

U W

E C

**Ukraine War
Environmental
Consequences
Work Group**

Issue #23

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Dear Friends!

*The main events in June this year were conferences and presentations of research on the environmental consequences of the Kakhovka hydropower plant dam's sabotage in 2023. The good news is that the short-term consequences were not as catastrophic as experts had feared. No dust storms developed, desalination and blooming persisted for just a few months in the Black Sea, and local species, such as willow and poplar, have grown on the bed of the former **Kakhovka reservoir** instead of invasive plant species. However, the disaster itself raised two important questions that remain relevant for the environment in Ukraine and the region today: how to hold the aggressor accountable for this ecocide and how the country will be restored once the war is over. Read more about the conferences and the results of the research dedicated to the anniversary of the destruction of the Kakhovka dam in our traditional review:*

- [**Environmental Consequences of the War in Ukraine: June 2024 Review**](#)

Over the past year, Ukrainian scientists have organized more than five expeditions to the bed of the former Kakhovka Reservoir. The research was conducted in close proximity to the frontline, so it has not yet been possible to carry out a full analysis. In addition, there is no data from the left bank of the Dnieper, which was severely damaged during the flooding. We also should not forget that while the war continues, threats of new disasters and pollution remain. The Zaporizhzhia nuclear power plant, located on the shore of Kakhovka Reservoir, still stands in the danger zone. In this issue you can familiarize yourself with the preliminary results of expeditions, results give hope of a green future for Ukraine:

- [**One year after the terrorist attack at Kakhovka Hydropower Plant: 1B trees instead of desert and willow forests unique to the continent**](#)

Some experts have described the issue of water resources as a cornerstone of this war, citing the need to guarantee water supply to the North Crimean Canal as one possible reason for Russia's full-scale invasion of Ukraine. However, the war has not resolved the "water issue", and new research shows that with proper management and modernization of the agricultural and infrastructure sectors, Crimea is capable of independently meeting its water needs. We hope that this will happen when the peninsula is liberated. UWEC expert Eugene Simonov explores Crimea's problematic stewardship of water resources:

- [**The thirsty peninsula: How much water will Crimea need in the future?**](#)



Discussion of the issue of Ukraine's green recovery continued in June at the **Ukraine Recovery Conference**. Unfortunately, military needs are still a top priority for the country, and for now Kyiv views the solution to the acute issue of energy security through an industrial prism: specifically, through the construction of nuclear and hydroelectric power plants, which it sees as compromise "green" solutions. Nevertheless, environmental organizations continue to advocate for more ambitious goals in post-war restoration projects for Ukraine. Read about the conference's outcomes in this article by Ukrainian journalist Viktoria Hubareva:

- [Ukraine Recovery Conference 2024: What were the key environmental takeaways?](#)

War upends the natural order, forcing living organisms to change their habits and adapt. This primarily concerns migratory species, such as birds. Destruction of long-term nesting areas, disruptions to civil aviation, shelling, and military activity affect almost all bird species, including birds of prey, forcing them to change their behavior and habitats. This all comes with environmental consequences, disrupting local ecosystems. Read more about the war's impact on raptor populations in Ukraine in this article by Viktoria Hubareva and Stanislav Viter:

- [Has the war forced eagles to alter their migration routes in Ukraine?](#)



You can explore other stories and news related to the consequences of Russia's full-scale invasion of Ukraine on our [website](#), as well as on [Twitter](#) (X), [Facebook](#) and on [Telegram](#).

We wish you strength and peace!
Alexej Ovchinnikov
Editor, UWEC Work Group



Environmental Consequences of the War in Ukraine: June 2024 Review

Alexei Ovchinnikov

Each month, the UWEC editorial team shares highlights of recent media coverage and analysis of the Ukraine war's environmental consequences with our readers. As always, we welcome reader feedback, which you can leave by commenting on texts, writing to us (editor@uwecworkgroup.info), or contacting us via social networks.

The main event in this past June was the anniversary of the explosion of the

Kakhovka hydropower plant (HPP) dam, an event which led to both the depletion of the reservoir and an environmental and humanitarian catastrophe in the Dnipro River delta. Over the past month, several conferences, events, and studies focused on the terrorist attack on Kakhovka HPP, analyzing its main environmental consequences. Other discussions also focused on



important recent occurrences, including conservation of the forests now growing on the bed of the former reservoir, an area historically known as Velyky Luh (“Great Meadow”) and ecocide taking place in Ukraine.

What is going on the bed of the former Kakhovka Reservoir? Conference outcomes

The “Kakhovka Reservoir Disaster: Tomorrow, One Year After and Future Prospects” conference took place 6-7 June 2024 at the Biology, Geography, and Ecology Department at Kherson State University. During the gathering, Oleksandr Khodosovtsev presented the work of an expert group that is monitoring vegetation restoration on the lands of the drained Kakhovka Reservoir.

He noted that one of the group’s focus areas is collecting data to bring the perpetrators of the dam’s sabotage to justice in accordance with Article 441 of the Criminal Code of Ukraine “On Ecocide”. The group, which includes experts from a number of Ukrainian research institutes and NGOs. The NGO Environment. Law. People worked with participants to develop and present [seven criteria](#) for a legal definition of the term “ecocide”. One defining criterion is an action that leads to the destruction of a biotope – defined as an area with uniform environment and wildlife – and, as a result, 50% or greater of the country’s residents cannot benefit

from environmental services. Experts believe that the sabotage of the Kakhovka HPP dam meets this criterion for an act of ecocide.

Oleksandr Khodosovtsev described how the monitoring group began its work on 30 June 2023, just weeks after the disaster. In total, the team organized four expeditions to the bottom of Kakhovka Reservoir over the better part of one year. Two small, flat-bottomed valleys in Kamianska Sich National Park were selected for monitoring.

The very first trip to Kakhovka revealed that the reservoir’s water level in the selected areas had fallen by 9.5 meters, a fact which greatly surprised the group members. The overall impression was shocking – a huge number of dead crustaceans, mollusks, and fish remained on the drying bottom of the reservoir.

Active natural restoration of vegetation began quite quickly in the zones selected for monitoring. By the second expedition, which took place on 19 August 2023, the emptied bottom of the reservoir had already been covered with several dozen plant species.

The scientists’ main concerns were that dust storms could arise at the bottom of the dried-up reservoir, as well as the possibility of invasive species overgrowing the land.

This rapid restoration of vegetation on the reservoir’s bed dispelled the fear



that almost 200,000 hectares of newly-dry land would become a zone for the formation of dust storms. At first, the soil was covered in algae and aquatic plants, but then the ground began to be actively overgrown with other species. During the initial expeditions, approximately ten plant species were identified growing in damp cracks of the dried bottom.

The second concern was also unfounded. An expedition on 22 May 2024 to the north end of the former Kakhovka Reservoir showed that the bottom of the former reservoir was overgrown, mostly with willows. The tallest specimen that the researchers encountered stood 4.75 meters tall in an area with a density of 32 plants per square meter. In total, more than one hundred plant species were recorded during the expeditions, only a quarter of which were invasive species. Those species occupy only small areas, mainly in the sandy coastal zone. These same willow thickets block alien species from reaching the bottom itself, enabling the biotope to recover naturally.

Moreover, a year after the disaster, a storeyed vegetative structure began to form, a process that illustrates development of a stable ecosystem on the site of the former Kakhovka Reservoir. A layer of moss and lichen began to appear on the bottom.

Today, a forest typical for this part of Ukraine is being restored: poplars are actively growing over sandier, higher banks while willow thickets take over the bottom.

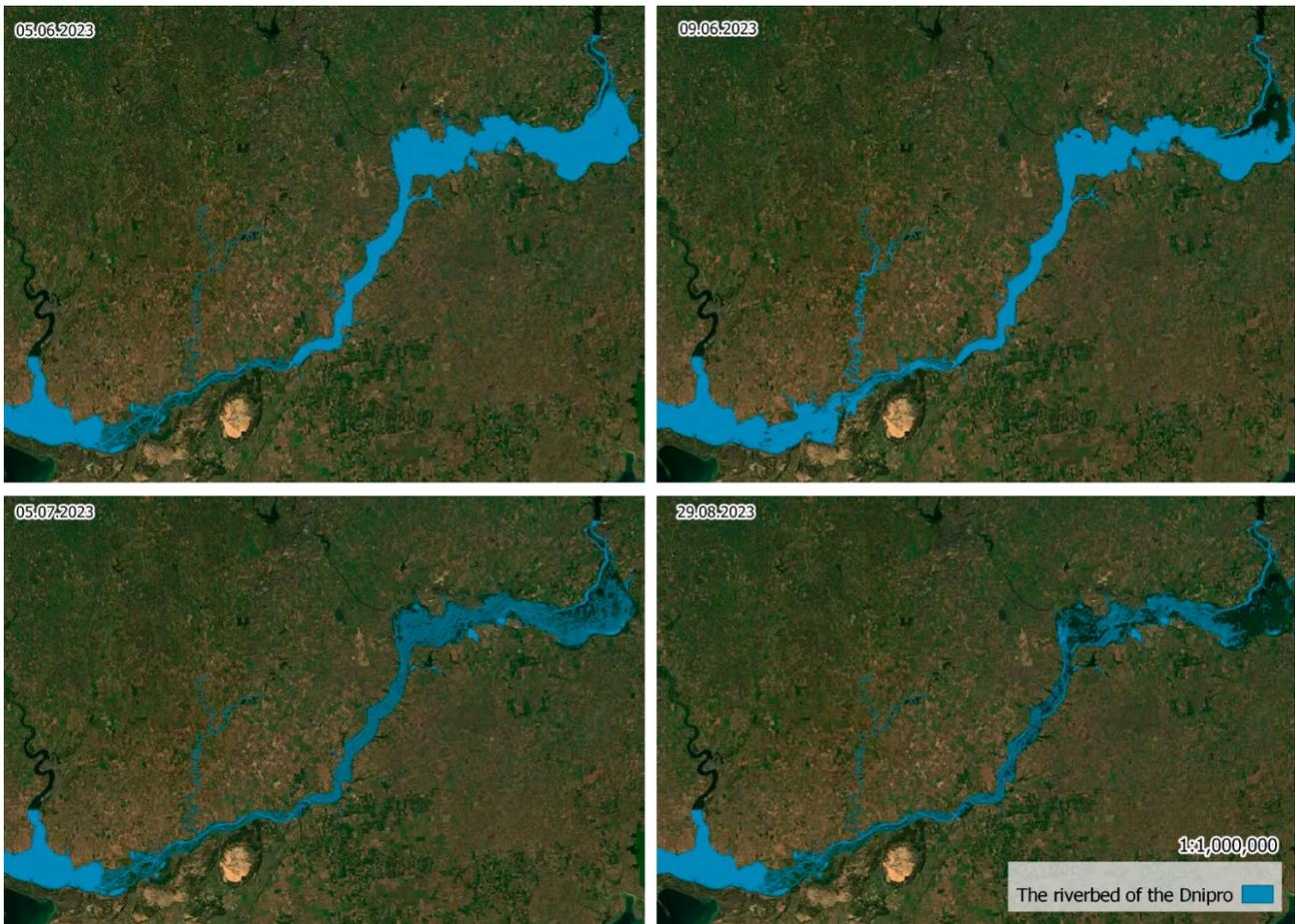
Sabotage of the Kakhovka HPP dam: War crime

The international NGO [Truth Hounds](#) has been collecting data since 2014 on war crimes that took place during the conflict in Ukraine, as well as during military conflicts in the Caucasus and Central Asia. In June 2024, they released a [report](#) on the impact of the Kakhovka HPP disaster on ecosystems, the agricultural sector, and civilian infrastructure in Ukraine.

The report shows the history of the construction of the Kakhovka HPP, presents an investigation into possible terrorist attack scenarios, and analyzes the consequences of the dam's sabotage.

As Truth Hounds noted, hydropower plants accounted for approximately 12 percent of the country's electricity generation before Russia's full-scale invasion of Ukraine. Researchers classify hydropower plants as renewable energy sources, with the country's highest concentration of renewable energy sources located in the southeast, namely in the Dnipro, Zaporizhzhya, Kherson and Mykolaiv regions. These areas suffered the most in 2022-2023, another factor that contributed to the country's falling renewable energy production.

The Dnipro River delta, where the Kakhovka HPP was located, is also a center of biodiversity in Ukraine. The country has lands protected by the Ramsar Convention and a large number of species listed in the Ukraine



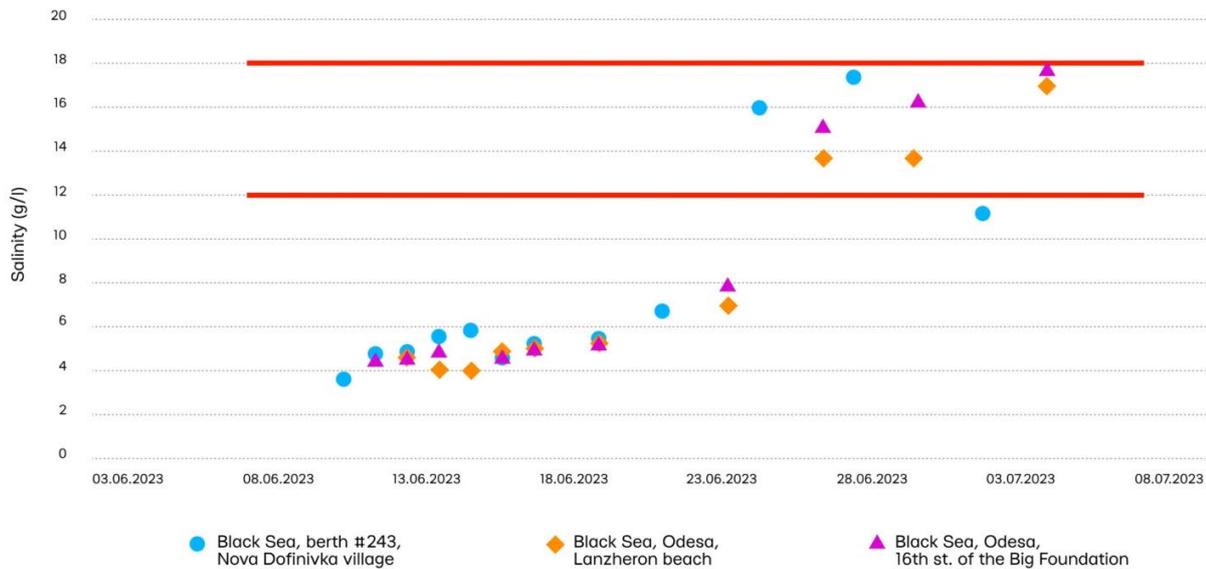
Dnipro River delta changes downstream of the Kakhovka Reservoir between 5.06.2023 and 29.08.2023. Source: [Truth Hounds](#)



Comparative analysis of flooded areas on 9.06.2023 Source: [Truth Hounds](#)



Salinity in the Black Sea



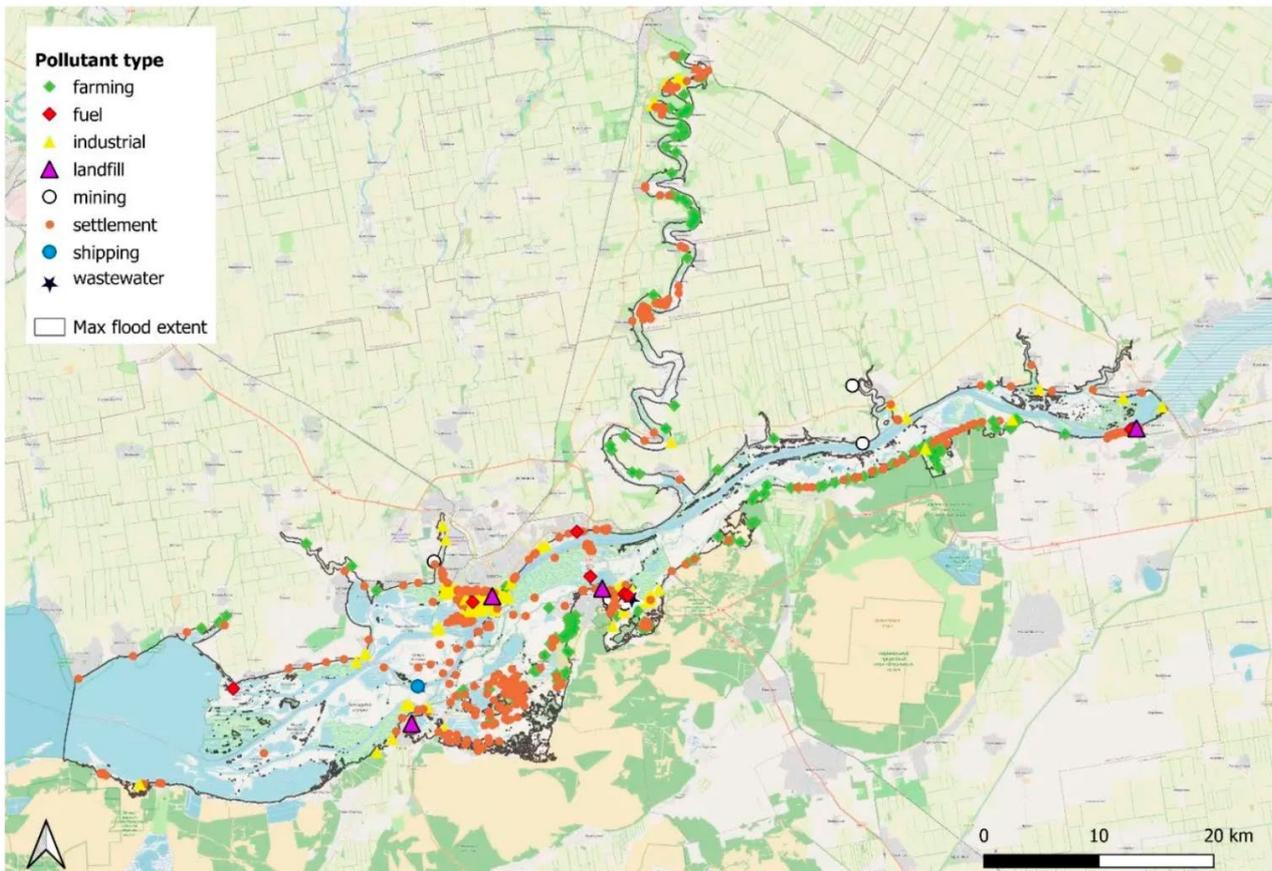
Indicators of sea salinity recovery on the basis of samples collected on the Ukrainian Black Sea shoreline. Source: [Truth Hounds](#)

Red Book. Areas such as the Lesser and Greater Kuchugury ('dunes') or the Sem Mayakov ('Seven Lighthouses') Marsh are extremely important nesting areas for migratory birds, meaning the entire Dnipro delta is important for preserving the entire region's biodiversity. The Black Sea Biosphere Reserve, a UNESCO heritage site, is also located here. After the dam's sabotage and water release, all of these territories suffered significant damage.

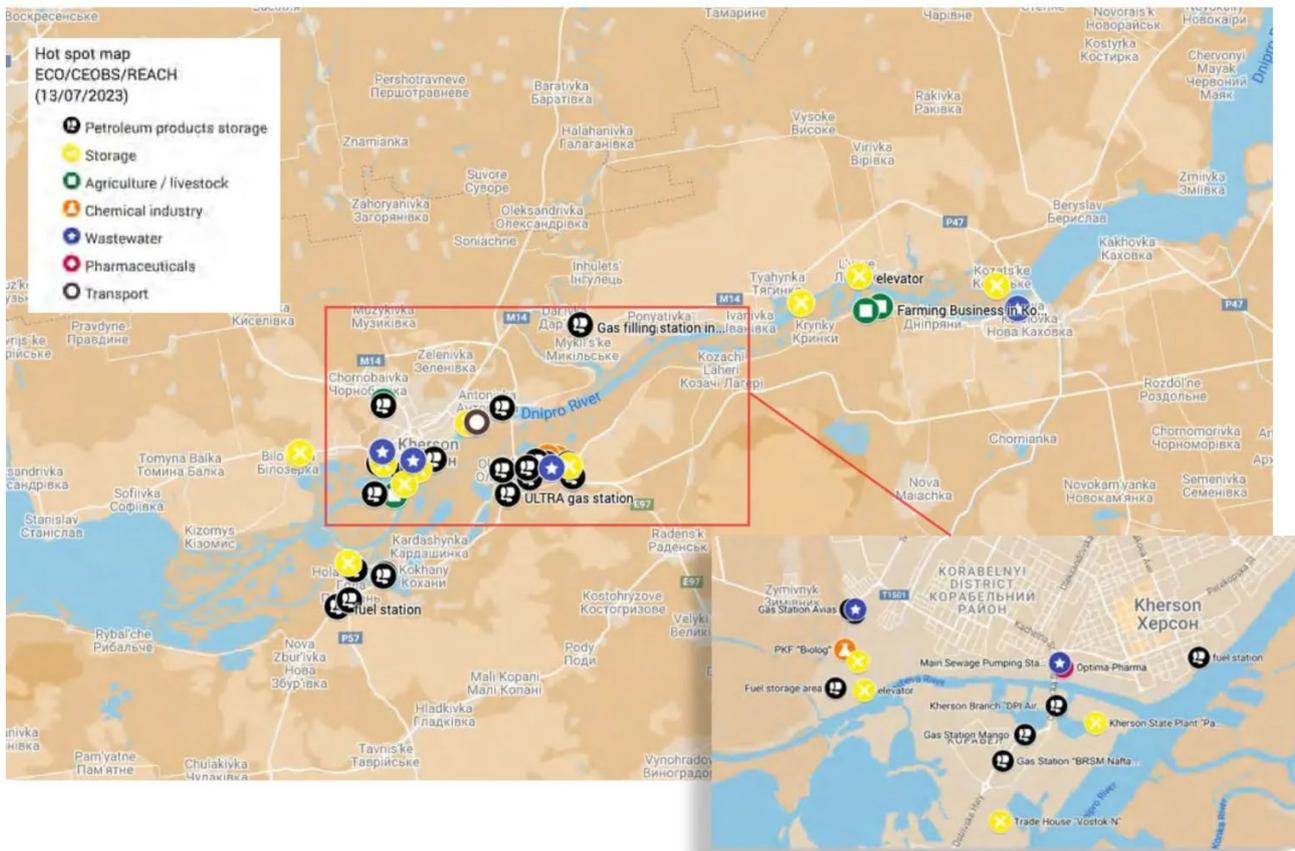
The main negative consequences were related to flooding immediately after the disaster. The floodwaters peaked on 9 June 2023, when Sentinel 2 satellite imagery showed that 1,284 sq km of land were covered by water in the delta. Before the disaster, on 5 June, this figure was just 812 sq km, meaning that 464

kilometers of previously dry land were flooded. By 5 July 2023, the water had receded to cover just 825 sq km, meaning that water levels actually reached the pre-rupture level, although the actual cartography of the upper waters and the basin, of course, changed.

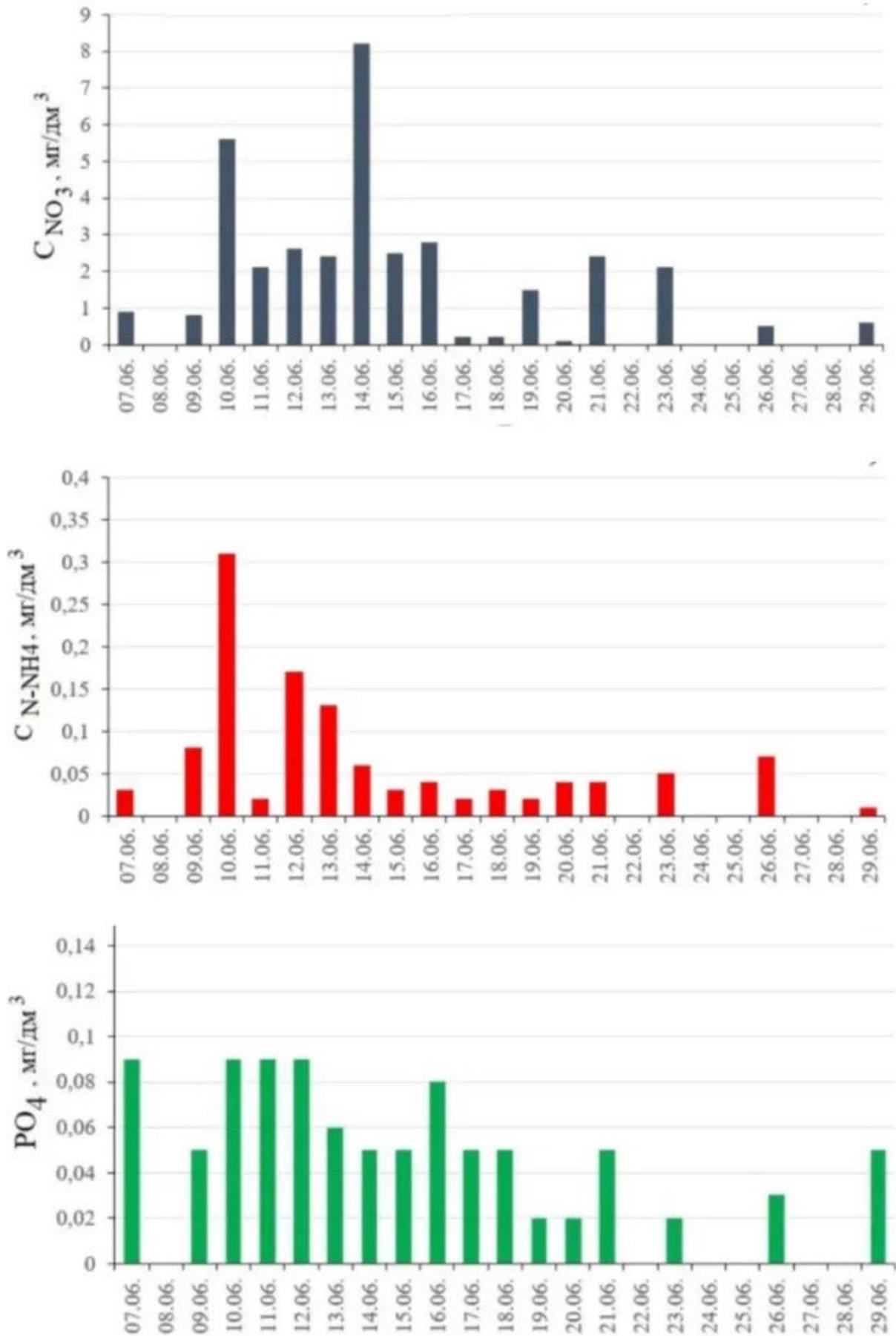
Among the main environmental consequences of the dam's destruction, Truth Hounds researchers noted a rise in groundwater levels, resulting in flooding of houses and areas located at some distance from the Dnipro delta itself. Overall, the reservoir's release changed the groundwater regime in the delta. Studies conducted in September 2023 by the Academy of Sciences of Ukraine showed a critical drop of 5-7 meters in groundwater levels in the Kakhovka Reservoir area.



Map indicating potential pollution sources. Source: [Truth Hounds](#)



Potential pollution source sites according to CEOBS and REACH data cited in the Truth Hounds report. Source: [Truth Hounds](#)



Graphs of pollution by ammonium salts, nitrates, and phosphates. Source: [Truth Hounds](#)



After the disaster, scientists worried about decreased salinity along the Black Sea coastline, a fact which could have a negative impact on local ichthyofauna. This did indeed happen in the first days after the disaster, but by the end of June 2023 salinity levels were restored as the waters mixed.

Another major concern was chemical pollution of waters in both the Dnipro delta and the Black Sea. The areas through which floodwaters passed were fairly dense metropolitan areas, meaning, for example, that sewage water would also have entered the river. The area also contained gas stations, farms, chemical industry facilities, and even pharmaceutical plants. For example, Greenpeace [noted](#) 32 fuel and agricultural industry facilities in the flood zone, all of which are potential pollution sources. The Conflict and Environment Observatory (CEOBS) [recorded](#) 88 hazardous facilities, 49 in areas controlled by Ukraine and 38 on the Russian-occupied right bank. Ecodozor [reported](#) 194 potential pollution facilities.

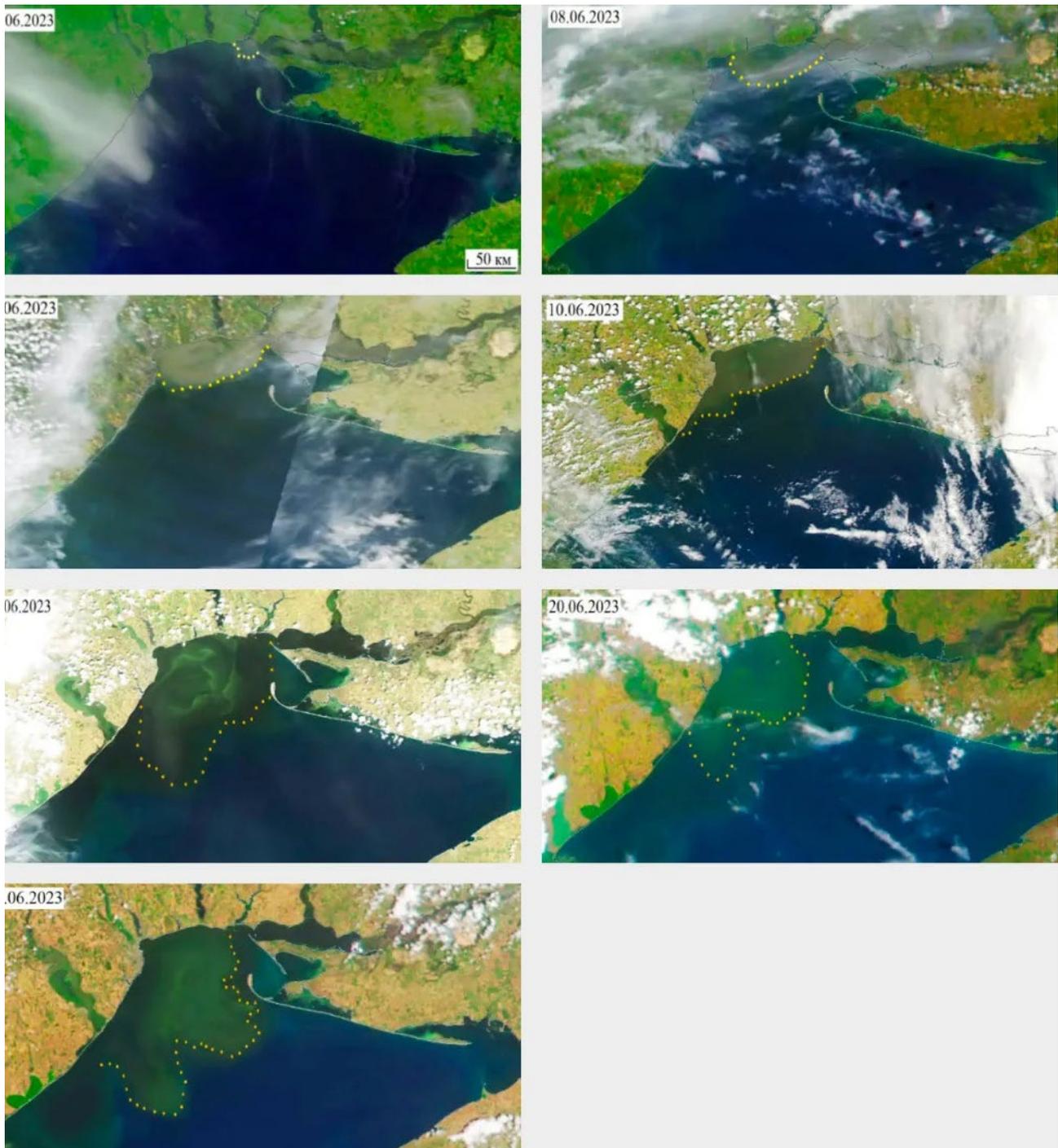
Analysis of water samples collected in the first days after the dam's destruction along the Black Sea shoreline near Odesa [showed](#) significant increases in concentrations of oil products, toxic metals (zinc, cadmium, arsenic), and chloro-organic compounds. In July 2023, these concentrations declined and returned to normal, perhaps the same effect seen with the desalination of water and mixing in a large water area.

The story with organic pollutants and nitrates was similar. Samples showed a significant excess in concentration standards in the first days after the disaster, decreasing as time wore on.

It is obvious, however, that the toxic substances raised by the flood did not simply disappear, but rather are highly likely to enter groundwater. Between infrastructure destruction, pollution of land and groundwater, and the death of biotopes, this data can be taken as evidence of ecocide against Ukraine.

Researchers also worried about bacterial pollution of the Black Sea, which had received a significant amount of organic matter. Indeed, satellite images showed an algal bloom in the waters that shifted precisely in accordance with circulating currents from east to west.

Lastly, pollution stemming from military sites is of no little importance. Flooding of the Dnipro delta occurred at the same time as Ukraine's counteroffensive in areas on the lower left bank of the Dnipro, an area occupied by Russian troops. As a result, both fortifications and minefields were flooded as well, resulting, of course, in significant volumes of military waste being dumped into the Black Sea. The danger of such pollution is that it can persist for many years and decades in



Confirmation of organic pollution that provoked an algal bloom in the Black Sea. Source: [Truth Hounds](#)

the form of washed-out mines, flotsam munitions, and other dangerous military objects. This type of pollution can kill people and animals and continue to threaten nature even after military operations end.

Holding the aggressor state accountable for environmental crimes committed

The sabotage of the Kakhovka HPP dam is one of the main components



of the Ukrainian government's case for prosecuting a case of ecocide in order to hold the Russian government accountable and seek reparations. In accordance with an [agreement](#) developed by the High-level Working Group on the Environmental Consequences of the War in Ukraine, the Cabinet of Ministers created an [action plan](#). However, environmental and nature conservation NGOs asserted that the process was tokenistic and proposed a number of changes.

The Ukrainian Nature Conservation Group [proposed](#) several noteworthy changes. The group's experts propose using the concept of "Planetary Boundaries" as the plan's basis. This concept asserts that the planet's resources are limited and that all states must work together to reduce pollution and sustainably use existing opportunities to avoid harm to future generations. Furthermore, war crimes that inflict environmental pollution represent not just an attack on the country's natural heritage but also a crime against humanity and planet Earth.

UNCG experts also provided detailed input on the wording of specific points in the plan. By the end of June 2024, Ukraine's Cabinet of Ministers accepted the comments, remarks, and proposals, after which the plan will be finalized using input provided and shifting from there to plan implementation.

UWEC Work Group will continue to monitor implementation of the action plan and supports greater involvement of environmental organizations in all programs related to surmounting the war's environmental consequences.

Dnipro River Integrated Vision

With the support of Ukraine's State Agency for Water Resources, NGOs **Greenpeace** and **Urban Coalition Ro3kvit**, presented a proposed [Dnipro River Integrated Vision](#) in early July 2024. The initiative's goal is to showcase the Dnipro River as Ukraine's largest and, perhaps, most significant river, along with its historical, cultural, infrastructure, and environmental significance for the country as a whole, as well as the consequences of the full-scale invasion on the river.

From environmental and climatic perspectives, the Dnipro River is extremely important for the entire region. Flowing from its headwaters in Polesye in the very north of Ukraine, the river descends into the Black Sea, passing through a variety of biotopes including forest, forest-steppe, steppe, and semi-arid steppe. There are a large number of nature conservation areas on the river's banks, including the Black Sea Biosphere Reserve, Kamianska Sich National Park, Biloozerskyi National Park, Velyky Luh National Park, and the Chernobyl Radiation and Ecological Biosphere



Reserve. Many of these areas are either included in the Emerald Network for the conservation of European biodiversity or are protected by the Ramsar Convention.

During the Soviet era, the Dnipro River was heavily regulated, including the construction of six hydropower plants; a system of reservoirs was created with the goal of producing electricity and supporting agricultural and infrastructure functions. All of this infrastructure development resulted in the flooding of villages, historical sites, and entire biotopes. The river was also used to transport extracted minerals, industrial zones were formed on its banks, and the Zaporizhzhya Nuclear Power Plant was built.

During this full-scale phase of the war, many cities and other sites located along the Dnipro River have been damaged. For example, the village of Gorenka, located near Bucha and only 15 kilometers from the Dnipro River, was almost completely destroyed. Today,

Gorenka is being restored and, as the study's authors noted, it has the potential to become a symbol of Ukraine's "green transformation". National parks and reserves located along the river have also suffered from the war as has Ukraine's infrastructure, and recreational use of the river has ceased.

The Dnipro will certainly play an important role in Ukraine's restoration. The country's infrastructure is directly intertwined with this large river, and the future of not only Ukraine, but the entire region, depends on a sustainable recovery for the river rather than permitting a "business as usual" consumerist attitude to remain.

The Dnipro River Integrated Vision is available in [English](#) and in [Ukrainian](#). •

Translated by Jennifer Castner

Main image: Part of the river on the Kamianska Sich National Nature Park territory is covered with meadow plants.

Source: Serhii Skoryk



One year after the terrorist attack at Kakhovka Hydropower Plant: 1B trees instead of desert and willow forests unique to the continent

Viktoria Hubareva

A year ago, the former Kakhovka Reservoir was predicted to become a lifeless desert, polluted with dangerous lakebed sediments. Instead, a unique willow-poplar forest grows there, the only such forest in all of Europe. If it can be preserved, it will bring good investments to Ukraine and have a positive climate impact.

On 6 June 2023, Russians committed a terrorist attack by sabotaging the dam at Kakhovka Hydropower Plant (HPP). This led to large-scale flooding of downstream lands. Roughly 16,000 people lived in the disaster area and about 80 settlements were in the flood zone. Water covered agricultural fields,



Exposed bed of Kakhovka Reservoir after the dam's collapse. Photo: [Environment. People. Law](#)

private homes, industrial enterprises, and infrastructure sites. According to preliminary estimates, the total losses amounted to approximately two billion US dollars.

The dam's collapse caused an ecological disaster. At least four national parks, a biosphere reserve, and other areas protected under the Ramsar and Bern Conventions were damaged.



Environmentalist Ekaterina Polyanska and other researchers visited Kamyanska Sich in October 2023, near the site of the former reservoir. Photo: Environment. People. Law

Immediately following the disaster, many voiced unfavorable predictions, one of them being the formation of a desert on the former Kakhovka Reservoir's lakebed. Some spoke of sandstorms that would scatter dangerous sediments that had for years been accumulating at the bottom of the reservoir. These forecasts did not come true.

UWEC Work Group spoke with Ukrainian scientists who took part in expeditions to the former Kakhovka Reservoir to learn about events at the site of the largest environmental disaster of the last year.

“In fact, it was quite difficult to reach Kamyanska Sich. But we managed, despite the danger.”

Research began even before Kakhovka HPP was sabotaged, almost immediately after the Dnipro River's right bank was liberated in the Kherson region. At that time, scientists were studying post-belligerence landscapes—landscape complexes that arise as a result of military activity—and the war's other consequences until the moment that the Kakhovka catastrophe occurred.

The first expedition to set out following the Russian terrorist attack headed to the de-occupied Kamyanska Sich National Park, a protected area located on the shores of the former Kakhovka Reservoir. This was three weeks after the disaster.

“In fact, it was quite difficult to gain access to Kamyanska Sich. But we managed,



Aleksandr Khodosovtsev stands on the site of the former Kakhovka HPP dam, just three weeks after its sabotage. Photo: Ivan Moisienko

despite the danger,” said Anna Kuzemko, Doctor of Biological Sciences, who participated in the expeditions along with her colleagues.

The expedition organizers were **Ivan Moisienko** and **Oleksandr Khodosovtsev** (members of [Ukrainian Nature Conservation Group](#)), professors at Kherson State University, and Kamyanska Sich National Park staff, as well as geobotanist-ecologist, National Academy of Sciences Academician **Yakov Didukh**. Despite the importance of the research, the scientists nevertheless had to obtain permits and jump through bureaucratic hoops, but in the end, the expeditions got underway.

At first, everyone feared dust storms and subsequently that the young

vegetation would not survive the winter. But the skeptics’ fears did not come true.

Anna shared that with each subsequent trip they **worried less and less about the environment**. All the pessimistic predictions uttered immediately following the disaster gradually dissipated.

“There were concerns that the silt that had accumulated on the bottom of the reservoir contained many different chemicals, including dangerous ones. That it would dry out, turn into dust, and the wind would carry these substances away. But when we first got there, three weeks after the dam was blown up, we saw that the soil was very dense, and it was unlikely to mix into the air when it dried out,” says Kuzemko. *“We still*



Site of the former Kakhovka Reservoir within Kamyanska Sich National Park, October 2023.
Photo: [Environment. People. Law.](#)



Kakhovka Reservoir in late April 2024. Photo: Ivan Moisienko

worried that invasive plant species such as black locust (often known as white acacia), shrubby amorphia, and American maples would grow there. But these concerns finally dissipated when we traveled there again last October and saw the young willow forest.”

The biologist continued, saying that in June 2023 they saw only small plant shoots, while, four months later, **dense willow thickets grew up to two meters high**. Some trees reached more than three meters in height.

But even then, skeptics could not believe what would happened at the bottom of the former Kakhovka Reservoir six months on:

“They said that the willow forest would not survive the winter, that there would be

*no spring floods, and it would dry up. But [in the spring – ed.] we returned and saw willow forest growing on the left bank. We saw that the growth had increased approximately 30 percent on the previous year, and that these willow thickets were in very good condition, still growing, powerful, and dense! Well... and we also saw poplar thickets near Khortytsia... **All fears of dust storms, desert landscapes, and invasive species remain unfulfilled.”***

A forest like no place else in Europe grows on the site of the terrorist attack

Scientists involved in Earth remote-sensing using machine learning, i.e. artificial intelligence, have created



a map of the Kakhovka Reservoir biotopes using field data (the map is not yet publicly available). As of November last year, roughly 40% of the former Kakhovka Reservoir was covered with willows, poplars, and other floodplain vegetation. And this forest is only growing larger.

Researchers are currently awaiting the results of a follow-up study that will quantitatively illustrate how much the forest area expanded from October to May.

The young willow-poplar forest covering a huge denuded area that was predicted to become a desert is a unique precedent, one with no analogs anywhere in Europe. According to Kuzemko, this type of **floodplain forest was typical in these areas before the reservoir was filled.**

“Usually such floodplain forests are significantly altered by humans. They form only along watercourses, because further away the land is either populated, or plowed, or something else is occurring there. But these places – [where nature is restoring itself naturally- Ed.] are truly unique. In Ukraine, and I think the same is true for Europe too, there are no analogs on the scale of this willow-poplar forest,” she explains.

“Imagine a willow that has grown 4.7 meters tall in less than a year! We compared this with other data and have not found comparable growth rates anywhere else,” Ivan Moisienko commented. Colleague Yakov Didukh, who studied the biomass

of young willows and poplars, says that willows on the former Kakhovka Reservoir are growing twice as fast as willows growing anywhere else in the world. Southern Ukraine’s fertile steppe soils and abundant nourishing silt at the bottom of the former reservoir are the reasons for this.

It is also important that the forest’s conservation status grows as rapidly as the forest itself. The type of biotopes protected by the Bern Convention are replacing an ecological disaster site.

“Over time, the value of these territories will only grow, as the biotopes continue to develop and biodiversity increasing as well, and with that, the status of this territory in the Emerald Network,” adds Kuzemko. That is, of course, if nothing interferes with forests’ development.

Kakhovka’s willow forest has the potential to positively influence climate. Before the sabotage of the hydropower plant a “water-desert” stood here, replaced by one billion trees today

The new enormous forest will deposit carbon and store harmful substances. All of the expedition members agree on one thing: *the ecosystem services that the young willow forest already provides cannot compare to those provided by the reservoir’s artificial ecosystem.* The region’s climate may change for the better, all thanks to the new forest.



Researchers on the “bottom” of the former Kakhovka Reservoir during an April 2024 expedition. Photo: [Environment.People.Law](#)

“These willows, poplars, and other plants at the bottom of the reservoir have already absorbed millions of tons of carbon. Carbon dioxide is the main greenhouse gas that causes global warming. I don’t know if it is possible to find another ecosystem in the world or in Europe that can fight global warming more effectively. This certainly wasn’t the case before, when the reservoir was there. Then there was a sort of, you know, ‘water-desert’ there,” explains Moisienko.

“Some believe that the climate will perhaps become more moderate now, and the number of droughts in the Kherson region

will decrease,” Kuzemko comments, agreeing with her colleague.

*“Well, actually, if we are talking about the need to plant a billion trees somewhere [per the President’s national [program on planting a billion trees](#) – Ed.] – they are planted in absolutely unsuitable locations – in the steppes, in sand... **While here, there may already be a billion trees here on the site of the Kakhovka Reservoir. Perhaps even more. With no need for any sort of significant capital investments,”*** Kuzemko highlighted.

It is difficult to overestimate the usefulness of the ecosystem services that this land has begun to provide. But until recently, they were only spoken



about hypothetically. Now scientists have set themselves a new goal: assess them quantitatively. One of the spring expeditions in 2024 focused on that question.

Calculating the cost of clean air, or how scientists speak the language of numbers to protect Kakhovka's forest

After the last expedition, a [video appeared](#) on the internet showing four men trying to pull a young willow several meters tall out of the ground in the young forest. It was not an act of vandalism, but rather necessary for a scientific experiment.

Didukh explained that the tree sample will be used to study the role of willow thickets, their climate impact, climate indicators, soil formation processes, and how they consume carbon. In doing so, scientists can make forecasts for five, ten, or even 50 years into the future.

Such studies are necessary to explain the main issue to the economists, farmers, and hydrologists laying claim to the land freed from water: in its new natural state the former reservoir's land will be much more valuable than any infrastructure facilities now and in the future.

"Environmentalists are currently trying to assemble quantitative arguments that prove the importance of these forests and not the reservoir. These people – hydrologists, farmers, economists – need numbers. We are

conducting those analyses now in order to assemble those quantitative arguments and will soon publish the data we have obtained," noted Didukh.

The team's earlier research indicates that the ecosystem services of mature forests, if they are allowed to cover at least 30% of the former reservoir's area, will be 16 times greater than the ecosystem services provided by an artificial reservoir.

In exchange for those services, Ukrainians can receive not only a clean, improved environment, richer biodiversity, a favorable climate, and even just a unique natural area for the world, but also very real income.

Ukrainians can earn big money from global funds by just leaving nature on the site of the former Kakhovka Reservoir alone. But there is one issue

Restoration of vegetation and the Dniro River's natural riverbed through the territory of the former Kakhovka Reservoir generally aligns with Europe's "green course", wherein other countries are striving to return rivers to their normal, natural state.

The European "Bringing nature back to our lives" initiative aims to restore 25,000 kilometers of rivers to their natural channels by 2030. The program presumes,



among other things, dismantling of dams. Consequently, Ukrainian hydropower company Ukrhydroenergo's plans to re-establish the reservoir, discussed just a month after the Kakhovka disaster, run counter to European policy of preserving biodiversity and achieving carbon neutrality. Given the pace of the reservoir's restoration, the new project stands to nullify all that these new territories can give us if they are "untouched".

It is the "don't touch" option that could bring investment to Ukraine

Funds do exist in the world that are prepared to pay landowners to conduct natural restoration. The owners themselves need not do anything, simply not use the land, leave nature to be, and let it restore itself.

Seemingly, nothing better can be dreamed up for Kakhovka Reservoir.

But for this to happen, several conditions are necessary.

First off, the war must end, given military actions are almost the only factor that holds these territories in a sort of limbo. Secondly, global funders must have guarantees that Ukrhydroenergo's dreams of building a new hydropower plant will not come true.

"If such guarantees can be achieved, I think that nature restoration can be funded for many years into the future. But both the first and second conditions are difficult tasks," Moisienko concluded.

In the meantime, all we can do is track the expeditions, wait for new research results, and watch as the 'great meadow' Velyky Luh (that existed here long before the creation of Kakhovka Reservoir), returns. •

*Translated by Jennifer Castner
Main image: Kakhovka Reservoir,
Kamyanska Sich National Park, April
2024. Photo: Ivan Moisienko*



The thirsty peninsula: How much water will Crimea need in the future?

Oleksiy Vasyliuk, Eugene Simonov

Russia's occupation of Crimea has paradoxically served as the catalyst for a fascinating experiment in climate adaptation. Deprived of the water it traditionally received from the Dnipro River, the arid peninsula's economy has been forced to make do with smaller local water sources.

Despite the occupation and the corruption and mismanagement it has brought, the lesson is that Crimea can rely on local resources, which give it the potential for successful, sustainable development in a free Ukraine.

Hydropolitics and war

Since the very beginning of Russia's military aggression against Ukraine back in 2014, the issue of water supply to Crimea was considered a matter of strategic importance by both Moscow and Kyiv, as well as neutral observers. Following the Russian annexation of the peninsula in 2014, Ukraine cut off the water supply to Crimea from

the Dnipro River (also known as the Dnieper) via the North Crimean Canal (NCC). This has [resulted in serious discussions](#) by experts in international law, and at times [Ukrainian politicians have even questioned](#) the decision to form a blockade.

In the lead-up to and [immediately after](#) the full-scale invasion of Ukraine



The North Crimean Canal and the settlements, land, and reservoirs it feeds. Source: [Hidropolitik Akademi](#)

in 2022, many international experts saw Russia's desire to reestablish Crimea's water supply as one of the main reasons for its escalating aggression, and as a possible bargaining chip for potential "peace negotiations".

Immediately after the full-scale invasion, Russia tried to restore the water supply to Crimea through the NCC, but this was later interrupted once again by

the destruction of the Kakhovka Dam and [its reservoir](#), which had fed the canal. Current discussions in Ukraine about the post-war future in most cases also assume that the water supply from the Dnipro to the peninsula [must be restored](#) for the normal functioning of the Crimean economy.

In this article, we attempt to look past the military and political rhetoric and discuss the changes in Crimea's water sector over the last ten years, a period



which has witnessed an unplanned experiment in climate adaptation on the dry steppe peninsula, which on average receives less than [400 mm of rainfall](#) per year.

A very Soviet project

The largest canal in Europe at more than 400 kilometers long, the North Crimean Canal (NCC) separates into five large branches once in Crimea: the Azovskiy, Rozdolnenskiy, Krasnohvardiyskiy, Chornomorskiy and Saksyiy branches. These sub-canals are often referred to as the “rice canals.”

Construction of the NCC began in the 1960s, once the Kakhovka Reservoir had been filled. This was the last in a series of projects that together would create a massive irrigation system in the south of Ukraine, transforming nature on a vast scale.

When digging began, the project had no critics or opponents. At that time, there was no large-scale environmental movement in the USSR, and climate change was yet to become a serious talking point. The idea of building the NCC was based on the ideology of transforming nature to ensure maximum economic performance, without any environmental justification. The task was to turn nature into an economy, not to adapt the economy to the capabilities of natural systems. The authorities planned to use the dry steppes for large-scale rice cultivation. Ignoring

modern ideas about climate, sustainable development and the fact that Ukraine is – alongside Moldova and Hungary – the most water-scarce country in Europe, the creation of rice fields in the driest part of Ukraine today looks like pure madness.

In recent years, scientists have discovered that [arid](#) (drought-ridden) climate zones in Ukraine have [expanded](#) significantly, with a consequent increase in moisture deficit. This only underlines the stark contrast between the old Soviet system of irrigated agriculture and the possibilities for sustainable development. The drier the climate, the more vulnerable inefficient irrigation systems become.

Diversion of water from the Dnipro had a large-scale impact on natural ecosystems in the north of Crimea. One of the key changes was the emergence of reed thickets, which replaced the local wetland vegetation. Before the construction of the canal, the main water body in Crimea was Lake Sivash, which is characterized by its high salt content.

Changes in ecosystems also influenced the [redistribution of avifauna throughout the region](#). Desalination of the salty Sivash Bay and the formation of moist habitats made the territory attractive for many migratory aquatic and wetland birds. At the same time, there was a significant decrease in natural steppe areas, which led to the disappearance of steppe bird species



Water body	Water taken from natural water bodies, total	Water used	Water returned to surface water bodies	
			total	share of polluted water
Total, including:	1553.78	768.56	208.5	93.17
North Crimea Canal	1346.3	596.5	-	-
Local surface water sources	136.38	113.37	132.7	84.38
Groundwater	68.54	56.13	-	-
Sea water	2.56	2.56	75.8 (into Black and Azov seas)	8.79

Table: Water supply and wastewater disposal in Crimea, in millions of cubic meters per year. Source: [Report](#) on the state and protection of the environment of the Republic of Crimea in 2013

from the region (for example, the number of Steppe Demoiselle Crane, Great Bustard, and Lesser Bustard fell significantly).

Local water resources in Crimea and water consumption on the eve of annexation

Until 2014, up to 85% of Crimea's water consumption was met through the transfer of Dnipro water through the NCC, which averaged one and a half cubic kilometers per year in volume. According to official data for 2013 from the Autonomous Republic

of Crimea, only half of the water taken from natural sources was used for various needs – the rest was lost on its way to consumers (see table).

Of the total volume of water consumed in Crimea in 2013 – the last year when Ukraine was able to conduct continuous statistical reporting – 590.18 million cubic meters (77%) was used for agricultural purposes, while 125.3 million cubic meters (16.4%) was consumed by housing and communal services and 50.64 million cubic meters (6.6%) by industry. **At the same time, 695 million cubic meters of water was lost during transportation through the**



canal – almost 50%. Such high losses reflect a long-term general trend and are similar [to data](#) for 2000-2012.

Ninety percent of the water used for agriculture was spent on irrigation, with 60% (i.e. at least 350 million cubic meters) going to rice fields. Viticulture and other forms of agriculture traditionally practiced in Crimea did not require even a small fraction of the water consumed after the creation of the North Crimean Canal. Grain crop production on irrigated lands, which began in the 1960s, was completely inappropriate for local natural conditions and by 2013 only 140,000 hectares [remained](#) of the 400,000 hectares irrigated in Soviet times.

Crimea's own water resources are relatively modest. The figure most often found in the literature is "up to 1 billion cubic meters per year." For example, an [article](#) by scientists from Moscow State University and the Russian capital's Institute of Water Problems indicates that after the annexation, the volume of Crimea's own water resources ranged from 800 million cubic meters to 1.2 billion cubic meters a year. At the same time, we estimate the total guaranteed flow of rivers in Crimea as 371 million cubic meters a year, which is a very conservative estimate for conditions of extreme drought.

A total of [23 reservoirs](#) have been built in Crimea – a centralized water source to supply the needs of the population and agriculture. Of these, eight reservoirs were filled using water from the North Crimean Canal (up to 145 million cubic meters in total), while surface runoff from the peninsula's mountain rivers accounted for the other 15 (up to 245 million cubic meters in total). Reservoirs are critically important for meeting municipal needs, as well as for recreational and tourism infrastructure – the mainstay of the Crimean economy.

The practically endless supply of free water from the Dnipro encouraged extremely wasteful use of water resources in Crimea, so there was little incentive to think about increasing the efficiency of water use.

No water, no agriculture

Ukraine's blocking of the canal after Russia's annexation of Crimea was a serious test for the peninsula. By 2022, only 17,000 hectares of irrigated grain crops [remained](#), the result of the dry local climate, which had spelled almost immediate doom for Crimea's inefficient irrigated agriculture when Kyiv cut off supplies. Not surprisingly, it was rice cultivation that [suffered the most](#) after the supply of water from the NCC was cut off.



View of the acid storage tank at the Crimean Titan plant, 2018. Source: [Youtube/Garnachuk](https://www.youtube.com/watch?v=Garnachuk)

Local industry was also unprepared for water shortages. For example, as a result of the cessation of supplies of Dnipro water to the peninsula, the Crimean Titan plant, the largest manufacturer of titanium dioxide pigment in Eastern Europe, was forced to cut production and lay off part of its workforce.

[The lack of access to water](#) for Crimean Titan also led to environmental pollution and an ecological [disaster in Armiansk](#) in 2018, caused by the evaporation of the contents of the acid storage tank where the plant's waste was dumped.

But the most acute problem was the provision of water to the local population and tourist facilities. In 2019-2021, scheduled supply was introduced for many settlements that received their water from reservoirs supplied by the canal. During the driest periods, access

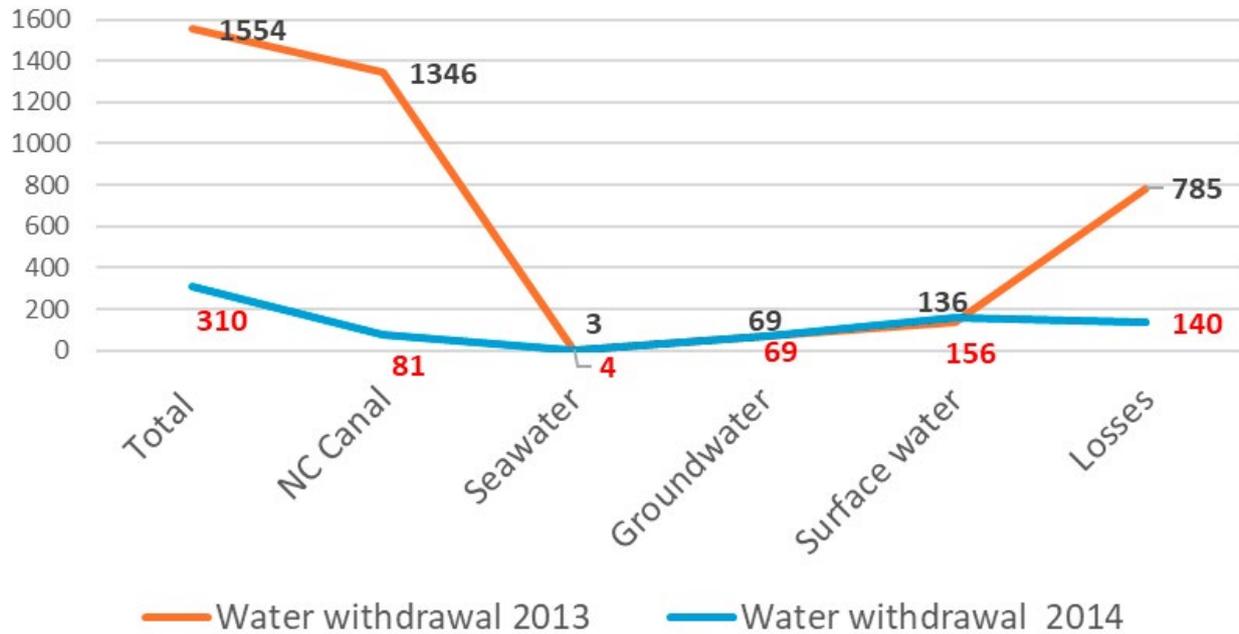
to water was limited to several hours a day in the morning and evening.

Despite the fivefold reduction in water intake, losses (the share of the volume of water intake that did not reach consumers) still amounted to 45% in 2014 (140 out of 310 million cubic meters – see diagrams above).

To reduce water shortages, in October 2020, the Russian government [approved](#) a comprehensive plan to ensure reliable water supply to the Republic of Crimea and the city of Sevastopol. The plan involved spending more than \$600 million on a wide range of measures to improve the efficiency of existing water resources and finding new ones. These measures to reduce losses in water supply networks should have saved 12 million cubic meters per year, and improving the operation of existing water intakes should have provided an additional 10 million cubic meters per year.

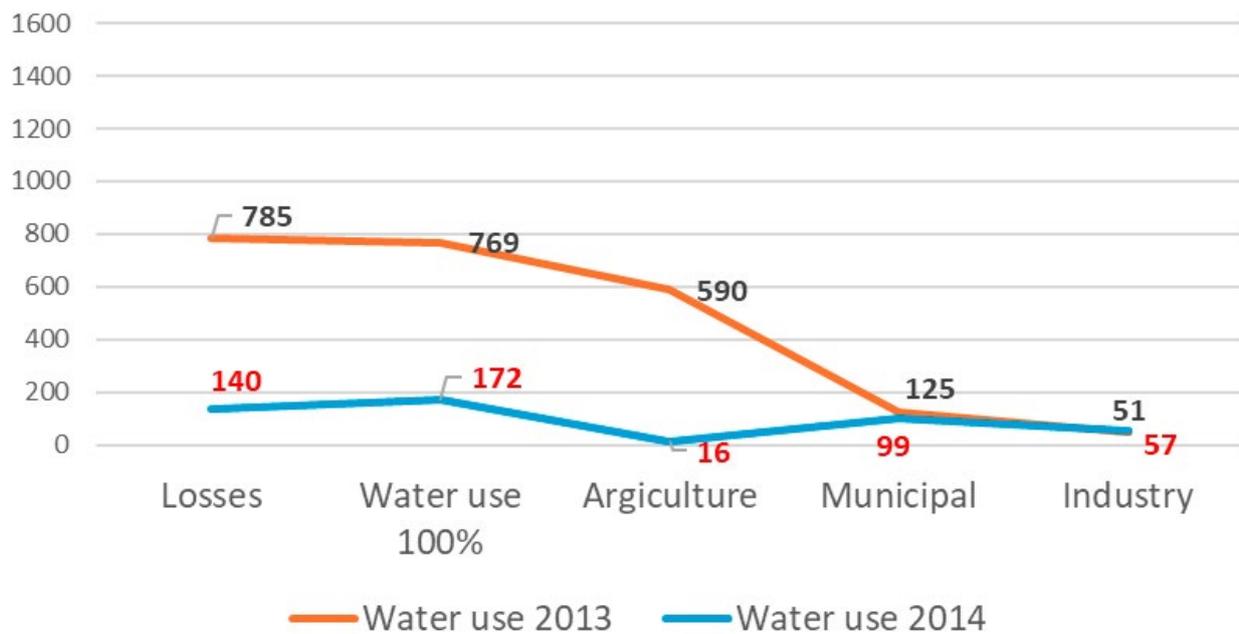


Water intake for Crimea for the period 2013-2014. (million cubic meters)



Water intake for Crimea for the period 2013-2014. 2013 data supplied by the Committee for Nature Protection of the Republic of Crimea. 2014 data supplied by the Russian Academy of Sciences' Institute of Economics and Organization of Industrial Production. Source: [Dictaphone](#)

Water use in Crimea for the period 2013-2014. (million cubic meters)



Water use in Crimea for the period 2013-2014. 2013 data supplied by the Committee for Nature Protection of the Republic of Crimea. 2014 data supplied by the Russian Academy of Sciences' Institute of Economics and Organization of Industrial Production. Source: [Dictaphone](#)



Diverting water from the **Belbek River** into the dry Mizhhorne Reservoir could provide 15 million cubic meters per year, and the exploration and installation of new underground water intakes can provide 25 million cubic meters per year. The innovative plan also envisaged the creation of desalination facilities (a first for the region) with an annual capacity of 15 million cubic meters, and even included the reuse of treated wastewater from Sevastopol for technical needs. Taken together, all these measures should have increased the annual supply of water by 112 million cubic meters. This would be sufficient to solve most problems, except for the restoration of large-scale irrigated agriculture of the Soviet type.

As usual, however, even the Russian government's best-intentioned programs are undermined by mismanagement and endemic corruption. An [investigation](#) conducted in 2021 by the publication Dictaphone demonstrated that most of the planned projects were never begun, and some of the money vanished into the pockets of the engineers without any result.

Some facilities, such as the Beshterek-Zuyskyi water intake for Simferopol and the water intake on the Belbek River for Sevastopol, were nonetheless built and put into operation. Construction is also currently underway on a 200-kilometer underground water pipeline from 38 new wells for industrial extraction

of groundwater to supply Feodosia and Sudak in the east of Crimea. A 7-kilometer tunnel under Mount Ai-Petri is also being built to supply water to the resort city of Yalta. However, it is worth noting that work has already begun on implementation of the most capital-intensive projects, which are easier to use in corrupt schemes, while the most important work on the widespread replacement of leaky pipes has been put on hold.

Crimea under occupation: taking the easy route

The seizure of the peninsula by Russian troops and the resumption of water supply through the NCC to Crimea in February 2022 gave the Russian authorities a feeling of long-awaited revenge, but had a [demotivating](#) effect when it came to their readiness to implement the planned system of measures to make Crimea water self-sufficient. In March 2022, the Russian government of occupied Crimea [announced that it had no plans](#) to build desalination plants and ordered that they be excluded from state programs. The treatment and use of wastewater was also no longer prioritized. After all, "free" water from the Dnipro was once again flowing to Crimea.

However, many large construction contracts for alternative water supply systems had already been completed with influential companies, and the



*The mouth of the North Crimean Canal before and after the destruction of the Kakhovka dam.
Source: earthobservatory.nasa.gov*

creation of some of the water supply projects continued after 22 February 2022. In addition, officials were anticipating gigantic contracts for the modernization of the leaky NCC and its huge network of “rice” canals, which have fallen into disrepair: tasty projects offering maximum opportunities for corruption.

In June 2023, after the Kakhovka Dam was sabotaged, the mouth of the canal quickly dried up and Moscow returned to its former talk of “water self-sufficiency” for Crimea. In August 2023, the Russian “head of the Republic of Crimea” Sergei Aksyonov [declared](#) that, apart from irrigation, the peninsula no longer needed water from the Dnipro.

The occupying authorities appear to believe that the 240 million cubic meters of water currently in storage will be enough to last the Crimean economy one year. In all likelihood it is. But it should be taken into account that this reserve was built up in 2023, the last water-abundant year, and in [drought conditions](#) additional measures will be required. These have already been outlined in the comprehensive plan to ensure reliable water supply to the Republic of Crimea and the city of Sevastopol.

Ensuring a sustainable future

Leaving aside the political value of the “umbilical cord” between the rest



of Ukraine and Crimea that the North Crimean Canal provides in the public imagination, it is also important to consider the possibilities and prospects for water supply based on natural conditions, socio-economic priorities, and modern technologies.

In 2022, prominent water management scientist **Igor Zonn** [published](#) an interesting article comparing water management in Crimea with that in Israel, which has less precipitation but similar water resources.

The article explains that the combination of effective innovative water management with the development and use of modern technologies makes Israel not only a water self-sufficient state with a large agricultural sector, but also a water exporter. Tel Aviv has achieved this under the same – or even worse – conditions than those in Crimea. The author points out that it would be useful for Crimea to adopt certain elements of Israeli water management, such as the large-scale use of wastewater for irrigation, as well as technological (i.e. genetic selection) and methodological innovations that increase the efficiency of agriculture, economical desalination plants, and innovations in water management policies. Effective drip irrigation and taking proper action against corruption in the implementation of water management programs would also help.

Water losses today in Crimea are monstrous, not only along the route of the NCC, which loses half of all the water that passes through it, but also in the municipal water sector. Yet there is also huge potential for water savings.

Mikhail Bolgov, a hydrologist at the Russian Academy of Sciences' Institute of Water Problems, said that 50-70 percent of already purified water supplied to consumers is lost in urban municipalities, particularly in sewer networks, which are in extremely poor condition and continue to degrade. In Simferopol the situation is especially acute: only 55% of the water supplied by the municipality reached the consumer in 2013, and by 2018 that figure had fallen to 43%.

In addition to a radical overhaul of the infrastructure, Bolgov [recommends](#) the development of instrumented systems for metering water consumption and discharge, combined with an increase in water tariffs and the issuing of fines for pollution. He also proposes reducing water consumption in industrial technologies and crop irrigation technologies, including through restructuring agricultural production.

Bolgov also recommended the artificial replenishment of groundwater during high-water periods (this will protect it from evaporation and allow it to be used during droughts).



Other [experts](#) and officials see potential for using the flow of groundwater into the sea, in particular in the Azov region, where a very rich freshwater (or slightly saline) aquifer is found under shallow sea waters near the Arabat Spit. Some experts believe, however, that this will also draw saltwater into underground aquifers.

The expert opinions presented in this article show that there are many well-tested opportunities for improving water use in Crimea, the first of which is reducing water loss.

If current needs with losses and ineffective management amount to 240 million cubic meters per year, then if losses are halved (from 50 to 25%), less than 180 million cubic meters of water will be required. This is half the most conservative estimate of the volume of guaranteed water resources on the peninsula and less than 20% of the generally accepted estimate of the annual volume of these resources.

One thing is certain: the peninsula's current water requirements will no longer be entirely relevant after the war, since the military industry is one of the biggest consumers of water in Crimea. Since 2014, the large-scale militarization of Crimea has [led to hyperconsumption of water](#). Now, with a full-scale invasion underway, military water supplies have increased even more, as militarization has [led](#) to a colossal increase in the need for fresh water to service military personnel and equipment.

The question of what kind of agriculture will Crimea need after its liberation remains unresolved. It is highly unlikely that the restored Soviet agricultural system will be at all profitable once the billions invested in restoring water supplies and modernizing destroyed networks are factored into the equation. Moreover, irrigated rice cultivation is not Crimea's first economic priority. In the best-case scenario, tourism will remain the basis of the peninsula's economy and the most important branch of agriculture will be Crimean winemaking. In the worst-case scenario, the peninsula will be a smoldering hotbed of ongoing conflict with a cluster of military bases and very limited economic activity.

In the event that Ukraine manages to successfully liberate Crimea and join the European Union, there are good reasons to expect that the climate crisis, EU laws, and common sense will encourage Ukrainian farmers to develop effective agricultural production adapted to the climate of the dry steppes on a scale commensurate with the needs of the economy. If irrigated crops are grown then drip irrigation should be used. It is likely that livestock farming (common here before the Soviet "transformation of nature") will have an increased role to play in Crimea, as it will throughout the south of Ukraine. In this case, Crimea's future will be stable, albeit rather dry (which is not a problem). Above all, the future must be peaceful. •

Translated by Alastair Gill



Ukraine Recovery Conference 2024: What were the key environmental takeaways?

Viktoria Hubareva

Ukrainian experts who attended URC 2024 share their views on the protection of conservation areas, the integration of reforms, green recovery and energy sustainability, full-scale invasion of Ukraine for the country's amphibians and reptiles.

On June 11-12, European and world leaders, international organizations and representatives of civil society converged on Berlin for the Ukraine Recovery Conference, devoted to discussing solutions for Ukraine's post-war transformation.

Held under the slogan "United for defense. United for recovery. Stronger together," this year's conference was the third summit dedicated to the recovery of Ukraine, following the meetings in Lugano in 2022 and London in 2023. It is a continuation of an event first held in



London in 2017 as the Ukraine Reform Conference.

Read more:

- [URC23 review: Ukraine offers opportunities](#)
- [Environmentalists critique Ukraine's reconstruction plan](#)

The Ukraine Recovery Conference 2024 was focused on four thematic tracks: security issues, Ukraine's accession to the EU, the roles of business, human resources and local government bodies in Ukraine's future recovery, as well as synergy between these areas. The challenge of restoring the country's power network – one of the most pressing issues to be resolved in Ukraine – was also raised at the event.

The UWEC Work Group spoke to members of leading Ukrainian public organizations to find out how the conference highlighted green and sustainability issues in the context of Ukraine's reconstruction, and how the proposed recovery strategies address climate change issues.

URC and green recovery: What was said?

“The priority needs that were voiced at the conference were the call for partners to support the provision of air defense, investments and energy sustainability. This somewhat sidelined the relevance

of green recovery and sustainable development,” said **Maria Lukyanova**, a green investment specialist at Ecoaction and a coordinator of the CEE Bankwatch network in Ukraine, who attended the conference.

According to Lukyanova, much more could have been said about environmental issues and principles for sustainable development. However, she reported that discussion did touch upon aspects relating to the introduction of green principles in the restoration of cities, green energy and environmental restoration.

“There were separate discussions on this topic in the panels on the specified thematic tracks. These included: What will a modern Ukrainian city look like? Sustainable urban development, energy efficiency and strengthening the resilience of municipal infrastructure (the local track); energy security and green recovery: the contribution of business to ensuring reliable and sustainable energy supply in Ukraine (the business track); green recovery and the European Green Deal for Ukraine: conditions for environmentally friendly recovery and growth (the European integration track); green transition as a business case (the European integration track), as well as how non-governmental organizations can contribute to a sustainable, green recovery for Ukraine (the Recovery Forum).”



EU integration for Ukraine and the impact of European reforms on environmental protection in Ukraine; protecting natural sites

“Unfortunately, the protection and restoration of nature reserves was barely discussed, only in isolated sessions. Primarily those that weren’t in the official part [of the conference program],” said **Maria Belkina** (Dyachuk), deputy director of the Ukrainian environmental organization Ecoaction and the head of its agricultural department.

“Even the relevant ministry considers the conservation of biodiversity only in the context of the forestry industry, in terms of timber extraction or the protection and rehabilitation of animals. So the restoration of natural areas and the protection of biodiversity were barely considered and weren’t integrated into sectoral discussions, although this is very important in the context of business development and compliance with environmental requirements, so that there are no cases like with the [Svydovets](#) mountain range. One of the main recommendations for the next year is therefore to highlight the separate dimension of sustainability [as an area for discussion], where the issue of restoration of natural areas won’t get lost among investment projects,” she explained.

Ukraine has already fulfilled all the necessary obligations in order to open

discussions on joining the EU, and on June 14, the EU’s Council of Ministers agreed to formally begin accession negotiations with Ukraine and Moldova.

Environmental experts believe that Ukraine will benefit significantly from integration with EU practices and policies, such as the [Green Deal](#) and the [EU Forest Strategy](#) for 2030, which define forests as natural allies in fighting and adapting to climate change, helping Europe achieve climate neutrality by 2050.

This was highlighted by **Valeria Kolomiets**, director of Ukraine restoration projects at WWF Ukraine, who also attended URC 2024.

“Regarding the European integration track, the Ukrainian environmental ministry has indeed conducted internal monitoring in the field of environmental protection and biodiversity. Several weeks ago, consultations on the negotiation process were held in Brussels, with the aim of determining when and what obligations will be fulfilled,” she said.

“Regarding the Emerald Network, for example, there are public organizations that have already begun work on preparing the introduction of the relevant directive into our legislation. But, to quote one of the URC speakers [Estonian Prime Minister Kaja Kalas], we shouldn’t forget that in fact the negotiation process on joining the EU is not exactly a process



The slopes of the Svydovets range. Source: Nata Mostova / CC BY-SA 4.0

of ‘negotiations’. It is a clearly defined and regulated process that places many demands on our country to introduce certain reforms and comply with certain rules recognized in the EU, especially regarding environmental protection.

“So it’s not going to work if we negotiate with one hand while with the other we adopt legislative initiatives that directly violate EU legislation (such as bill #9516, which proposes the abolition of restrictions on sanitary logging), as well as implementing a project that destroys Emerald Network sites ([an example of the fight](#) for the Svydovets mountain range). Furthermore, such contradictions may directly hinder our rapid accession to the EU,” said Kolomiets.

The Svydovets nature reserve is a nature conservation area in the Ukrainian Carpathians, which is part of the Carpathian Biosphere Reserve. Its ecological significance and diversity of flora and fauna, Svydovets is included in the Emerald Network of Europe – areas of special conservation importance, important for the preservation of biodiversity.

Restoring Ukraine’s battered energy system is a key priority

Russia is carrying out a deliberate campaign to destroy Ukraine’s power network – 80% of the thermal energy system and a third of the hydroelectric power system, which could provide



Valeria Kolomiets, Director of Ukraine Restoration Projects at WWF Ukraine, speaks at the conference. Source: WWF Ukraine.

9 GW of capacity, has already been destroyed. This is half of the total capacity required by the country in winter. Ukraine and its Western partners are therefore faced with the challenge of immediately strengthening energy security: preserving the existing generation capacity and restoring what has been destroyed.

With this in mind, Ukraine's deputy economy minister Oleksiy Sobolev has presented the draft National Energy and Climate Plan (NECP). In addition, Ukraine has concluded 12 cooperation agreements with financial institutions and energy companies. It also became known that Ukraine will receive 400,000 euros from Estonia, 138 million euros from the Netherlands, \$109 million in grant funding and \$824 million from the

United States to support the Ukrainian energy infrastructure.

Valeria Kolomiets from WWF Ukraine noted that this year's conference tackled the issue of the country's green recovery and green transition in the context of energy for the first time.

"Indeed, it is clear to everyone that adaptation to climate change is part of these cross-cutting processes. Given what was announced during the panel discussions, the priority task for the state in this area today is the introduction of a decentralized system based on renewable energy sources, along with increasing energy efficiency. This is understandable, since our energy system has been suffering as a result of Russian military aggression for several years now, and therefore, in attempting to



solve this problem, it is important for us not to return to old methods that pollute the environment, but to use sustainable and nature-friendly approaches,” said Kolomiets.

During his speech at the conference, Ukrainian President Volodymyr Zelensky underlined that Ukraine must do everything to deprive Putin of the use of blackouts as a weapon. Today, given the massive destruction, the energy sector is a large market for creating a new energy base in the country. He also noted that Ukraine urgently needs to find a fast and inexpensive way to restore its energy facilities to ensure they will be ready in time for winter, and has asked Ukraine’s Western partners to provide equipment from mothballed thermal power plants in the EU.

“The solutions announced at the conference to ensure energy sustainability included, in particular, the development of distributed generation, energy saving and the use of gas installations as an immediate solution to overcome the crisis,” added Maria Lukyanova. “The transition to renewable energy sources was also mentioned as a plan for the next two-three years with additional investments of 10 billion euros. Risk reduction, investment guarantees, and attracting private capital should be the main financial instruments here. At the same time, it is important to ensure free pricing and the integration of renewable energy into the electricity market.”

Lukyanova pointed out that Ukraine has a good example of ensuring the sustainability of energy systems at local community level: the central city of Zhytomyr, which has been working on the introduction of renewable energy sources in the municipal sphere for a long time now.

“As a result, its residents today do not suffer from power outages. Therefore, it is critical for municipalities to open access for small communities to the resources of large financial institutions, such as the European Investment Bank (EIB) and the European Bank for Reconstruction and Development (EBRD), to loans in national currency, to technical support for project preparation and grants. In view of the significant destruction of energy infrastructure and the leading role of communities in the recovery processes, public organizations have renewed their [call](#) for support for municipalities to switch to renewable energy sources to ensure their resilience.”

According to Lukyanova, the possibilities of increasing nuclear energy in Ukraine were also discussed at the conference. It was announced that up to 1 GW of maneuverable generation would be increased by 2024:

“This year, ambitious plans have been announced to build 1 GW of maneuverable generation by the end of 2024, which is provoking debate. The intensification of work on completing



the construction of nuclear power units looks pessimistic: first, it's an expensive indulgence for which Ukraine needs significant financial resources (which it lacks); second, it's a long process, and given the destruction of half of its generating capacity, Ukrainians need quick solutions for the coming winter; and, most importantly, nuclear power is not what Ukraine should be striving for in the context of the Green Deal."

Ecoaction is currently running a [campaign on nuclear power](#) calling for Ukraine to move away from an energy source that is underpriced, does not include the cost of decommissioning and disposal of radioactive waste, and increases Ukraine's dependence on Russia for resources.

What was said at URC 2024 about sustainable recovery?

Ukraine formally joined the [New Leipzig Charter](#) for urban development as part of a topical panel during the conference titled "What will modern Ukrainian cities look like?"

The New Leipzig Charter provides a political framework for the presentation and implementation of European and global agreements on the urban scale. Its aim is to protect and improve the quality of life in all European cities and their functional zones, to make cities inclusive, safe and sustainable, and also ensure that they are in line with [New Urbanism](#), the [Paris Agreement](#) and the

European Commission's [Green Strategy](#).

In addition, the Ukrainian Ministry of Education and Science signed cooperation agreements with Belgium and Germany, under which these countries will allocate more than 41 million euros for the restoration of educational institutions and the development of vocational education in Ukraine. So many EU assistance initiatives are aimed not only at restoring critical energy infrastructure, but also at rebuilding cities in general.

"I cannot say that the entire conference was permeated with a clear vision of the principle of 'let's build back better' enshrined in the [Ukraine Facility](#) but there's still an attempt to find a balance between today's humanitarian needs and solutions to long-term consequences. That is, the restoration of housing stock and infrastructure facilities should still take into account the principles of energy efficiency, refusal to use asbestos building materials, and so on," says Valeria Kolomiets.

Meanwhile, Ukrainian public organizations had the opportunity to offer their own visions for the country's green recovery, in which they will actively cooperate with the authorities.

"During one of the presentations at the Recovery Forum (an event held as part of the Conference), together with Natalia Kholodova from [the Ukrainian environmental organization] Ecoclub, we shared examples of how



public organizations are already cooperating with communities and the state to implement a sustainable and effective restoration process,” explains Kolomiets. “Natalia talked about how their organization cooperates with communities and implements energy-efficiency projects, and I shared the experience of WWF Ukraine’s cooperation with the Ministry of Environmental Protection and the Ministry of Infrastructure on the greening of road infrastructure.”

Maria Lukyanova added: “The representation of civil society organizations working on green recovery and sustainable development was more substantive than at previous recovery conferences. A joint statement on green recovery was prepared by non-governmental organizations specifically for the Berlin Conference.”

Green recovery platform for Ukraine at URC 2024 and the Kakhovka reservoir

One of the panel discussions organized as part of URC 2024 was notable for the announcement of the creation of a [Platform for the Green Recovery of Ukraine](#). This aims to bring together representatives of government authorities, public organizations, communities and businesses, as well as scientists and other interested participants, for the joint preparation of decisions. It was a positive sign

that immediately after the launch of the platform, a discussion began at the conference itself about the most high-profile and large-scale nature restoration project in Ukraine – the former Kakhovka Reservoir.

“On behalf of WWF Ukraine I proposed to bring the issues of the Kakhovka Reservoir for discussion by this platform,” said Valeria Kolomiets. “In particular, [we should] discuss which of the region’s specific needs were satisfied by this system (after all, we must recognize that “to build or not to build” is a question concerning not only the environment) and develop alternative options for meeting these needs that can be considered in the future by the state authorities. The Kakhovka Reservoir is an example of to what extent the State is ready to implement nature- and human-friendly solutions in the spirit of “building back better,” or will most of our reconstruction still attempt to recreate Soviet infrastructure, which is technically and morally outdated?” she said.

Based on the feedback of those experts attending, the Ukrainians were much better prepared for URC 2024 than for last year’s event: the arguments sounded more specific. However, given the circumstances, attention by necessity focused on continuing support for Ukraine and covering urgent needs related to airspace protection and energy. However, there were also



positive changes: participants of the conference began talking about green urban recovery, as well as the fact that Ukraine is one step closer to joining the EU. This means that it will implement

environmental reforms in line with the Green Deal, which will not allow natural areas to be destroyed. •

Translated by Alastair Gill

Main image source: [Mariupol Reborn](#)



Has the war forced eagles to alter their migration routes in Ukraine?

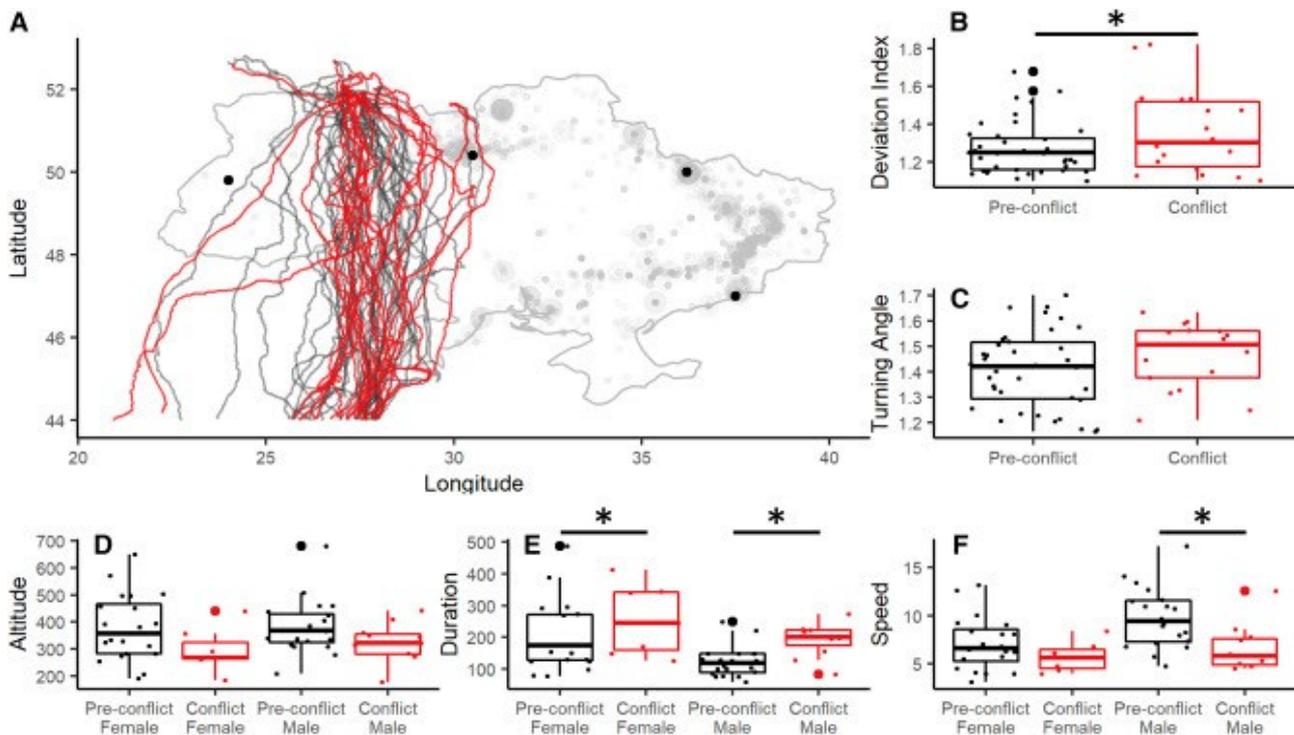
Viktoria Hubareva, Stanislav Viter

It is not only military activity that is affecting bird numbers in Ukraine – other factors are also at play. What needs to be done to ensure that birds of prey still have a place to live in the country?

A recent story in the Ukrainian media claims that the [war in Ukraine has had an impact on bird migration](#). The news is based upon a [study](#) in the journal *Current Biology*, which reports that Greater Spotted Eagles (*Aquila clanga*) traveled an average of 85 kilometers

more than usual while crossing Ukraine in 2022, increasing their total migration time by an average of 55 hours.

As one of the few scientifically-documented changes in the animal kingdom caused by Russia's full-scale invasion of Ukraine, the study has been



Spring migration routes pre-conflict (2019–2021, in black, 41 birds) and spring migration during the Russian-Ukrainian conflict (2022, in red, 19 birds). Source: [Active European warzone impacts raptor migration](#)

seized upon by many media outlets, though they have failed to pick up on some significant details.

In order to find out what is happening to birds amid the war in Ukraine, experts from UWEC Work Group have decided to look more carefully at the issue. We should preface our report by pointing out that it is not the war alone that is affecting avian migration routes, behavior, choice of nesting sites, and reproduction. Man-made dangers can be found everywhere and are often created in the course of everyday human activities.

What does the research actually show?

A closer look at the study reveals that we are talking here about a relatively

small number of **Spotted Eagles** that nest in the Polissia (Polesia) region, part of which includes northern Ukraine, along the border with Belarus. That is, the findings are based on a small sample from a very limited geographical area. But these are no ordinary birds. All of them were recorded using geotrackers and during migration they moved in a westerly direction – that is, in the direction of Poland.

It is therefore very unlikely that the Spotted Eagles studied flew over areas affected by military operations. In addition, it should be noted that the study compares migration routes in the years before the full-scale invasion with one season in 2022. Data for 2023 is not provided.



This has led to criticism of the publication from the scientific community. Some experts say the data presented is insufficient, while others argue that the war has no substantial influence on the migratory routes of birds, at least eagles.

“Polissia Spotted Eagles traditionally did not migrate over territories that were affected by hostilities in 2022-2024. Their migration routes lie along the Carpathian region, through Podilia [west-central and southwest Ukraine] and further through the Eastern Balkans,” says **Stanislav Viter**, an ornithologist with a doctoral degree in biological sciences. *“Therefore, military operations have nothing to do with this. But the absence of passenger aircraft – as one type of landmark – could lead to certain changes in migration routes over the course of one season. In subsequent seasons, the birds adapted to the new conditions.”*

“In 2022, I observed the same thing on the Siversky Donets [river], but already in 2023 there was a surprisingly noticeable migration even over combat zones or in close proximity to them. Species such as Buzzard, Honey Buzzard, White-tailed Eagle, Black Kite and Pygmy Eagle were also visible nesting at a distance of 20 km from the frontline,” he adds.

Viter argues that this change in migration routes was temporary, and the main factor in such changes was not in fact explosions, but the disappearance of a familiar component of air traffic for birds – passenger aircraft. The constant

traffic along certain civil aviation routes in Ukraine and nearby parts of Russia served as a kind of landmark for migrating birds, which now “lacked something in the sky – something familiar and stable...”

“Changes in migration movements occurred in 2022 and lasted only one season,” the [ornithologist explains](#). *“This didn’t happen at all due to military operations or explosions, because migrating birds of prey don’t react to these explosions. In fact, no matter how creepy it sounds, they even visit battlefields to feast on fresh human flesh.”*

“But already in the fall of 2023, near the city of Kharkiv, i.e. in a region directly bordering areas of very intense fighting, and where explosions are very clearly audible, I noted an intense migration of Ospreys – up to seven or even ten individuals a day – as well as Greater Spotted Eagles, common Buzzards, Honey Buzzards, Pygmy Eagles, Marsh Harrier, Black Kites,” he says.

According to Viter, the birds later managed to find the routes again, because older and more established landmarks, such as the location of the sun, the unchanging nature of river valleys and mountains, turned out to have a stronger influence.

What else could be affecting the behavior of birds?

Vitaly Grishchenko, deputy research director at the Kaniv Nature Reserve in central Ukraine, [recently posted](#) that



in 2022, white storks were significantly delayed in arriving in Ukraine, looking at average arrival dates. But he puts this down to cold weather along the migration routes – “in particular, a strong cold snap in Turkey caused the birds to get ‘stuck’ for a long time before reaching the Bosphorus” – rather than the fighting. “Perhaps this also affected the spotted eagles,” he suggests.

Although humans also destroy nesting habitat in peace time, birds do, of course, suffer during military action. Black kites, studied by Czech researcher **Ivan Literak** since 2019, are an example of this. In the summer of 2022, these birds did not reproduce in their nesting habitat near Dvorichna village in Kharkiv region. At that time, Dvorichna was occupied by Russian troops, and today the frontline is only a few kilometers away from the population center.

“Of course, birds do not nest on the battle lines – 20-30 km wide – where the ground has been scorched bare by artillery fire,” says Stanislav Viter. “That is, if their habitat disappears and they have nowhere to nest, raise offspring, and find food, any intervention – be it fighting, a fire, or logging in the forest, even selectively, affects the behavior of birds.”

For this reason, he argues, it is important not to focus exclusively on frontline areas – there are many more threats to birds throughout Ukraine.

“I advise paying more attention to the destruction of raptor biotopes

due to forest fires caused by military operations, such as in [Serebryansky Forest in the Luhansk region](#), as well as to the destruction of raptor habitats in peacetime,” says Viter.

Even before the start of Russia’s full-scale invasion, the economic activities of Ukrainian entities and individuals in state-managed forests were responsible for the destruction of far more raptor nesting areas than artillery fire from the Ukrainian and Russian armies combined – in the Kharkiv region, at least.

“Also, 6-10 kV overhead power lines, which are not fitted with bird-protective devices, pose a great danger to raptors. We can add idiots with firearms deep in the rear to the list as well – after all, poachers are responsible for most of the deaths of White-tailed Sea Eagles, Golden Eagles, and Ospreys migrating from Fennoscandia [an area encompassing the Scandinavian peninsula, Finland, and Russia’s Kola peninsula and Karelia region] via Ukraine,” he explains.

Referring specifically to the effect of loud explosions as a factor in bird anxiety, Viter gives the example of the first days of the war in 2022, when the intense artillery shelling of Kharkiv caused considerable distress to Magpies and Hooded Crows.

“The birds flew nervously, screamed, and were frightened by every loud sound. Due to stress, some hooded crows lost some of their feathers, mainly from their wings and tail. But by April, at the height of the



nesting season, these birds had occupied their nesting areas, got used to loud sounds, and even learned to recognize 'arrivals' and 'departures' [of missiles]: the birds barely reacted to the latter, despite the loudness of these sounds. All 20 pairs of Hooded Crows and 30 pairs of Magpies that were observed in the center of Kharkiv successfully raised their chicks, although the birds were terrified a month before nesting began," says Viter.

What do we know about the impact of war on birds from the past?

The full-scale war has already lasted over two years, and for a decade in eastern Ukraine. While this represents a huge period of time on a human scale, it is too short for research. So it is perhaps too early to draw conclusions about how modern war actually affects bird migration.

However, we have found [studies](#) published by Sir **Hugh Gladstone**, a Scottish landowner who wrote a book titled *Birds and the 1914-18 War*, about the effects of fighting on birds during the First World War.

Although bird life was described as almost normal in the artillery zone and a short distance from the trenches, many species appeared to have been forced to leave areas destroyed by shelling. Yet the effect on bird behavior, as far as the study could tell, was extremely small, and birds in the areas where the loudest explosions occurred showed an

astonishing ability to adapt to conditions that would have been considered impossible in pre-war days. The studies concluded that the birds had adapted to loud blasts and had become indifferent to the noise of battle.

Gladstone devoted a separate chapter to the impact of war on migration. The data is presented rather vaguely, and it is impossible to evaluate it from a scientific point of view. However, the author does note certain changes in migration routes – some birds chose new routes for flights, did not return from wintering, or selected new regions for nesting and raising chicks.

He writes that in 1915, in the Taurida Governorate (an administrative region of the Russian Empire that covered present-day Crimea and part of today's Kherson and Zaporizhzhia regions that did not see fighting during the war), a large number of all types of birds were observed, especially those species that migrate through the Carpathians. That is, the birds chose areas far away from the main combat zones.

"Those birds whose nests were usually situated in localities affected by the war were perforce compelled to abandon their homes and migrate to other places, thus evoking an increased flight of individual kinds of birds to certain spots."

Gladstone also noted claims that 60 species of migratory birds stopped visiting the UK as a result of the shelling, but this thesis was soon disputed. While



the book provides many interesting observations, they were collected from different eyewitnesses, so the probability of errors is high.

Gladstone quotes an unnamed French researcher who had observed significant changes in bird migration caused by the fighting in the First World War, such as wild ducks from the eastern counties of England. In 1916, instead of making their usual flight to the Netherlands and France via the North Sea – that is, directly southeast – the ducks flew first to the north, then west, and only then moved south, skirting the coast of Ireland.

Warblers from Fennoscandia migrated along the coast of the North Sea and the English Channel to the Brittany Peninsula and only then turned south, although in previous years of observation there had been widespread migration directly across the European continent. In the fall of 1915, larks and blackbirds, which usually flew through France from their breeding grounds in northern Europe to winter in the Mediterranean, bypassed war-torn eastern France and migrated through Switzerland. In 1916-1917, swallows abandoned migration to Europe in many cases and raised their chicks in Tunisia instead – halfway from their wintering grounds. White Storks were often observed in places where they usually do not nest, and in the northeast these birds left their habitual nesting grounds.

Yet Gladstone does not conclude that the war led to systemic disruptions in bird migration. After all, detailed observations on other “hot fronts” – in Mesopotamia and Palestine – showed that bird migrations continued uninterrupted in these territories.

Besides the war, what else characterizes the period of 1916-1917, when it seemed that a significant disruption of bird migration in Western Europe was being observed? Above all, the weather conditions, namely unusually cool temperatures. In 1917, for example, snow fell in London at the height of summer – in July. These weather anomalies (cold temperatures, heavy rainfall, a lack of sunny days) may have been the determining factor in the migration of shorebirds not across the continent, but along the warmer coastline, and encouraged blackbirds to take a shorter route through Switzerland. Was it the lack of real summer weather that caused the swallows to stay in northern Africa (Tunisia) and nest “halfway” home?

As for the White Storks, perhaps it was the war that played a significant role in their unusual behavior – the tendency to leave their traditional nesting sites and appear in particular places. Storks mainly nest in populated areas, and Alsace-Lorraine, the region where the bloodiest fighting of the First World War took place, is home to the largest population of these birds in France



during the nesting season. Fighting in populated areas, which resulted in the direct destruction of nesting sites, may have been the most significant factor responsible for the strange behavior of these birds. Although “years without summer” certainly don’t help the species to nest. And in regions such as Palestine and Mesopotamia, which saw no changes to bird migration patterns, there were no weather shocks like those in Western Europe in 1916-1917.

What do the changes in routes and the number of migrating birds during the war tell us?

Firstly, we should not draw premature conclusions. It will only be possible to put an end to the debate among ornithologists and make final judgments after the war.

“In general, we cannot say that birds are avoiding Ukrainian territory during migration or that there is a significant reduction in their numbers. The war that is taking place on the territory of Ukraine, oddly enough, is not an event of sufficient scale to scare away migrating birds. Some birds avoid dangerous areas, others fly – everything is very individual,” says Stanislav Viter, who stresses that there are many factors that can affect the migration of birds, including weather conditions and food distribution.

“We don’t have enough data, and the impact of war on bird populations is very

local, within a very narrow zone of military operations,” he says.

After the war Ukraine can begin to restore destroyed areas

It is possible to help birds restore their nesting grounds in places where their habitats have been destroyed. For example, an attempt could be made to restore Kreminski Forestry Division in the already-burned Serebryansky Forest.

“First of all, we need to cut down burned pine trees and plant new plantations that do not affect the birch, aspen, and alder groves, which are recovering well,” proposes Stanislav Viter. *“Those areas of the forest that are not damaged should be left as they are. The birds will return in time. Serebryansky Forest is home to several pairs of bird, and they can nest in nearby places. The damaged area is quite limited, at least on the scale of raptor population density,”* says Viter.

Assigning protected status to damaged areas

It also seems quite a logical step for Ukraine to transfer new territories to protected status.

While some suitable bird habitats have been destroyed, others which are not yet the site of human activity, can offer a new home for birds. It is extremely important to protect the natural places that we have left today.



According to biologist **Oleksiy Vasyliuk**, head of Ukrainian Nature Conservation Group, new natural reserves would significantly improve the conditions for biodiversity in Ukraine. Such protected areas would be worthy compensation for the loss of wildlife during the full-scale war.

Restoring natural ecosystems where none previously existed, rather than simply saving the last remaining ones, is the basis of sustainable development in

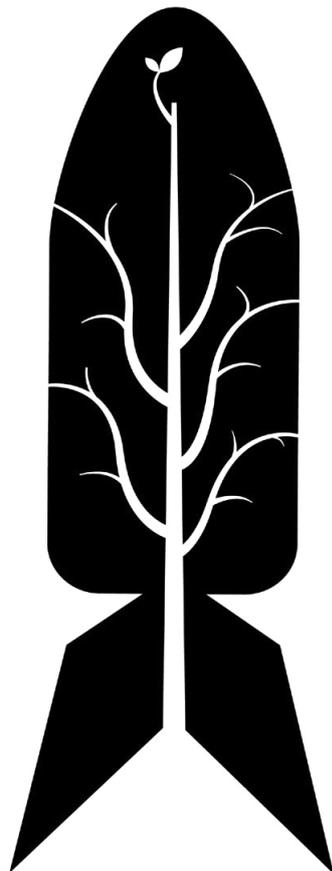
Europe. In recent years, European states have increasingly taken bold and far-sighted decisions to halt global climate change and guarantee a green future for the entire continent. Ukraine can and must follow this same path in order to preserve not only its birds, but also the environment itself. •

Translated by Alastair Gill

Main image: Greater Spotted Eagle.

Source: Sanjay MalikeBird S33227441

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