches and bunkers.

First, forests and shelterbelts are used as natural camouflage for combat positions. For the trees, this means that their exact location will inevitably become an active conflict zone, including munitions attacks. Frontline videos show that most trees in these areas have no remaining branches.

Secondly, all such concealed positions are located below ground level and thus offer poor visibility. Troops often specifically destroy such trees (and particularly shelter belts) in order to ensure a better view around their positions.

Ecological footprint of life in the trenches

Another problem worth mentioning is pollution resulting from construction and daily life in defensive structures.

Troops living for months in fortified areas dump all the products of their daily lives in the immediate vicinity of bunkers and trenches: garbage, feces, and possibly even communal graves.



Fig. 7. Interior view of a bunker. Photo: [Wikipedia](#).



Fig. 8-9. Fortifications become the focus of combat operations, particularly shelling, leading to the complete destruction of vegetation. Source: [TSN.ua](#).



Fig. 10. Long-term occupation by soldiers living in bunkers results in massive dumps of household waste. Source: [Euronews](#)

As soldiers retreat and advance, they leave their trash and waste behind. In those conditions life-supporting items (ranging from food to bedding) are delivered by support units and are most often single-use.

All packaging, including that of ammunition used in combat in incredibly large quantities, is also single-use.

Damaged trenches and bunkers, along with remaining everyday items, are damaged by rain and snow and are abandoned when the front line is redrawn.

As a result, each soldier leaves behind a significantly larger environmental footprint than the average person living in their own home where there is less

excess to be consumed and all types of waste can be disposed of or recycled.

In addition, the presence of a large number of remains of dead soldiers creates high risks for bacteriological contamination.

Since 2015 (not long after Russia began to seize Ukrainian territory), experts have repeatedly noted the likelihood of groundwater contamination resulting from ill-conceived, spontaneous burials. This factor also significantly affects prospects for post-war land use of areas where the most active hostilities occurred.

Wildlife in trenches

Small terrestrial animals suffer the most from the construction of



fortifications, be it insects and other flightless arthropods or vertebrate species of reptiles, amphibians, and mammals.

Trenches become a trap for most animals with the misfortune to fall into them. In theory, animals could climb out on their own. But when soldiers are present in the trenches, rapid death is the outcome for many animals.

Imagine, for example, a situation where a snake or rodent – often feared by many people – falls into a trench. Soldiers would rather kill such an animal than carefully catch and release it. Moreover, during active hostilities there may not be opportunity for a humane approach.

For many species of animals, this threat is becoming quite urgent, as fortifications stretch for over 800 kilometers across the entire front line in both eastern and southern Ukraine.

As for animal migration, the line of defensive fortifications is unlikely to have a significant impact; in this part of our planet, land animals do not undertake significant seasonal migrations. That said, local wildlife movements including dispersal of sub-adults, predator movements in search of prey and, most importantly, animals fleeing from explosions, gunshots, and other events lead to numerous cases of animals landing in trenches and ditches.

Animals entrapped by military fortifications include many rare

species of endemic mammals, such as Nordmann's Mouse, Feather-tailed Three-toed Jerboas, and the Sandy Mole Rat. UWEC Work Group [previously discussed](#) the consequences for wildlife from the Kakhovka Reservoir flood. These species live precisely where the Russian troops' defense line was built along the left bank of the Dnieper.

For reptiles, the vast majority of all species of snakes and lizards living in the combat zone and in temporarily occupied territories are listed in the Red Book and are actually endemics of this zone within Ukraine.

Today many stories can be found on the internet telling of both soldiers rescuing animals from trenches and brutal animal killings and cases of incredible sadism.

Lastly when fortifications lacking well-thought-out drainage flood with groundwater, the chances of saving wildlife are further reduced.

Land rehabilitation and restoration

After war ends, removing fortifications will be one of the most difficult tasks in Ukraine's green recovery. As we mentioned above, the areas experiencing active soil erosion are much larger than the fortifications themselves. Any approach to restoration must be comprehensive.

How should areas damaged by fortifications be rehabilitated? Of course



the artificial changes in the relief of such areas should be smoothed by backfilling trenches. The exact methods for such work should be decided upon only after the end of the war, when the full extent and breadth of soil damage will be finally clear. Soil science tells us, however, that restoring the relief alone will not stop soil erosion.

Restoring protection forests damaged by the wholesale placement of fortifications within them will be the most urgent component of Ukraine's future green recovery. Essentially the vast majority of protection forests in the country's most arid landscapes have been destroyed or damaged during Russia's full-scale invasion. That level of destruction has resulted in active desertification processes. The loss of each forest belt accelerates wind erosion and desertification processes across hundreds of hectares, and the cumulative effects of these losses significantly accelerate desertification throughout the region.

The first 18 months of the full-scale war have set Ukraine back in implementation of its "National Plan to Combat Desertification" by a decade. It is not known whether it will be possible to restore lost protection forests in current climatic conditions.

Nature does not wait for wars to end. As with the former [Kakhovka Reservoir](#) –

now covered in young willows and other vegetation – vegetation regrowth starts very quickly. Study of satellite imagery reveals that in spring and summer this year almost the entire frontline became a greenway. Vegetation is rapidly taking over areas where no agricultural cultivation is occurring and no pesticides are used.

Unfortunately, unlike the bottom of the Kakhovka Reservoir, abandoned fields and destroyed settlements are initially largely overgrown by alien invasive species. Despite their success in occupied territory, invasive species do not create or support stable plant communities, although such vegetation may be useful when it comes to combating wind-induced soil degradation. Generally speaking, however, invasive plant growth means a loss of biodiversity.

- Read more: [Invasive species threat resulting from Russia's full-scale invasion of Ukraine](#)

It is important to begin studying which plant communities are growing in places with abandoned fortifications. Different types of fortifications in different landscapes create different geomorphological conditions (microrelief, moisture regime, substrate), subsequently partially colonized by vegetation. In most cases these "colonizers"



will be invasive species. Examining these areas facilitates prioritization of restoration efforts, including support for self-restoration.

The first action for Ukraine's green recovery in frontline areas should be mine clearance. Soon thereafter reclamation must begin. Recovery includes:

- Identification of minimally-contaminated areas that can eventually return to economic use;
- Immediate restoration of perennial grass ecosystems in all damaged areas experiencing soil erosion. Only these ecosystems are capable of quickly healing pockets of erosion and stopping the loss of

soil moisture; and

- Restoration of shelterbelts, removal of invasive plants, phytoremediation.

Knowing the scale of munitions use, it may turn out that some areas that experienced fortification could become nature restoration zones in the future – economic “no-go” zones. However, these areas should not simply be left to their own devices “for self-restoration”, but rather require human intervention to restore ecosystem stability as quickly as possible. Rehabilitating former fortification zones reduces climate impacts and prevents desertification of the entire southeastern region of Ukraine. •

Main image credit: NBCnews



Wartime challenges for Ukraine's protected areas

Viktoria Hubareva

Translated by Alastair Gill

Ukrainian journalists studying the impact of the war on the environment visited eight protected zones in Ukraine and have also spoken to staff from those that are currently under occupation. The consequences of the war are being felt both on the frontline and in occupation, as well as in national parks and reserves located far in the rear.

There are no fewer than eight UNESCO biosphere reserves in Ukraine. These are areas which have international protected conservation status and are especially valued for their landscape, geological composition, and flora and fauna. Another reserve, which covers almost the entire Chernobyl

exclusion zone, has intermediate status. It meets almost all criteria, except one – there are no people living within it, a mandatory criterion for reserves. Viktoria Hubareva tracked and analyzed the patterns and problems which have appeared in these protected areas since the full-scale invasion.



Fig 1. Fires in the Biloberezhia Sviatoslava National Nature Park resulting from Russia's full-scale invasion of Ukraine. **Photo** supplied by the national park.

War has changed – and so have the ways of recording its consequences

Two of Ukraine's UNESCO biosphere reserves – **Askania-Nova** and the **Chornomorsky (Black Sea) reserve** – are currently under occupation. In spite of this, however, the former was able to continue in “Ukrainian mode” (with financial and resource support from Ukraine) for a year after it was occupied. Although the occupation meant the reserve was unable to receive its allocated budget, the conservation body received financial support from other Ukrainian public organizations. This state of affairs lasted until the appointment of a Russian administration in spring 2023.

Askania-Nova's animal collection is under threat of destruction. Today most of the reserve's staff have been evacuated to Ukraine-controlled territory, and it is only possible to keep track of what is happening in the reserve by studying satellite images.

This method is also being used to record the consequences of the war on the environment in the **Biloberezhia Sviatoslava National Nature Park**, part of the **Chornomorsky Biosphere Reserve**. Despite the fact that the territory of this national park, which forms part of the reserve, is currently occupied, the park's administration and research department are continuing their work from Ukrainian-controlled territory.

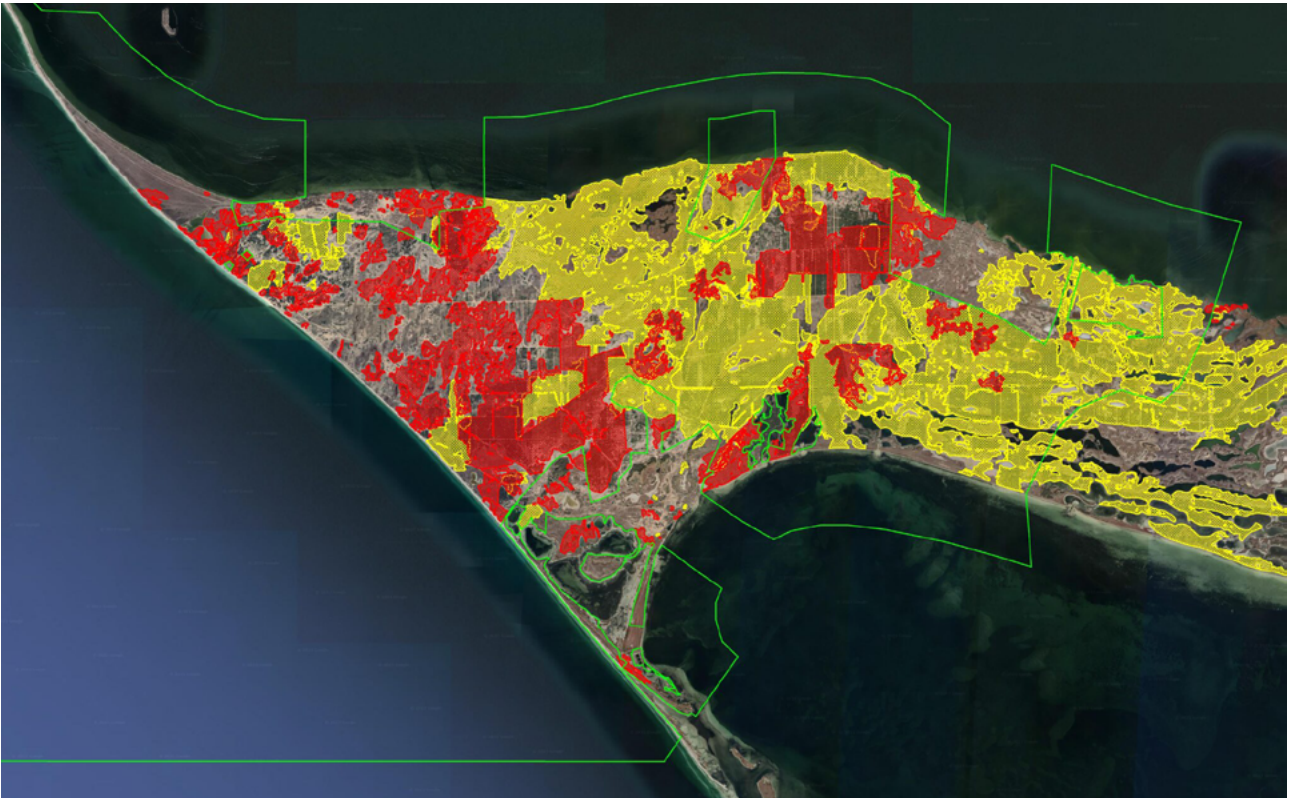


Fig. 3. A map of fires on Kinburn Spit, which has suffered extensively from burning. Satellite images like this are helping scientists to gather analytical data and collect evidence of ecocide by Russia on occupied territories. Source: Earthstar Geographics. Image supplied by the Biloberezhia Sviatoslava National Nature Park.

By using earth remote sensing technology, using data supplied by the European Space Agency and the U.S. National Geological Service, scientists can remotely record fires, flooding, various kinds of pollution and soil damage. The resulting analytics help to establish the precise causes for changes to the composition of biodiversity in a given area. This data is collected not only for the Biloberezhia Sviatoslava National Park, but also the Chornomorsky Biosphere Reserve, since they share common ecosystems.

Scientists have been gathering analytical data on the state of the environment since the first days of the

war. They have taken on this vitally important mission to monitor the environmental impact of the invasion with the goal of bringing Russia to justice for ecocide at an international level.

Further field studies, which will be carried out after the liberation and demining of the occupied territory, will provide more information about the damage inflicted by the war, though there is already one example of a liberated reserve in the country where scientists have begun research.

- Read more: [Protected areas and war: two years of humanitarian aid](#)



Fig. 3. The Chornomorsky Biosphere Reserve, 2020. The Chornomorsky Biosphere Reserve contains a number of Ramsar wetlands. Ornithologists from Biloberezhia Sviatoslava in collaboration with their colleagues from two other national parks documented pelican migration routes in 2022 and 2023. Photo: Ihor Chervonenko.

What will happen in liberated protected areas?

The **Chornobyl Radiation and Ecological Biosphere Reserve** offers an example. In the very first days of the full-scale invasion, Russian troops entered Ukraine through the reserve on roads from Belarus, which borders the reserve. Although the occupation lasted a relatively short period of time in this area – from February 24 to April 2022 – the consequences of the military presence were significant.

The most obvious of these were the construction of fortifications along roads, looted scientific research

equipment and stolen, damaged or destroyed vehicles. In addition, more than 30,000 hectares of land in the reserve were damaged by fires, including 18,000 hectares of forest.

During the occupation, the Russians prevented these fires from being put out – they simply banned firefighting equipment from leaving the city of Chornobyl. Firefighting efforts are now complicated by the potential presence of mines in these areas. Furthermore, when **Oleksandr Borsuk**, head of the flora and fauna laboratory in the reserve's scientific department, showed us the sites of the largest fires of 2022



Fig. 4. The house of the inspector of the Desniansko-Starohutsky National Nature Park in the town of Stara Huta burned down as a result of shelling. Photo: Courtesy of Desniansko-Starohutsky National Nature Park Director Serhii Kubrakov.

on the map, we noticed that most of them began right on the border with Belarus. It is quite possible that all this is a consequence of enemy sabotage.

Studies on the impact of the war on ecosystems in the reserve have already begun. Research is now being conducted here into the processes through which plant growth returns to belligerent landscapes, areas impacted by the preparation and conduct of combat operations. This will make it possible to use the findings for the analysis of more seriously damaged areas that have suffered not only from the war, but also from resource extraction. This knowledge will enable scientists

to make forecasts for the restoration of these areas and plan appropriate measures.

- Read more: [Impact of Military Action on Ukraine's Wild Nature](#)

Protected natural areas located near the combat zone

What is happening directly near the frontline is clearly demonstrated by the case of the **Desniansko-Starohutsky National Nature Park**, which contains the core of the Desniansky Biosphere Reserve. It has suffered enormous damage as a result of the war, since



Fig. 5. Office of the Desniansko-Starohutsky National Nature Park. In the foreground is a crater caused by shelling from across the border in Russia. Photo: Desniansko-Starohutsky National Nature Park director Serhii Kubrakov.

the entire territory of the reserve is shelled almost daily by the Russian armed forces – the reserve runs along the Russian border for 30 kilometers. In June 2023 a Russian sabotage and reconnaissance group killed six workers from the Svesky forestry plantation, who were driving along a forest track in a jeep seven kilometers from the border.

Until mid-2023 the national park's administration was located in the town of Seredyna-Buda. The town's administrative boundaries hug the Russian-Ukrainian frontier. Last summer, the park's administration building was destroyed. To protect its

workers and property, the Desniansko-Starohutsky National Nature Park moved to the city of Shostka, and there are now almost no people left in settlements near the park. There is almost no electricity and no shops or other essential amenities.

However, despite the direct threat to life in the park, the reserve's anti-poaching unit continues to operate, the scientific department continues its work remotely, and the environmental education department runs events for young people in safer areas.

In 2023 the Desniansko-Starohutsky National Nature Park team won an IUCN WCPA International Ranger



*Fig. 6. View from a bridge of the Tysa River, located in the Karpatsky Biosphere Reserve.
Photo: Mykola Tymchenko.*

Award. This is an international award for rangers, including Indigenous, community, and volunteer rangers, as well as those working in protected areas and reserves. Put simply, it is the most prestigious international award for those working in the conservation sphere.

According to park director Serhii Kubrakov the prize consisted of a grant, which was spent on purchasing equipment for patrolling the park. Despite having to work in extremely dangerous conditions, the park's staff have no intention of quitting and are continuing their important mission.

- Read more: [Protecting the environment in times of war. An Interview with environmentalist Yehor Hrynyk](#)

Why are national parks and reserves away from the combat zone suffering from the war?

There are three reserves in the west of Ukraine. Two of them – the East Carpathian and Rostochya reserves – are transboundary; the third – the **Karpatsky (Carpathian) Biosphere Reserve** – has no foreign “neighbors”. All of them are located deep in the rear,



*Fig. 6. View from a bridge of the Tysa River, located in the Karpatsky Biosphere Reserve.
Photo: Mykola Tymchenko.*

so they have been unaffected by the direct effects of the war, such as fires resulting from shelling or sabotage by Russian soldiers. Nonetheless, this does not mean that these reserves have been unaffected by the war.

Even before the start of the full-scale war, conservation areas in Ukraine struggled to find financing. A significant part of their income came from tourists: many Ukrainians would visit the Carpathians as part of their vacation.

Now, however, it is the proximity of protected areas to the border that is now the primary obstacle to visiting reserves on the Ukrainian side. For

example, all visits to **Uzhansky National Nature Park**, which is part of the East Carpathians Biosphere Reserve and borders Poland and Slovakia, must be coordinated with the state border service. This is one of the reasons for the fall in visitor numbers.

Inna Kvakovska, the park's deputy director, says that only three-four of the park's 17 eco-trail routes are currently accessible. The rest are closed due to the ban on visiting border areas, meaning less income for the park. The lack of funds is felt even more keenly for the reason that financing environmental institutions for the state during war is a



Fig. 8. Bridge over the Tysa River in the Karpatsky Biosphere Reserve. Photo: Mykola Tymchenko

very low priority, and unfortunately the money often runs out before they get their turn.

The Boikivshchyna National Park, which is also located on the border, is in a similar situation. Permission to visit the source of the Sian River, along which the Ukrainian-Polish border runs and where one of the park's eco-trails lies, must be coordinated with the border service. Tourists need to obtain special permits and can only move around in the area when accompanied by military personnel.

A similar problem exists in the "neighboring" reserve, situated a little way to the north. Although the Yavorivsky National Nature Park, which

is part of the Roztochchia Biosphere Reserve, is located a long way from the combat zone, two of its recreational areas are located in the buffer zone, in the Yavorivsky Base for Military Training. As a result, the Roztochchya zone has essentially been vacated and is closed to the public most of the time. And it is also difficult for tourists to visit Vereshchytsia, a recreational area boasting vacation homes, an environmental education center, and lakes. Although the area is still partially open to visitors, the human factor comes into play. Few people are interested in admiring nature in a place where there are audible explosions and risk of an enemy missile strike.



Fig. 9. Journalist Viktoriya Hubareva at the source of the river Sian, which runs along the Ukrainian-Polish border. This is considered neutral territory, and an eco-trail near the source of the river is shared by the two countries. But getting here is not that easy: visits are possible only if accompanied by employees of the state border service. Photo: Mykola Tymchenko.

Around 80% of those employed by national parks and reserves earn the minimum wage, meaning they receive less than EUR 200 each month. Yavorivsky National Nature Park does not have the funds for bonuses, additional payments, and supplements. Previously, the park had a regular staff turnover, with employees coming and going, but the outbreak of the war saw a significant outflow of personnel. It is almost impossible to replace employees, resulting in staff shortages, making it impossible for these conservation institutions to carry out their work fully.

The frontier zone has grown to

two kilometers in width, including in protected areas on the border. In February 2023 Ukraine's Verkhovna Rada passed a law to facilitate this, which the UWEC Work Group has previously covered. The lands were withdrawn from the Natura Reserve Fund and transferred to the Ukrainian state border service. This creates a risk that animals will not be able to move along their migration corridors, which cross through the entire transboundary reserve, and of which there are many in protected areas.

As we have seen in this article, the war is having an impact on conservation



areas throughout Ukraine and at all levels, from the direct damage caused to the ecosystem to the inability of national parks and reserves to carry out their direct responsibilities for various reasons.

At the political level, high hopes are being placed on the reparations that Ukraine should receive from Russia after the end of the war. These resources can be used to restore ecosystem services and finance environmental institutions. However, it is already clear that painstaking work on demining must be carried out before the restoration process can begin, and unfortunately national parks have been given the lowest priority for demining.

However, there are also positive aspects. Ukraine is now gaining invaluable experience in recording the consequences of war on the environment, and through cooperation with foreign partners, law enforcement agencies, public organizations, scientists, media and even individual communities, the country has gained a unique asset that will allow us to find solutions to similar problems around the world. •

Main image: Forest in the East Carpathians Transboundary Biosphere Reserve. In the foreground is the Ukrainian part of the reserve, beyond it the Polish sector. Photo: Mykola Tymchenko.



Protected areas and war: two years of humanitarian aid

Oleksiy Vasyliuk

Translated by Jennifer Castner

Over the two years of Russia's full-scale invasion of Ukraine, the work of many environmental institutions would have been impossible without volunteer and humanitarian assistance. In this article we will examine how the employees of strict nature reserves and national parks continue to protect Ukraine's protected areas during the war and in occupied territories thanks to the help of volunteers and community organizations.

From the first days of the war, volunteering and donations were one of the driving forces that enabled Ukrainians to save their country. From the first hours of the invasion, both Ukrainians and concerned people from all over the world organized many types of aid.

Overall, at least 61% of Ukrainian residents volunteered in some capacity in 2022.

One focus of volunteering provided aid to national parks and nature reserves. A newly published study prepared by NGO in Ukraine (with support from ISAR) and devoted to analyzing assistance to protected areas formed the basis of this article.

Nature reserves, known in Ukrainian and Russian as zapovedniks, have the highest



degree of environmental protection and include very restricted public access

Nature reserves and national parks in wartime

First and foremost, the full-scale invasion of Russian troops had an extremely negative impact on compliance with conservation measures in areas experiencing military operations and/or temporary occupation. Moreover, those same areas affected a significant number of large and high value protected areas.

The full-scale invasion also affected protected areas in regions at a distance from the combat zone, as they became centers for humanitarian aid operations, receiving displaced persons, or simply located near Ukraine's western border.

Protected areas in the combat zone

According to official data from Ukraine's Ministry of Environmental Protection and Natural Resources, military action has affected 900 protected areas [totaling 1.24 million hectares](#) in size, roughly one-third of all protected areas in Ukraine.

The lands most affected during the full-scale invasion include [44% of protected areas](#) belonging to the strictest protection categories (biosphere and nature zapovedniks, national parks, regional landscape parks).

22 of the protected areas affected are government institutions managed by special administrations (three biosphere zapovedniks, four nature reserves, and 15 national parks). Some of these protected areas remain under the control of Ukraine (some of which were liberated), but eight zapovedniks and national parks remain under occupation.

The consequences of the military invasion for affected protected areas vary widely – from the cessation or reduction of government funding for those located in the occupied territories to the physical destruction of ecosystems, destruction of conservation and administrative infrastructure, and kidnapping and even murder of reserve workers.

Combat hostilities have also occurred near or directly within protected areas, naturally leading to significant damage. For example, battles for the villages of Bilohorivka and Bohorodychne, as well as the cities of Sviatohirsk and Lyman (Donetsk Oblast) occurred almost entirely within the borders of the **Sviati Hory National Park**. The combat that destroyed the villages of Zakitne and Ozerne (Donetsk region) took place in the **Kreidova Flora** (Cretaceous Flora) department of **Ukrainian Steppe Nature Reserve**.

The most valuable parts of these protected areas have enjoyed protected



status since 1927 and had never previously been significantly damaged by human activity until the full-scale invasion in 2022.

Ukraine's armed forces halted the advance of Russian troops in **Kamianska Sich National Park** on the right bank of Kherson Oblast, resulting in significant destruction and pollution.

Other examples include **Velykyi Luh National Park**, the territory of which was drained as a result of the explosion of Kakhovka hydropower plant's (HPP) dam on 6 June 2023. **Nyzhniodniprovsky ("Lower Dnipro") National Nature Park** was washed away by Kakhovka Reservoir waters in the first hours after that terrorist attack. Dead and living animals from this national park subsequently washed ashore [along Odesa Oblast's](#) coastline in the Black Sea.

- [Is it time to restore Velykyi Luh?](#)

Protected areas under occupation

In 2023, Russia announced that it was incorporating occupied Ukrainian protected area institutions into its state system and subsequently appointed Russian "directors." The forced leadership change that occurred in [Askania-Nova Biosphere Reserve](#), which, until that time, was led by Ukrainian leadership in 2022, was the most striking [example of successful](#)

[assistance](#) under military occupation.

- [Askania Nova Biosphere Reserve captured by invaders](#)
- [Fires in Askania Nova: Consequences of military occupation of reserve](#)

Ukrainian wartime policies for protected areas

In the first weeks of the full-scale invasion (February-March 2022), the main priorities were the safety of protected areas staff, continuing institutional work, preserving and removing documents, and documenting crimes against the environment.

Funding reductions posed a serious problem for protected areas managers. These reductions sometimes stemmed from the government's desire to avoid sending public monies to occupied areas. In addition, financial resources held by protected areas in bank accounts prior to the full-scale invasion also became inaccessible to those found in occupied areas. Conservation institutions could not access accounts they held to receive ongoing charitable donations because the Ukraine's Treasury Service was not servicing such financial transactions.

Reductions and delays in receiving government funding have increased humanitarian problems for both workers and protected area institutions in occupied territories.



Role of community organizations in financial and resource support for reserves

Even in the first months of the war, community organizations contributed significantly to organizing emergency assistance to protected areas. They were also experiencing the challenges of aid assistance during martial law for the first time. No one had previous experience in providing aid in a combat zone or occupied territories.

It was necessary to quickly find ways to help that would not require physical visits to affected institutions. One challenge was devising ways to deliver generators, animal fodder, medications, and food to an occupied area. It turned out that doing so was essentially not possible. As a result, the focus became providing financial support and assistance to protected areas staff who managed to leave occupied areas: finding housing and work and providing initial financial assistance after returning from occupied areas to areas controlled by Ukraine.

The vast majority of those wanting to help did not have their own means of transferring funds directly to protected area employees. As a result, for most, the solution was to transfer funds to trusted public organizations, with the goal of using those funds to help protected areas.

In most cases, assistance was provided through the accumulation of funds

by public organizations and payment for services and goods to Ukrainian enterprises and entrepreneurs who also found themselves under occupation. For example, a commercial supplier of grain, fuel, or construction materials has warehouses of products remaining in occupied territories. Funds are transferred to an account in Ukraine, and feed, materials, or equipment are delivered to nature reserves from a warehouse located in the occupied territory.

Support for occupied Askania-Nova

The greatest public response during campaigns to support protected areas focused on F. E. Falz-Fein Askania-Nova Biosphere Reserve (hereinafter referred to as Askania-Nova Biosphere Reserve), a fully-occupied protected area.

From the first days of the Russian military invasion of Ukraine beginning 24 February 2022, Askania-Nova found itself in a temporarily occupied zone. Despite that, the protected area was able to continue operations throughout 2022.

Including its infrastructure, the contents of Askania-Nova Nature Reserve differ radically from other Ukrainian protected areas due to the combination of virgin steppe ecosystems with artificial ecosystems: a dendrological park and a zoo with semi-free-ranging wild ungulates. Housing a non-native zoo collection requires significant



material costs and human resources. There is no option to pause care or rely on spontaneity.

Concentrated feed for animals became a critical problem. At the end of February (when the occupation began) the final stages of tender purchases of grains fell through.

Most of the reserve's problems were resolved using charitable donations from Ukraine, European Union countries, and the United States. [Ukrainian Nature Conservation Group](#) (UNCG) played a mediating role by opening an account to collect charitable donations designated for affected protected areas.

Funds were also collected by the [European Association of Zoos and Aquaria](#), [Botanic Gardens Conservation International](#), and Ukraine's [UA ANIMALS](#), an organization also focused on helping Askania-Nova Nature Reserve.

When funds had been gathered for the reserve, the first priority was purchasing and organizing fodder and diesel fuel reserves. By maintaining equipment in working condition, the reserve cut swaths and firebreaks along the perimeter of the steppe to prevent a possible fire. These fire-prevention measures also enabled collection and distribution of baled hay (total 594 metric tons) – a resource critical for sustaining the zoo's ungulate population in winter.

Anticipating problems with electricity, the necessary components for an ESD-

75T stationary diesel power plant and an DE-55RS Zn mobile generator capable of producing 40 kW were purchased. This equipment is required to maintain a collection of animals housed in an arid steppe environment totaling 2,369.6 hectares in area as well as an irrigated arboretum (167.3 hectares in size) that is completely dependent on well-water.

Backup deep-well pumps, equipment, spare parts, and components necessary for repairs and the uninterrupted performance of various service machinery and technical support for the maintenance of biological collections were also purchased. A significant supply of building materials was used for routine repairs of enclosures, fences, canopies, feeding stations, decking, etc. Winter enclosures for ungulates were reinforced and insulated (numerous unused doorways blocked and sealed, functioning doors insulated, etc.). This not only improved safety for the animals, but also kept reserve workers occupied during the occupation.

At the end of March 2023, after 13 months of Russian occupation, the situation in the reserve changed dramatically as the occupying reserve administration established de facto control over the protected area. This ended the Ukrainian administration and employee's ongoing work for the maintenance and life support of the reserve's infrastructure and wildlife. Accordingly, financial support from charitable organizations and volunteers



has been halted until the anticipated liberation of the left bank of the Dnipro River in Kherson Oblast from Russian occupation.

Support for unoccupied protected areas located in active combat zones

As for protected areas located in the active combat zone, but not occupied, public financial support primarily focused on meeting priority needs. For some protected areas, this means firefighting equipment, generators, fuel, and lubricants. For others, it takes the form of aid for employees and repairing destroyed buildings and infrastructure.

For such protected areas, the mechanism for providing aid was completely different, because it was possible to purchase goods in the Ukraine-controlled territory and directly transport them to zapovedniks and national parks. The main challenge lay in organizing safe delivery logistics, given the proximity of the front line.

Supporting protected areas in liberated areas

Challenges that arose after the liberation of protected areas simply added to those they had struggled with during the weeks and months of occupation.

Previously occupied institutions liberated by the end of 2023 include Chornobyl Radiation and Ecological

Biosphere Reserve, **Drevliansky Nature Reserve** (partially), **Desniansko-Starohutskyi National Nature Park**, **Sviati Hory National Nature Park** (partially liberated), **Kamianska Sich National Nature Park**, **Dvorichanskyi National Nature Park**, and the **Kreidova Flora** (“Cretaceous Flora”) department of the **Ukrainian Steppe Nature Reserve**. Some of them have only been partially liberated.

For protected areas unlucky to be or have been on the front line, the challenges following liberation include active shelling and built fortifications. De-occupation revealed other problems, including understaffing, destruction and theft of the institution’s property, mining activity, destroyed protected area buildings (including employee housing), and other critical issues caused by the war.

After achieving the primary objective of resisting the invasion, the Ukrainian government’s next priority is development and restoration of liberated areas. The first priority in that category will be restoration of critical infrastructure, assistance to the local population, and creating safe living conditions.

It follows then that liberated protected areas are not prioritized for restoration, and in reality the state is using them to carry out tasks required by martial law. As a result, protected areas have become a place for recording crimes against the environment. Military occupation



brought losses or destruction of their material and technical infrastructure, minefields, and constant shelling, all of which mean that protected areas are unable to provide their primary ecosystem services.

Organization of aid to Ukrainian protected areas

Ukraine's Ministry of Natural Resources worked with Lithuania's Ministry of Environment to provide 24 vehicles for Ukrainian protected areas for improved operations. An additional nine SUVs, two boats, and 300 sets of fire-fighting uniforms will as be provided. Given the challenges for distributing aid intended for both liberated and unaffected protected areas, only 30% received government assistance through or with government mediation.

Community organizations and foundations in Ukraine and abroad proved more effective in providing assistance to the affected areas. 70% of the assistance received from public organizations is logistical aid (firefighting equipment, generators, computer equipment), and 30% is humanitarian in nature (perishable food, personal hygiene items, and household items such as blankets and mattresses) for improving working conditions in protected areas.

Aid to war-affected, protected areas recently liberated from occupation has been an attractive option for foreign humanitarian organizations, which, due

to legal restrictions, could not provide aid that could in any way be used for military purposes. When negotiating aid, such organizations were primarily interested in the liberated status of an institution along with evidence that the assistance they provided would not be used to achieve military goals.

Ukrainian community organizations did not face such restrictions and have helped protected areas in all conditions, including those located in occupied areas.

Protected areas' needs are addressed on a case-by-case basis. For example, North American buffalo living in an enclosure were frightened by loud explosions. They broke through the enclosure and escaped from **Yelanetska Steppe Nature Reserve**. Employees managed to patch up the hole and return the bison, providing them with fodder and water. Acquiring materials for repairing the enclosure itself was carried out with charitable contributions.

Wartime aid for specialty protected areas: botanical gardens

The majority of Ukrainian botanical gardens and zoos are also categorized as protected areas. They are usually small in size, located in urban environments, and, as a rule, have good facilities, material resources (and often possess great scientific and historical value), collections, and financial resources. Their location in large cities renders them extremely



vulnerable to military attacks and the resulting consequences (blackouts, for example). Keeping greenhouses warm is a critical need on days when urban power and heat outages occur.

Donors in Europe supported botanical gardens in need of certain equipment and funding for operations in times when there was insufficient visitor revenue. The collected funds were divided evenly between the costs of backup power generation and support for employees caring for botanical garden collections.

[Peli Can Live](#) charitable foundation created a campaign to support [Hryshko National Botanical Garden's](#) greenhouse in Kyiv. Many citizens supported the campaign – 6,300 donors [raised](#) roughly three million hryvnia (over €73,000).

Wartime aid for specialty protected areas: zoos

The situation with zoos merits a separate discussion. Occupation of zoos in the cities of Berdiansk and Kherson, destructive shelling of zoos in Kharkiv and Mykolaiv, and the physical destruction of several private zoos in northern Ukraine were highly publicized both in Ukraine and around the world. Plentiful [evidence of destruction and damage](#) was documented.

Work with zoos is immediately multidimensional, given that most of them are interconnected in various associations and trade unions, share extensive connections among institutions

within Ukraine and abroad, are experienced in transporting animals, and possess reserve operating funds.

[European Association of Zoos and Aquariums](#) (EAZA) created the [EAZA Ukraine Zoos Emergency Fund](#) (Fund) to raised €1.5 million in funding for zoos in Ukraine in the first days of the war. The Fund transferred funding to zoos in Ukraine and conducted due diligence to ensure funding went to support zoo resources. The Fund also made it possible to support zoos through a wide range of activities, including local and international supply of material supplies, logistical support, infrastructure maintenance, and the possible movement of animals to temporary housing sites in Ukraine or abroad.

Teams from zoos in [Warsaw, Lodz, Gdansk, Wroclaw, Berlin, Prague, and Kosice](#) invested extensive effort to facilitate delivering aid to Ukrainian zoos. The Berlin and Prague zoos contributed significantly to Mykolaiv Zoo, which was significantly damaged by shelling.

Two coordination centers were established in Poland – in Warsaw and Lodz – to provide animals with fodder, veterinary drugs, and special equipment. By the sixth day of the war, a group launched a Telegram channel named [“Help Ukrainian animals in war”](#). Zoo departments across Ukraine joined, connecting with specialists to address high priority needs.



Area residents set up Ukrainian Zoo aid collection points in zoos in Berlin, Prague, Warsaw, Wroclaw, and Kosice. Uljana Kalazny and her colleagues at Lodz Zoo (Poland) coordinated shipments to Ukraine.

Donors and other support for protected areas

Overall over 212.9 million hryvnia have been donated to protected areas in Ukraine since the beginning of the full-scale invasion. It can be presumed that the overall scale of assistance to protected areas is significantly greater. Inexperience and wartime implementation challenges complicate the distribution of aid packages.

Community organizations from other countries made great efforts to assist. Foreign contributions came from countries that expressed the greatest support for Ukraine in the war's early days: Poland, United States, United Kingdom, Canada, Czech Republic, and Germany. There is a lot that remains unknown about foreign community organization support for protected areas; rather than organize assistance through these new direct channels, they used pre-existing channels of cooperation between donor organizations and protected areas.

Only 10% of the protected areas studied received assistance from the state, while 70% received assistance from community organizations and charitable foundations registered in Ukraine and

abroad. That assistance mainly focused on logistical and humanitarian needs (support for protected areas staff).

European government agencies also provided aid, including the Estonian Ministry of Climate, Lithuanian Ministry of the Environment, and Lithuanian Forest Service. A variety of protected areas benefitted from such assistance, including those liberated from occupation or partially damaged during hostilities.

Donors had their own parameters for aid, varying by activity and the charities' priorities. Some donors focused specifically on humanitarian assistance. Some aid for Ukrainian national parks was conditional, including, for example a ban on the purchase of body armor and helmets.

The situation was different when it came to Ukrainian citizens as benefactors of protected areas. The low popularity of protected areas among ordinary Ukrainians, and even more limited awareness of Ukraine's protected areas among citizens from other countries, significantly limited fundraising opportunities. Moreover, people not involved in nature conservation do not readily make the mental leap connecting protected areas and their flora and fauna with aid to protected area employees, although it is those protected area employees who make environmental protection measures possible by protecting, studying, and teaching others about protected areas.



Nevertheless, Ukrainian community organizations remain deeply involved. For example, UAnimals, a well-known Ukrainian non-profit organization single-handedly collected and donated nearly one million hryvnia to protected areas (nine national parks, two biosphere reserves, and one biological reserve) meet the specific needs of wild and captive animals. The organization also collected 31.5 million hryvnia to care for animals affected by the Russian terrorist attack on Kakhovka hydropower plant, including support for national parks.

Evolving needs and support

The tasks facing volunteers and donors have changed dynamically, as have their priorities. Early in the Russian invasion, the priority was support for Ukraine's armed forces and territorial defense units, as well as aid for displaced people. Gradually, as demand for support of displaced people (in and out of Ukraine) declined and international aid for Ukraine's military grew, opportunities to support protected areas increased.

Overall, the fundraising campaign for support of protected areas was very successful. Each of the thousands of donations to protected areas represented a conscious decision by individuals with hundreds of choices for dedicating their donations.

Generally speaking, Ukrainian donors are not systematic when it comes to

charitable giving, instead reacting to acute problems. Few people intentionally maintain long-term support for an issue (although there are wonderful exceptions), but they will donate enthusiastically in the event of an acute event. Ukrainian charitable giving is strongly linked to emotional factors.

Financial support of protected areas has become an avenue of support in Ukraine. Money collected by community organizations in the first weeks of the full-scale invasion made it possible for some protected area employees to evacuate in time from areas quickly overrun by the invaders and allowed others to adapt to the conditions arising from temporary occupation and to preserve hope for restoring Ukrainian control.

Aid also made it possible to save documentation, research collections, and important property belonging to protected areas. And most importantly, to save people. In areas that have already been liberated, delivery of humanitarian supplies helped protected area staff to quickly resume ordinary life and return to work. Finally, these events have been a unique experience for both community organizations and donors themselves, experiences that merit close study in the future about lessons learned. It is quite possible that those lessons will soon be put to work helping other protected areas recover after their occupation ends. •

Main image source: [Revelator](#)



International banking projects and restoring the Lower Dnipro's ecosystems

*Oleksiy Vasyliuk, Eugene Simonov
Translated by Jennifer Castner*

International development banks are extremely important participants in Ukraine's recovery. It is important for civil society to engage in dialogue with them, and banks must comply with strict social and environmental requirements as well as discuss projects with civil society. The war has inflicted tremendous damage on the energy sector, including on hydropower plants, and at the end of 2023, European development

banks announced loans to modernize the Dnipro River cascade of hydropower plants. This article discusses civil society's options for talking about this complex issue and suggests ways to advise international banks in order not to miss opportunities for improving the environmental situation in the Dnipro floodplain, both now during planning and implementation of key reconstruction projects in Ukraine.



International banks – leverage for Ukraine’s green recovery

During this war, international development banks (IDBs) are playing an important role in the support and green recovery of Ukraine – their role may only grow in the near future.

According to estimates by the [European Parliament](#), the World Bank has already spent USD 30 billion in Ukraine since 24 February 2022, mainly in support of macroeconomic stability, as well as projects in energy, road and urban infrastructure, and agriculture. Some projects, for example, a program to improve Luhansk Oblast’s rural economy, had to be refocused on emergency needs at the discretion of the Ukrainian government.

Since the beginning of the war, the European Bank for Reconstruction and Development (EBRD) has invested EUR 3 billion in restoring Ukraine’s infrastructure and maintaining the stability of its banks and the energy industry. The entire “bank portfolio” in Ukraine is roughly EUR 5 billion. The largest state energy companies Naftogaz and Ukrenergo have each received loans totaling EUR 300 million. Thanks to these significant investments, Ukraine managed to ride out winter 2022-2023, when the Russian military used massive missile attacks to deliberately destroy key energy infrastructure facilities (power plants, trunk power lines,

and 42 of Ukraine’s 94 high-voltage transformers).

A [report](#) prepared jointly by the United Nations Development Program (UNDP) and the World Bank in preparation for the first anniversary of the war shows that Ukraine’s energy system remains extremely vulnerable; it operates with limited safety margins. Electricity generation capacity in Ukraine has decreased by almost 50% on 2022, including the loss of more than 67% of thermal generation capacity. The total damage to the energy system exceeds [USD 10 billion](#).

On 19 December 2023, EBRD shareholders approved a 13.3% increase in the bank’s paid-in capital by EUR 4 billion to ensure continued support for Ukraine. The EBRD expects to provide Ukraine with investments of approximately EUR 1.5 billion per year from its own funds during the war and then increase support to EUR 3 billion per year in the recovery phase.

In March 2022, the European Investment Bank (EIB) launched the “Solidarity with Ukraine” emergency fund for 2022-2023, allocating EUR 2.3 billion on the basis of reallocating existing loans. In addition, the EU Fund for Ukraine attracted financial commitments from 20 Member States totaling EUR 415 million. Investment projects will cover energy, energy efficiency, roads, transport, education, infrastructure, and reconstruction and rehabilitation programs.



At the end of December 2023, the EIB specifically [announced](#) the allocation of EUR 99.6 million to help the Ukrainian government restore and modernize critical infrastructure damaged by ongoing Russian shelling. These funds make it possible to rebuild roughly 200 small municipal and social infrastructure projects, including in Chernihiv, Dnipro (formerly Dnipropetrovsk), Kharkiv, Kyiv, Mykolaiv, Odessa, Sumy, Volyn, and Zhytomyr.

Banks and environmental organizations

The main partner of these banks is the Government of Ukraine, and the official guiding document for the country's recovery is the "Lugano Recovery Plan", the environmental shortcomings of which prompted a scathing [rejection](#) by many community organizations. All development banks have detailed environmental and social standards and are obliged to consult with representatives of civil society. Requests from community organizations have frequently prompted development banks to modify, improve, or cancel potentially dangerous projects proposed by government agencies. It is important for NGOs to be in close dialogue with IDBs in order to improve Ukraine's restoration programs and quickly identify project concepts that could cause damage to nature.

As mentioned above, these banks are guided by their environmental and

climate standards when allocating money for Ukraine's reconstruction. In 2023 Vice President of the European Investment Bank [Teresa Czerwińska](#) stated that, "Inclusive, green, and resilient growth of Ukraine is a top priority for the EIB. As the EU climate bank, we focus on projects that provide for a greener future for Ukraine. We minimize the carbon footprint in the reconstruction process. For example, since 2014 we have rebuilt over 100 buildings: schools, hospitals, and so on. These reconstructions are green and allow to save up to 50% of energy." Bank priorities also include the development of hydropower and many other sectors that require vigilant public control.

International support programs for renewable energy and hydropower electricity generation are connected not only to the need to attain global climate obligations, but also to prospects for other European countries to gain stable access to "green" energy produced in Ukraine.

The peaking capacities of these hydropower plants and pumped storage power plants appear to be particularly valuable resources, given that the building of such plants on Europe's rivers today is extremely problematic due to negative socio-ecological consequences and almost full utilization of all watercourses where such projects could be possible. Dikes and dams are the most common issue preventing the



restoration of Europe's river ecosystems today. At present, the EU [plans to restore 25,000 kilometers](#) of free-flowing rivers by 2030.

International banks and Ukrainian hydropower

In the decades before this war, international development banks considered supporting the creation of new hydropower stations and hydroelectric and pumped storage power plants using Soviet-era designs on the [Dniester](#), [Southern Bug](#), and Dnipro rivers. Each of these projects raised concerns among scientists, as well as protests from the environmental community and local residents. Well-known international organizations such as CEE Bankwatch Network were involved in risk [analysis](#) and even [produced documentaries](#) to inform the local population about the risks. As a result, none of the proposed new hydropower stations were implemented with funding from cautious international banks.

At the same time, banks are willing to provide Ukraine with money for the modernization of aging Soviet-era hydropower plants, facilities that require regular renovation and replacement of key equipment. Modernization of a single large hydropower plant often requires a loan of USD 100 million or greater, and a return on the investment is reliably guaranteed by the sale of the electricity produced. Unlike dispersed

wind and solar power plants, large hydropower facilities are convenient for providing large loans, and as a result, bank staff prefer to support these sorts of "no sweat" projects. Ukrhydroenergo regularly received loans to renovate Soviet dams, but, unfortunately, these projects rarely included the task of reducing the environmental damage they routinely caused. In the EU, and even more so in the United States, reducing "chronic" environmental impacts in accordance with present-day legislation is a mandatory requirement not only for large modernization projects, but even simply for renewing the license to operate hydropower plants. After all, some dams have been in service for centuries and were created at a time when there were no environmental requirements for them whatsoever.

Nevertheless, the repair of existing environmentally-harmful hydropower plants, as a rule, is much less damaging than building new ones under claims of "sustainability" and "environmental friendliness". Real modernization can, in fact, bring great benefits. In 2021, the World Bank and Ukrhydroenergo launched an innovative project for ["Improving Power System Resilience for European Power Grid Integration"](#). The project is based on the assumption that Ukraine's energy system and hydropower stations themselves are not sufficiently flexible and their safe integration with the EU network will be facilitated by



integrating hydropower plants with batteries and small solar power plants for short-term energy storage. Given that hydropower plants are usually presented as the most maneuverable and flexible type of generation, such a conclusion seems paradoxical. Nevertheless cross-integration of hydropower generation, battery storage, and photovoltaics is promising. The project should be implemented at Kaniv and several other hydropower stations in the Dnipro cascade, as well as at the Dniester hydropower station to the southwest. The war makes the need for a safe and reliable connection to the EU energy grid an urgent and important task.

Restoration and modernization of hydropower in wartime

While in the first months of the war it seemed to UWEC experts that hydropower plants [suffered significantly fewer](#) losses than other types of power generation, the subsequent [targeted destruction](#) of hydropower infrastructure by Russian missiles in December 2022, and ultimately the destruction of the Kakhovka hydropower plant dam in June 2023, underscored their greater vulnerability.

Ukrhydroenergo, Ukraine's leading hydropower producer, [reports](#) that Russia has carried out fifty plus attacks on hydropower facilities during the war, disabling some 2,500 MW of generating

capacity (of a total of 6,000 MW). After the [destruction of the Kakhovka hydropower plant](#) and targeted shelling of the Dnieper hydropower plant, Ukrhydroenergo [appealed](#) to banks and other foreign partners for help in restoring capacity.

Banks quickly came to the rescue. In December 2023, the [European Investment Bank](#) allocated a new tranche of EUR 113 million for the repair of hydropower plants damaged by shelling on the Dnieper cascade within the 2012 [“Rehabilitation of Hydropower Plants”](#) project.

A new [EBRD loan](#) of EUR 200 million is planned to be disbursed in January 2024, financing the replacement of four outdated generators at Dnepro HPP that were damaged by shelling, ultimately increasing capacity by 16%. Funding repairs and equipment replacement can only be welcomed, but the environmental community also seeks consideration and reductions of the chronic negative environmental impacts of hydropower during that reconstruction. This is especially relevant today, following dramatic changes along the lower Dnieper after the disappearance of Kakhovka Reservoir.

Along with Ukrainian officials, banks would like to avoid conducting environmental impact assessments until the conclusion of martial law, despite the obvious need. The EBRD baldly [states](#): *“While the Company is an existing client, the Bank has not undertaken a project with*



the Company for some time, and no new projects were done under the 2019 E&S Policy (ESP). Recent pre-war attempts to undertake projects have not provided sufficient, additional, E&S information and ESD therefore cannot state that current corporate E&S standards are compliant with the Bank's Environmental and Social Policy. Due to the ongoing war and associated security risks, the Bank is unable to undertake meaningful additional environmental and social due diligence on both the project, and on other Company projects. An independent environmental and social audit is, therefore, required to be undertaken both on the Project, and on corporate Environmental, Social and Governance management systems, within 12 months of martial law lifting in Ukraine."

Also in need of further clarification is the EBRD's contradictory position according to which replacing generators at hydropower plants during martial law is permissible, while assessing the impacts of such work and analyzing Ukrhydroenergo's corporate responsibility are impossible. A future environmental impact analysis, after modernization of the hydropower plant is complete, may reveal omissions, but many will be impossible to correct. Timely dialogue between banks and civil society is needed now in order to consider the environmental components of such projects, despite the fact that, at present, conducting an Environmental Impact Assessment (EIA) and public discussion in Ukraine is limited under martial law.

Despite that challenge, the war does not somehow cancel the environmental and social standards of banks, especially since Ukrhydroenergo's compliance with those standards is already raising doubts within the EBRD.

Environmental flow – is it a task for hydropower plant restoration?

In accordance with the [hydropower standards](#) that European banks themselves have adopted, efforts to restore the Dnipro hydroelectric cascade must be coordinated with biodiversity conservation objectives and the restoration of ecosystem services and local economies in the Lower Dnipro region. After the release of the waters in Kakhovka Reservoir, conditions changed dramatically, and currently the impact of Dnipro Hydropower Plant operations and the downstream cascade are subject to new, detailed environmental and social assessments.

First and foremost is the question of how to conduct environmental flows (water releases) from the hydropower plant to sustain downstream ecosystems. Such seasonal environmental releases downstream of the Dnipro hydropower plant support the restoration of biodiversity and ecosystem services for natural floodplain river ecosystems. Strategic investments in the renovation of hydropower stations in the Dnipro cascade are positioned to require the



development and implementation of an Environmental Flow Management Plan. The destruction of Kakhovka dam means that the subsequent restoration of floodplain ecosystems is already underway across a huge landscape. Such a large floodplain cannot be managed without revising the requirements for environmental flow management. These revisions would be reflected in regulations for the use of water resources at Dnipro HPP and the entire cascade.

Can the limits of maneuvering capacity be overcome?

The emptying of Kakhovka Reservoir has [noticeably complicated](#) daily water discharges downstream of the Dnipro hydropower station. Today, hydro-peaking cannot be leveled by the Kakhovka Reservoir in order to cover peak demand; instead the river flows directly into the Dnipro river channel near Khortytskyi National Reserve. Sudden changes in water flow can cause river bank erosion and negatively affect aquatic fauna and flora. Development and implementation of such a scheme for restoring the maneuvering capacities of the Dnipro hydropower plant and the entire cascade could be an important task for restoration. A well thought out plan could eliminate negative environmental impacts stemming from daily hydro-peaking. In the event that a “counter-regulator storage basin” could

be engineered downstream of Dnipro hydropower plant, an option provided for in a Ukrainian Cabinet of Ministers’ [resolution](#) of the Cabinet of Ministers, it is important to minimize impacts on the river ecosystem’s natural and cultural complexes, including downstream government-protected areas.

When considering investments to modernize the Dnipro dam cascade, the EBRD and EIB will need to examine the restoration and development of modern management systems in the Lower Dnipro. Operation of the Dnipro cascade is of decisive importance for the environmental wellbeing and sustainable development of the Lower Dnipro.

EIB and EBRD projects may also affect Ukrhydroenergo’s plan for the restoration of the Kakhovka hydropower plant. According to [many scientific and community organizations](#), reconstruction of Kakhovka’s reservoir will result in enormous environmental losses with extremely dubious economic benefits. Meanwhile, the structure of currently allocated loans is consistent with the hypothesis that European banks may consider reconstruction of the Kakhovka hydropower plant to be a promising project. For example, half of a EUR 200 million loan is provided by the Italian government. It is likely that, among other objectives, such a contribution supports the participation of Italy’s largest company WeBuild (formerly Salini Impregilo) in



Ukrainian power hydropower sector. Ukrhydroenergo and [WeBuild](#) have already signed a memorandum of cooperation, which has been [approved by the two governments](#), that is related to the “creation of new hydropower plants and conversion of hydropower stations into pumped storage power plants.” [Research by European scholars](#) shows that WeBuild received low scores in corporate responsibility and was a key executor of many of the most odious hydroelectric long-term hydropower construction projects, including the

Nenskra hydropower station in Georgia, Gibe-III in Ethiopia, and the Rogun hydroelectric power station in Tajikistan.

During and after the war, the preservation of Ukrainian river ecosystems and the sustainable development of their watersheds is a complex set of challenges, solutions to which are impossible without productive interactions between multilateral development banks, NGOs, the expert community, and relevant government agencies in Ukraine. •

Main image source: [Freepick.com](#)



Environmental consequences of Russia's war in Ukraine: January 2024 Digest

*Alexej Ovchinnikov
Translated by Alastair Gill*

CEOBS and Zoi Environment Network release 7th study on environmental consequences of war in Ukraine

The Conflict and Environment Observatory and Zoi Environment Network's latest [study](#) is devoted to the invasion's impact on ecosystems and biodiversity, with a particular focus on the consequences for conservation zones.

In particular, the study notes that although Ukraine occupies around 6% of Europe's territory, the war impacts 35% of its biodiversity. This is largely due to the migration of various species, as well as its unique ecosystems.

At present, conservation zones make up around 6.8% of Ukraine's total land area. This is significantly lower than the EU standard. However, it should be noted that beginning in 2015 Ukraine



lost control over some areas that are important for the conservation of biodiversity, in particular over protected areas in Crimea. UWEC has covered this in previous articles.

- Read more: [Nine years after Crimea's annexation: militarization's environmental consequences](#)
- Read more: [The Crimean Bridge: Environmental impact of Russia's 'project of the century'](#)

After the beginning of the full-scale invasion many protected areas were also occupied. In particular, the extensive Askania-Nova Biosphere Reserve. Read about the fate of protected areas experiencing occupation and the assistance being provided to them in our articles:

- Read more: [Wartime challenges for Ukraine's protected areas](#)
- Read more: [Protected areas and war: two years of humanitarian aid](#)

During the full-scale invasion, reserves and national parks not only found themselves under occupation, but in many cases military action occurred (and continues to occur) on their territory, and consequences extend beyond forest fires.

As part of its analysis, CEOBS used data from [Ecodozor](#), a tool developed

with the support of Zoi Environment Network, the UN's environmental program and the humanitarian initiative REACH.

UWEC Work Group plans to carry out a more detailed analysis of the impact of military action (in particular fires caused by fighting) on Ukraine's conservation areas and its consequences. Until then, you can familiarize yourself with this [study](#) by CEOBS and Zoi Environment Network.

Review of policies for recycling waste generated by military intervention

The organization Environment People Law (EPL) has [carried out](#) an analysis of the recycling of waste accumulated as a result of Russia's invasion of the Chernihiv and Kharkiv regions. This primarily concerns destroyed buildings, infrastructure, and other waste left behind after shelling and as a result of fighting.

[Resolution No. 1073](#), passed by Ukraine's Cabinet of Ministers on September 27, 2022, establishes a procedure for handling waste created by the damage to or destruction of buildings and structures as a result of military operations, terrorist acts and sabotage, and determines what steps are necessary to clear up the damage. One feature of this procedure is that, whenever possible, sorting and separate collection of waste is carried out onsite.



However, the analysis showed that in the Chernihiv region no measures had been taken to organize places for the temporary storage and sorting of waste. In the majority of the region's hromady (socio-territorial units) there are no plans for the sorting and use of waste. In five, waste was used by local residents and thus eliminated. In several communities, waste was transported to existing landfills. A similar situation developed in the Kharkiv region.

As the EPL analysis showed, in both regions there is no policy for the temporary storage of waste caused by military activity, and its sorting, although waste disposal solutions may vary.

It is important to note that the recycling of waste formed as a result of the invasion, is an important part of Ukraine's green recovery and depends directly on this, how the environment copes with the consequences of war.

Meeting on the environmental consequences of the invasion of Ukraine

"United for Nature. Agenda for Ukraine", an [international forum](#) organized by the Ministry of Environmental Protection and Natural Resources of Ukraine, will be held on January 31.

The goal of the forum is to gather diplomats, international organizations, and representatives of business

communities to assess the impact of the war on the environment and also analyze the implementation of climate obligations and policy relating to Ukraine's green transformation.

UWEC Work Group will also be sending a representative to cover the forum: Oleksiy Vasyliuk, the head of the Ukrainian Nature Conservation Group.

Ukrainian environmental organizations have written an open letter on the importance of civil society participation in resolving green recovery issues in Ukraine

Ahead of upcoming discussions of the status of the creation of a fund for Ukraine (Ukraine Facility Regulation), a coalition of civil society organizations has called for their inclusion in the decision-making process, as the Ukrainian environmental organization Ecodiya (Ecoaction) [reports](#).

The open letter drawn up by the organizations insists that when drafting regulations for this fund, the European Commission and the European Parliament should pay close attention to the following issues:

- transparency in decision-making;
- the importance of including civil society representatives in processes related to the Plan for Ukraine and the work of the fund;



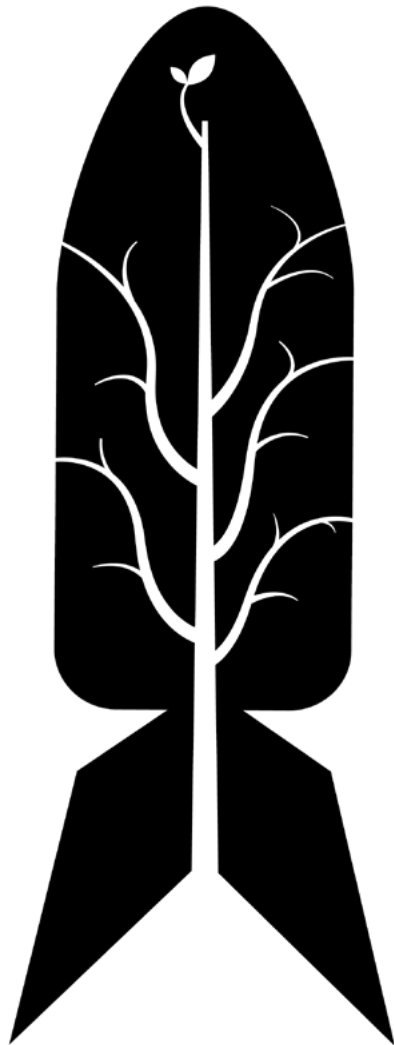
- compliance with environmental guarantees and principles.

The 2024-2027 Plan for Ukraine (a new Ukraine Facility) was announced by the European Commission in June 2023. It promises financial support in the form of grants, creation of a special Ukraine Investment Framework, and

also technical support to help implement the program.

- Read more about the role of civil society organizations: [International banking projects and restoring the Lower Dnipro's ecosystems](#)

Main image: Bridge over the Tisa River in the Carpathian Biosphere Reserve. Photo: Mykola Tymchenko



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