Protecting the Dniester: Moldova and Ukraine’s struggle for sustainability and security

Description

Flowing through Ukraine and Moldova, the Dniester River sustains millions of people through fresh water, agriculture, and energy. Still, environmental degradation, geopolitical tensions, and war threaten its future. As both nations face complex challenges, strengthening cross-border cooperation and prioritizing sustainability are crucial to preserving this vital transboundary resource.



The transboundary Dniester River, 1,362 kilometers long, flows partially along the border between Ukraine and Moldova. It serves as a vital lifeline for both countries, providing fresh water to approximately 7 million people and supporting economic activities such as agriculture, energy production, fishing, and tourism. For centuries, it has been not only a crucial water source but also a natural political boundary that shapes regional relations. However, managing this shared resource has become increasingly complex, as both countries must enjoy their benefits while respecting each other’s preservation. Over the past few decades, tensions have arisen due to environmental and geopolitical concerns. Despite previous disputes, efforts toward bilateral cooperation offer hope for a more sustainable future.

Environmental concerns over hydropower plants

Over the years, the Dniester River has become a strategic energy production source for both Ukraine and Moldova. The first hydropower plant was built on the Moldovan bank in 1954 with the Dubasari plant. During the 1970s and 1980s, Ukraine began to make a large hydropower complex upstream to meet its growing domestic energy demands, significantly altering the river’s natural flows. However, the expansion of the complex over the years has led to significant environmental and social consequences, particularly for the downstream part of the river in Moldova.

Various reports documented that the Dniester Hydropower Complex (DHC) has an adverse effect on the quality of the river’s water. A first report published in 2019 by the UNDP, OSCE, and UNECE analyzed the effects of the reservoirs on the state of the Dniester River [2]. The report indicated that the reservoirs and dams along the Dniester significantly affected the river’s hydro-morphology. The retention of 90% of suspended sediments in the reservoirs has reduced the sediment supply downstream by three to six times compared to pre-dam levels. This reduction in sediment has exacerbated downstream erosion, leading to degradation of the riverbed. Water quality has also deteriorated with a decrease in temperature in the warm season and a rise of up to 6°C in November. Additionally, the decrease in oxygen levels in the lower layers of the reservoir has led to unbearable conditions for aquatic organisms to develop. In fact, since the construction of the first hydropower dam, the fish species decreased by almost 50%, with high-native species extinct and replaced by invasive, low-value species such as Prussian carp.

These findings were reinforced three years later by a report published by the UNDP, the Ministry of Environment of Moldova, and with Sweden’s support. The report emphasized the impact of the DHC on the River, suggesting that the complex had reduced water volumes downstream by approximately 10%. The complex has also been responsible for noticeable changes in temperature and sediment transport, further disturbing the natural balance of the river.

The expansion of Ukraine’s largest hydropower complex, the Novodnistrovsk complex, has also alarmed Moldova. In 2021, Ukraine’s government announced the launch of another electricity-powered turbine, which could further

exacerbate water quality and quantity issues for Moldova. Experts have estimated that the river's annual water volume has decreased from 10 to 7 cubic kilometers, representing the total yearly flow of Moldova's second-largest river, the Prut [4]. This significant water loss is a primary concern for Moldova, particularly regarding water supply for the population's economic activities and ecosystem sustainability.

The river at the heart of geopolitical tensions for decades

Over the years, the Dniester River has been at the core of regional geopolitical tensions. The central tension occurred between 1990 and 1992 between the Republic of Moldova and separatist groups on the Eastern bank of the Dniester.

Today, the Dniester not only acts as a natural boundary between the Republic of Moldova and the separatist Transnistria but also reinforces geopolitical tensions due to Transnistria's control over a considerable portion of the river's flow, including critical infrastructure such as the Dubasari Hydropower Plant, a key source for electricity generation. This dependence leaves Moldova vulnerable, as it lacks full control over water management and energy resources. The management of the Dniester River is often addressed in the 5+2 settlement negotiations involving Moldova, Transnistria, the Organization for Security and Co-operation in Europe (OSCE), Russia, Ukraine, and observers from the United States and the European Union [8]. Moldova, in its arguments, has pushed toward stronger environmental protections and shared governance over the river. At the same time, Transnistria, backed by Russia, resists external regulations, viewing them as a threat to its sovereignty.

Energy security crisis: the Dniester River during Ukraine's War

Russia's large-scale invasion of Ukraine in 2022 has further complicated the management of the Dniester, rekindling security concerns in Moldova and threatening critical infrastructure along the river. Hydroelectric power stations have become strategic military targets for Moscow. Since the start of the conflict, four of the nine Ukrainian hydroelectric power plants located on the Dnieper and Dniester rivers have suffered major destruction, depriving millions of people of electricity.

Moldavia, which relies both on energy supplies from Ukraine and on electricity generated by the flow of the Dniester, was directly affected. Moreover, until recently, the country had been heavily dependent on Russian gas, supplied via Ukrainian territory. The interruption of this supply, as of January 2025, led to major shortages, particularly in Transnistria, prompting Chisinau to declare a state of emergency in the energy sector.

The conflict has also had serious environmental consequences on Ukrainian rivers, including the Dniester: the destruction of infrastructure on the river's banks has led to water contamination, disruption of ecosystems, and increased threats to biodiversity. The bombardment of industrial sites close to the river caused chemical leaks, further degrading water quality. This damage has had a direct impact on local agriculture and access to safe drinking water.

The difficult path to Dniester's cross-border cooperation

Cooperation between Moldova and Ukraine for the management of the Dniester River goes back to 1994, when both countries signed an agreement on the shared part of the water on the border. This agreement did not yield the desired results because it failed to consider the ecosystems and stakeholders. Even if it is still applicable today, it was complemented by an agreement signed in 2012 by both countries on the protection and sustainable development of the Dniester River basin. The negotiation for this agreement began in 1999, following a first refusal by Ukraine. It was lengthy process, marked by years of lobbying and international cooperation between NGOs, the OSCE, and UNECE, aimed convincing Ukraine of the benefits of transboundary basin cooperation. Since 2012, the Commission created for this agreement has been able to implement and develop strategies for analyzing the Dniester basin and develop new "Rules for reservoir operations in the Dniester Hydropower Plant Complex."

In 2024, both countries signed a cross-border environmental cooperation agreement to align with the Espoo Convention. This international treaty aims to ensure that environmental concerns are considered in the early stages of planning large infrastructure projects that may affect neighboring countries through Environmental Impact Assessment (EIA). Under the

convention, each country should notify and consult its neighbor when planning projects with potential transboundary environmental impacts.

Despite this commitment, Moldova has expressed its concern about Ukrainian plans to extend the Dniester hydroelectric complex, which it considers insufficiently assessed from an environmental point of view. Chisinau fears that the reduced river flow will compromise downstream agriculture, biodiversity, and drinking water supplies.

At the same time, Russia's aggression against Ukraine has diverted Kyiv's attention from environmental issues related to the Dniester River. Funding originally earmarked for ecological cooperation was redirected to the war effort, rekindling diplomatic tensions between the two countries. Further collaboration will now depend on political and economic factors, including the prospect of Moldova joining the EU. Ukraine, which controls most of the river's course, retains a dominant position that hampers balanced cooperation. However, post-war reconstruction efforts and foreign investment could boost basin rehabilitation, improve wastewater treatment, and reduce environmental risks.

Mapping the future of the Dniester River's sustainability

The future of the Dniestr will depend, therefore, on the ability of the parties to strengthen their bilateral cooperation, progress towards European integration, and secure international support.

The river's long-term sustainability will require rigorous water management policies, investment in ecological rehabilitation, and compliance with international environmental standards. To preserve the Dniester, Moldova and Ukraine will have to place ecological sustainability above short-term economic profit, when geopolitics allows. Transparent governance, inclusive decision-making involving stakeholders, and a real commitment to shared responsibility will then be essential to guarantee the future of this river for generations to come.

Thumbnail: The Dniester River near Zhvan – Ukraine (Wikimedia Commons/Kacurovska)

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