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RIVERS AS BATTLEFIELDS: UKRAINE'S DNIPRO

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Wars turn the natural environment into battlefields. In economic wars, regions perceived as rich in resources become contested bounty for powerful predators, investors, state authorities, and eventually settlers. Wars follow transportation routes along rivers that reflect power relations in the movement of settlers, emissaries, and troops. In pursuit of energy, agriculture, and state power—and not only the ends of war—rivers are often sites of violent environmental change when they are straightened, blocked, or drained. And in the worst circumstances, soldiers transform entire ecosystems into war machines, even to the extent of setting fire to forests and fields, blowing up factories and power stations, and pouring toxic chemicals and fuels into rivers to poison the waters.[1]

Fig. 1. The destroyed Kakhovka Dam, Beryslav town, and Dnipro riverbank, dried-up after water level sharply dropped following the collapse of the dam, are seen from the town of Nova Kakhovka in Kherson region, Russian-controlled Ukraine, 5 July 2023. © picture alliance / REUTERS / Alexander Ermochenko. All rights reserved.

The Dnipro River, the fourth-longest river in Europe (after the Volga, Danube, and Ural), and the inhabitants of its basin have experienced such cruel hardships over the last century, most recently due to Russia's invasion of Ukraine. The Dnipro became the front between the Ukrainian and Russian armies, and its fate is now connected to the blowing up of the Kakhovka Dam along with the Hydroelectric Station (KGES), in Kherson region of Ukraine, in June 2023.[2] The explosion released water from an 18.2-cubic-kilometer reservoir from behind a 30-meter-tall dam. The torrent inundated cities, towns, and farmlands, and killed unknown scores of people downstream in the Kherson and Zaporizhzhia regions.

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At 2,200 kilometers in length, originating in Russia and flowing through Belarus and Ukraine to the Black Sea, and with a drainage basin of over five hundred thousand square kilometers, the Dnipro has rich cultural, economic, national—and environmental—meaning for Ukraine.[3] It served the Amber Road trade route between the North, Baltic, and Mediterranean Seas in antiquity and was central to power plays between the Polish-Lithuanian Commonwealth and Russia from the time of Peter the Great. It was a major focus of Soviet efforts to transform the empire's rivers into "machines"—nexuses of hydropower, irrigation, canal, transportation, and military systems in support of state power.[4]

Many observers in western Europe and the United States became aware of the environmental significance of the Dnipro River only after the 1986 Chornobyl disaster. The Pripiat River, the source of cooling water for Chornobyl's reactors, flows into the Dnipro and thence to Kyiv, only 90 kilometers away, and deposited radioactivity in sediments in and around Ukraine's capital city.[5] But large-scale engineering projects that altered the Dnipro's ecology long predated Chornobyl's notoriety. They include the Bug-Dnipro Canal, first opened in the late eighteenth century and reconstructed several times up to the present. Engineers pursued other canal, impoundment, and power-plant projects involving the Dnipro, as they do on rivers everywhere in the name of flood control, power generation, and irrigation. In their calculations, they often underestimate the costs of construction, and they rarely take into full account the inundation of fertile farmland, the displacement of tens of thousands of local people, the destruction of churches, villages, cemeteries, and memories, and other significant socioenvironmental costs. Yet, flood control on the Dnipro was paramount, as there were nine major floods between 1789 and 1931, the last of them endangering some of the most densely settled areas of Kyiv.[6]

Fig. 2. The Dnipro River basin. Wikimedia Commons. CC BY-SA 4.0.

The modern engineering assault on the Dnipro commenced with the Russian Revolution. As part of Vladimir Lenin's plan for the electrification of Russia (GOELRO, or State Commission for Electrification of Russia, 1918), the Bolsheviks set out to build the world's greatest hydropower stations. They believed that electricity provided a foundation on which to erect Communism. One of the most famous, and first, hydraulic schemes arose on the Dnipro at Zaporizhzhia after Lenin's death: the widely celebrated "Dniprostroi" (Dnipro Construction Project), planned in the 1920s and carried out in the early 1930s. Dniprostroi was an early Stalinist hero project that focused the nation's labor and capital resources on waterworks. It sought to demonstrate what raw, peasant recruits could accomplish when forced by the Communist Party to achieve state-construction goals in short order; in this case, however, the government had to rely on technology and experts from the United States to bring the project to fruition.[7]

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World War II temporarily interrupted transformation projects on the USSR's river basins. But the state returned to its war on nature through Stalin's Great Plan for the Transformation of Nature (or Stalin Plan, 1948), a massive effort to control the major waterways of the European USSR—the Don, Dnipro, and Volga Rivers; to create an extensive irrigation network to turn steppe into agricultural wonderland; and to plant seventy thousand kilometers of so-called forest-defense belts to protect farmlands from hot, dry winds.[8] The Stalin Plan explicitly pointed to "capricious" nature as an enemy of socialism. No less than counterrevolutionaries and "wreckers," nature would succumb to the harsh intervention of the Communist Party, which would force it to operate according to five-year production plans.[9] Yet, the projects connected with the Stalin Plan led to the inundation of hundreds of villages and towns and the forced removal of tens of thousands of residents, and they required the use of hundreds of thousands of gulag prisoners, many of whom perished in harsh labor conditions.

The complete numbers of oustees from river engineering in the USSR—or along Ukraine's Dnipro—are held in closed archives. The exact numbers of gulag prisoners at dam, canal, and other hydroconstruction sites, similarly, remain unknown. But two hundred thousand prisoners were used to build the Kuybyshev Hydroelectric Station (now Zhiguli Hydroelectric Station) alone in the early 1950s, and many of the other labor camps involved in hydraulic excavations held twenty to fifty thousand slave laborers. The USSR was not unique in pursuing projects so costly to local residents, prisoners, and nature. These kinds of hydraulic schemes often translated into high levels of state violence by the late twentieth century: in China, between one and a half and two million people were ousted for the Three Gorges Dam on the Yangtse River, and roughly the same number from three states—Gujarat, Maharashtra, and Madhya Pradesh—for waterworks on India's Narmada River. In all events, over the entire Soviet period, the discharge of the Volga River into the Caspian Sea was reduced by almost 70 percent; that of the Dniester, Dnipro, and Don into the Black and Azov Seas by around 50 percent.[10] Severe erosion plagued most dams, irrigation likely reached only one-third of the targets, fisheries were destroyed, and spawning areas eliminated. These were the costs of a war on nature undertaken under the Communist banner of improvements in transport, agriculture, and power production.

Fig. 3. Soviet Union stamp depicting the Kakhovka Dam, 1951. Wikimedia Commons. Public domain.

The Kakhovka Hydroelectric Station grew out of the Stalin Plan. The project included the construction of the Kakhovskyi and North Crimean Canals intended for irrigation in territory that was annexed and occupied by Russian invaders in 2014. In early December 1950, the first caravan of barges from Zaporizhzhia arrived at Kakhovka with construction materials and exuberant young workers. Within a year, some twenty thousand laborers were excavating, building cofferdams, dynamiting, and pouring concrete; they toiled in miserly, filthy conditions, and lived in temporary barracks, with long lines for bread, late pay, and few moments of leisure or rest.[11]

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By 1959, the power station reached its capacity of 350 megawatts. Electricians hung power lines to Crimea, Kherson, and Krivoy Rog; plumbers and pipelayers built pumping stations at Tsiurupynsk (now Oleshky), Vynohradiv, and Dudchany to support thousands of hectares of farmsteads through irrigation networks. In the fervor of Communist construction, the press was filled with articles about how the waterworks would enable transport from the Mediterranean Sea almost to Leningrad without going through the Strait of Gibraltar, how irrigation would turn steppe into lush gardens, beautiful orchards, and vineyards, and how dairy cattle and fine-fleece sheep would occupy verdant pastures while electric tractors would make collective farmers happy.[12] Ukrainians in Ukranian SSR, Tadjiks in Tadjik SSR, Russians in the Russian SFSR—the Soviet masses all seem to have embraced the technological modernization promised in the Stalin Plan, as indicated in extensive celebratory coverage of projects in local, regional, and republican press. In essence, all of these hydraulic projects were intended to weaponize water, to subjugate it to state economic and military plans intended to ready socialist industry for the inevitable war with the capitalist world.

> *The Dnipro itself ultimately became a cog in the Soviet military industrial complex.*

To fill the reservoir of the Kakhovka Dam, some 37,000 people had to be resettled from villages near the city of Kakhovka. The reservoir flooded the historical area of Velikiy Lug and ancient burial grounds in the floodplain of the Dnipro that had belonged to the Zaporozhian Cossacks until they were subjugated by Catherine the Great. In all, perhaps 90 settlements were submerged, along with 257,000 hectares of land. Many animals drowned, and others, such as wolves, were tracked down and shot.[13] Troubled by the displacements, the Ukrainian writer and director Alexander Dovzhenko, who visited the construction site before the reservoir filled, dedicated a filmscript, *Poem about the Sea* (1958), to the memory of flooded villages. Literary and social opposition to the Soviet economic-development model appeared in Russia as well, for example in the work of writers of the village-prose genre, notably in Valentin Rasputin's *Farewell to Matyora* (1976), about the inundation of a community and its memories of simple life during the closing of a dam.[14]

The Dnipro itself ultimately became a cog in the Soviet military industrial complex: from the 1920s to the 1970s, workers built a cascade of six reservoirs and dams: Dnipro (1930s, 560 MW), Kakovka (1950s, 350 MW), Kremenchuk (1950s, 700 MW), Kyiv (1960s, 440 MW), Dniprodzerzhynska (now the Middle Dnipro Hydroelectric Station, early 1960s, 350 MW), and Kaniv (1970s, 500 MW).[15] The Kakhovka Reservoir, at 18.2 cubic kilometers, held a greater volume of water than the Kyiv, Kremenchuk, and Kaniv reservoirs combined.

Engineering megaprojects across the globe often move forward with promises of cheap kilowatts, nearly fail-safe flood control, and increases in agricultural production. They are inextricably tied to other technologies—transport, industry, electricity distribution, military enterprises, cooling, and fisheries—whose operation they alter and influence. They create jobs. But, unspoken, they clearly arise in response to their promoters' visions of enhancing the state's military might and preparedness. The authorities—and publics—tend to overlook the immense environmental degradation brought about by megaprojects such as the Stalin Plan because of their touted large-scale benefits. Unfortunately, construction efforts such as the KGES—and river basins such as the Dnipro's—also become sites of direct military operations and environmental devastation when they are weaponized in situations of conflict and war. A 1968 Soviet postage stamp leaves no doubt about the military meaning of dams for Soviet power (Figure 4).

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Fig. 4. A 1968 postage stamp commemorating 50 years of the Soviet (Red) Army. Courtesy of the Russian postal service. Public domain.

In June 1941, the Nazi Wehrmacht invaded the USSR, rapidly overrunning the Ukrainian SSR and Belarusian SSR. Soon thereafter, Stalin, who had signed a treaty with Hitler to divide Eastern Europe in 1939, ordered the interior ministry of the Soviet Union (NKVD) to blow up dams and other industrial facilities in Ukraine (including the Dnipro Hydroelectric Station and its dam) ahead of the German advance, to deny access to power and fuel resources. The demolition of the dam led to flooding of villages and settlements along the Dnipro, killing thousands of unsuspecting civilians and Soviet troops. Some historians estimate the death toll at between twenty thousand and one hundred thousand. One survivor, Oleksiy Dotsenko, remembers that the Dnipro "turned red." He recalled that "People were screaming for help. Cows were mooing, pigs were squealing. People were climbing on trees." The authorities justified the human losses to protect the Motherland and to permit evacuations to proceed.[16]

After gaining its independence in 1991, Ukraine's power industry sought to update and repair the Kakhovka Reservoir, replacing six turbines and increasing the power by 20 megawatts. The station was crucial to Ukraine's future: its locks enabled navigation from Kherson to Zaporizhzhia, its reservoir cooled the Zaporizhzhia Nuclear Power Plant (with six one-thousand-megawatt reactors, the largest station in Europe—and currently also occupied by Russian soldiers), and its waters were critical to agriculture in southern Ukraine—and in Crimea. Ukrainian officials ordered a study already in the early 2000s about the potential of a full-scale disaster along the Dnipro if a dam were to fail after a terrorist attack.[17]

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In early 2022, when Russia had amassed 180,000 troops on Ukraine's border, Ukrainian and Western observers still hoped that President Putin would not order an invasion. But on 24 February 2022, Russia attacked. Within a few days, the Zaporizhzhia Nuclear Power Plant fell into Russian hands. On 11 November 2022, Russian troops blew up sections of road and railroad at the Kakhovka dam. On 6 June 2023, as Ukraine began an offensive along sections of the Dnipro River, the dam was blown up as a tool of war. The reservoir poured out into towns and villages. The water carried petrochemicals and urban waste downstream, creating dank, toxic, turbid swamps, littering the shores with bodies, livestock, and pets. Fish gasped for air in mud flats. Art museums, schools, monuments to World War II (ostensibly important to Russian memory politics), archeological sites dating back two millennia, factories, agricultural regions, irrigation systems—all were destroyed.[18] The destruction of the dam put the Zaporizhzhia Nuclear Power Plant at great risk because it depends on the Kakhovka Reservoir to cool its reactors. The demolition cut water supplies to Crimea, endangering Russia's annexed land. It threatens Ukraine's production of corn, wheat, sunflowers, barley, and a variety of seed oils. In all, 80 villages were submerged.[19]

Fig. 5. The city of Kherson after the explosion on the Kakhovka Dam. © Vladimir Smirnov on Adobe Stock. All rights reserved.

The KGES was an architectural monument to Stalinism, a key to Ukraine's energy independence and agricultural power, a heroic symbol of engineering hubris, a deepwater route from the Black Sea to Zaporizhzhia, and a place of homes, roads, power lines, and other communications that united the left and right banks of Ukraine's Dnipro before Russia's invasion.[20] When the war and occupation end, Ukraine will face serious questions about how and to what extent to rebuild KGES and other massive engineering projects that became battlegrounds along the Dnipro.

Notes

[1] On war and nature, see Simo Laakkonen, Richard P. Tucker, and Timo Vuorisalo, eds., *The Long Shadows: A Global Environmental History of the Second World War* (Eugene: Oregon State University Press, 2017).

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[2] There is some debate over responsibility for blowing up the Kakhovka Dam, but this debate originates in disinformation campaigns. Most analysts understand that at the time of the explosion the dam was physically in Russian hands, that the explosion occurred at a fateful area of the dam whose choice was based on blueprints in Moscow's hands. Russian troops had already damaged approaches, roadways, and so on. Finally, Ukraine had been upgrading the station and had no economic or military interest in destroying a major dam on its territory, which led to flooding of the Dnipro downstream, a large loss of life among Ukrainians, and great risk to safe operation of the Zaporizhzhia Nuclear Power Plant on the Dnipro's shores. On Russian responsibility for the explosion, see James Glanz, Marc Santora, Pablo Robles, Haley Willis, Lauren Leatherby, Christoph Koettl, and Dmitriy Khavin, "Why the Evidence Suggests Russia Blew up the Kakhovka Dam," *New York Times*, 16 June 2023, https://www.nytimes.com/interactive/2023/06/16/world/europe/ukraine-kakhovka-dam-collapse.html. On disinformation about the explosion, history, and the war, see Timothy Snyder, "The Nova Kakhovka Dam in Ukraine: Ten Guidelines for Writing about Catastrophe," *Snyder Substack* (blog), 7 June 2023, https://snyder.substack.com/p/the-nova-kakhovka-dam-in-ukraine.

[3] For a cultural history of the Dnipro River, see Roman Cybriwsky, *Along Ukraine's River: A Social and Environmental History of the Dnipro* (Budapest: Central European University Press, 2018).

[4] Richard White, *The Organic Machine* (New York: Hill and Wang, 1996).

[5] International Atomic Energy Agency, *Radiological Conditions in the Dnieper River Basin: Assessment by an International Expert Team and Recommendations for an Action Plan* (Vienna: IAEA, 2006), https://www.iaea.org/publications/7247/radiological-conditions-in-the-dnieper-river-basin.

[6] Andriy Manchuk, "Velika Kiivs'ka Povin' [Great Kyiv Flood]," *Ukrainska Pravda*, 4 April 2013, https://www.istpravda.com.ua/blogs/2013/04/4/119569/.

[7] Sergei Budantsev, "Dnepropetrovsk," *Novyi Mir*, no. 6 (1928): 209–16; Anne Rassweiler, *The Generation of Power: The History of the Dneprostroi* (New York: Oxford University Press, 1988).

[8] On the Stalin Plan and forestry, see Stephen Brain, *Song of the Forest* (Pittsburgh: University of Pittsburgh Press, 2011). See also Mitrofan Davydov and M. Tsunts, *Ot Volkhova do Amura* [From Volkhova to the Amur] (Moscow: Sovetskaia Rossiia, 1958); F. P. Koshelev, *Velichestvennye Stalinskie Stroiki Kommunizma i Ikh Narodnoxhoziistvennoe Znachenie* [Great Stalinist hero projects of Communism and their national significance] (Moscow: Gospolitizdat, 1952). On the extensive, murderous use of prisoners at Soviet construction sites, see O. V. Lavinskaia and Iu. G. Orlova, eds., *Zakliuchennye na Stroikakh Kommunizma: Gulag i Ob"ekty Energetiki v SSSR—Sobranie Dokumentov i Fotografii* [Prisoners at the construction sites of Communism: Gulag and energy facilities in the USSR—Collection of documents and photographs] (Moscow: Rosspen, 2008).

[9] Bernd Stevens, "Nature Mastered by Man: Ideology and Water in the Soviet Union," *Environment and History* 3, no. 1 (1997): 69–96, https://doi.org/10.3197/096734097779555962.

[10] David Tolmazin, "Black Sea—Or Dead Sea?," *New Scientist* 84, no. 1184 (6 December 1979): 767–69. See also Tolmazin, "Soviet Environmental Practices," *Science* 221, no. 4616 (16 September 1983): 1136, https://doi.org/10.1126/science.221.4616.1136.a.

[11] Iurii Shchur, "Arkhivy KGB: Kak v Griazi i Nishchete Stroili Kahkovskuiu GES" [KGB Archives: How the Kakovka Hydroelectric Power Station was built in dirt and poverty], *Depo Kherson*, 15 August 2021, https://herson.depo.ua/rus/herson/arkhivi-kdb-yak-u-brudi-ta-zlidnyakh-buduvali-kakhovsku-ges-202108151355165.

[12] On these projects and their cultural meaning, see Paul Josephson, "Stalin's Water Workers and Their Heritage: Industrializing Nature in Russia, 1950–Present," *Global Environment* 10, no. 1 (2017): 168–201, https://doi.org/10.3197/ge.2017.100107.

[13] On the destruction of monuments of history and memory, see Evgenii Burdin, *Volzhskii Kaskad GES: Triumf i Tragediia Rossii* [Volga cascade HPS: Triumph and tragedy of Russia] (Moscow: Rosspen, 2011).

[14] Oleg Shama, "Kak i zachem postroili Kakhovskuiu GÈS" [How and why the Kakhovka Hydroelectric Power Station was built], *New Voice*, 11 June 2023, https://nv.ua/ukraine/events/kahovskaya-ges-dlya-chego-stroili-v-sssr-posledstviya-i-zhertvy-ukraincev-istorik-novosti-ukrainy-50330250.html. On the rise of literary environmentalism in the USSR, see Nicholas Breyfogle, "At the Watershed: 1958 and the Beginnings of Lake Baikal Environmentalism," *Slavonic and East European Review* 93, no. 1 (2015): 147–180, https://doi.org/10.5699/slaveasteurorev2.93.1.0147.

[15] Ukrhydroenergo , "Kanivs'ka GES" [Kanivska GES], https://web.archive.org/web/20120319184035/http://www.uge.gov.ua/clients/ukrge/site.nsf/(documents)/2FA424BD7A634DD8C22577550051D1B7; Ukrhydroenergo Press Service, "Kremenchuts'ka GES" [Kremenchuk GES], 28 December 2019, https://uhe.gov.ua/media_tsentr/novyny/kremenchucka-ges-visoka-manevrenist-ta-stabilnist-robochoi-potuzhnosti. For a short documentary on the building of KGES, see Kakhovka GES, "Stroitel'stvo Kakhovskoi GÈS 1955 god" [Construction of the Kakhovka Hydroelectric Power Station, 1955],

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https://www.youtube.com/watch?v=7fzzGmgh5ZM. On the crucial cultural, economic, and military meaning of the projects, see F. P. Gromyko, *Energiia Rek—na Sluzhbu Kolkhozam* [The energy of rivers in service of collective farms] (Ivanovo: Ivanovskoe Oblastnoe Gosudarstvennoe Izdatel'stvo, 1949), 3. See also Mitrofan Davydov and M. Tsunts, *Rasskaz o Velikhikh Rekakh* [A tale of great rivers] (Moscow: Gosizdat kul'turno-prosvetitel'noi literatury, 1955); F. G. Basov, *Ispol'zovnie Vodnoi Energii Rek na Kolkhoznykh Gidrostantiiakh* [Use of water energy from rivers at collective farm hydrostations] (Voronezh: Voronezhskoe Oblastnoe Knigoizdatel'stvo, 1940); Mark Walberg, "Antichnye arki, bashni v dukhe renessansa: Kakoi byla Kakhovskaia GÈS" [Antique arches and towers in the spirit of the Renaissance: What was the Kakhovka Hydroelectric Station like?], *Vot Tak*, 7 June 2023, https://vot-tak.tv/novosti/07-06-2023-kakoj-byla-kahovskaya-ges; Sergii Pivovarov and Evgen Spirin, "Kakhovs'ka GES mala stati stalins'kim eksperimentom z prirodoiu" [The Kakhovka HPP, a Stalinist experiment with nature], *Babel*, 14 June 2023, https://babel.ua/texts/95063-kahovska-ges-mala-stati-stalinskim-eksperimentom-z-prirodoyu-vterti-nosa-ssha-i-vraziti-yegipet-a-v-razi-chogo-jiji-mogli-pidirvati-zgaduyemo-pro-ostannyu-veliku-budovu-komunizmu-v-arhivnih-kadrah.

[16] Dmitro Moroz and Claire Bigg, "Ukrainian Activists Draw Attention to Little-Known WWII Tragedy," *Radio Free Europe/Radio Liberty*, 23 August 2013, https://www.rferl.org/a/european-remembrance-day-ukraine-little-known-ww2-tragedy/25083847.html.

[17] Zoia Veshnevskaia, "Poka Grom ne Grianul…" [Until the thunder crash…], *Zerkalo Nedelni* 10, no. 485 (13–19 March 2004), https://web.archive.org/web/20051101064157/http://www.zerkalo-nedeli.com/nn/show/485/45872/.

[18] Asya Zolnikova, "Kakhovskaia GÈS byla Odnoi iz 'Velikikh Stroek Kommunizma'" [The Kakhovka HPS was one of the "hero projects of Communism"], *Meduza*, 9 June 2023, https://meduza.io/feature/2023/06/09/kahovskaya-ges-byla-odnoy-iz-velikih-stroek-kommunizma-ona-polnostyu-razrushena.

[19] Walberg, "Antichnye arki"; Pivovarov and Spirin, "Kakhovs'ka GES."

[20] Walberg, "Antichnye arki"; Pivovarov and Spirin, "Kakhovs'ka GES."

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