

The consequences of destroying the Nova Kakhovka dam

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On 6 June, critical elements of the Nova Kakhovka dam and hydroelectric power plant were destroyed, probably as a result of the detonation of explosives planted by the Russian army. Only a few fragments of the nearly four-kilometre-long dam survived. As a result, the water level in the Kakhovka Reservoir has fallen significantly (as of 12 June, its volume was 72% lower than before the disaster). The government in Kyiv announced that the power plant had been completely destroyed, and that up to several hundred tons of petroleum products from its engine room could have leaked into the River Dnieper. The lower section of the Lower Dnieper Valley has now been flooded as a result of the dam's destruction. The flood wave peaked on 7–9 June, and water levels began to fall on 10 June. Since the towns located on the river have been *de facto* on the front line since last November and have been largely abandoned, civilian casualties are relatively small; 10 people have so far been confirmed dead in the areas controlled by Ukraine. The head of the local sanitary and epidemiological authority said that the flood poses a high risk of a cholera outbreak in the region.

Commentary

- Valuable ecosystems protected as part of the Lower Dnieper National Park have been destroyed and the water has been polluted with municipal wastewater, dead animals and elements of houses and household equipment due to the flooding. It is not entirely clear how much toxic material has leaked into the Dnieper and the Black Sea, or whether it could cause a mass die-off of fish and other animals. In the long run, the most serious problem is the significant lowering of the water level in the Kakhovka Reservoir. Over the decades harmful substances from sewage and fields have accumulated at its bottom and they could be released once more, for example in the form of dust as a result of the water outflow. The supply of drinking and technical water to cities, including Kryvyi Rih, Melitopol and Berdyansk, will pose a major challenge as most of it came from canals fed from the reservoir and the River Dnieper.
- The long-term consequences of the Kakhovka Reservoir emptying out will be much more serious than the immediate effects of the flood. The reservoir, along with the Dnieper below the dam, used to feed a network of canals that irrigated tens of thousands of hectares of fields in the Kherson, Zaporizhzhia and Dnipropetrovsk oblasts, as well as in Crimea (before 2014 and again from 2022). Before the war, the region played an important role in agriculture, and Kherson oblast was Ukraine's main vegetable-growing area. For example, it accounted for 34% of watermelon, 28% of tomato and 25% of pepper production. Since Russian troops occupied this territory, vegetable prices have doubled because supplies to the non-occupied territories were cut off (in contrast to

Ukraine's cereal crops, its vegetables were mainly grown for domestic needs). The drying up of the irrigation network could lead to climate change in the region, including dust storms and soil degradation. The destruction of the dam may also affect industrial plants located in the vicinity of the reservoir (including the steelworks in Kryvyi Rih), which used the water from the reservoir in their production process.

- The Kakhovka Hydroelectric Power Plant had 335 MW of capacity installed, which was approximately 5% of the capacity of all hydroelectric power plants in Ukraine. It is estimated that it will take between \$800 million and \$1 billion to rebuild it, taking at least five years; it is unlikely that any such work will start as long as the hostilities are continuing. A potentially even bigger problem is that the water from the Kakhovka Reservoir used to feed the reservoir used by the Zaporizhzhia Nuclear Power Plant, the largest facility of this type in Europe, which the Russian army now controls. Although none of the six reactors have been in operation since last September, they still need water for cooling. For the time being, Enerhoatom (the Ukrainian nuclear power plant operator) has issued reassuring statements emphasising that the water level in the tank at the power plant is stable, and there is enough water to keep the reactors safe.