

HYDROPOWER ON DNIESTER AND THE NEEDS OF THE RIVER ECOSYSTEM: ROOM FOR IMPROVEMENT IN THE FRAME OF BILATERAL TRANSBOUNDARY WATER COOPERATION

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Abstract. The article analyses the real impacts of the Dniester Hydropower Complex on the Dniester River low stream ecosystem and estimates in what scale the authors of the new Operational Rules of the Complex recently adopted by Ukrainian side, solves the issue of negative impacts. It is demonstrated that, despite long-term draft discussions, the new Operational Rules have almost no provisions directed to soften the negative impacts. It is also noted that the format of negotiations on improving the management of water and related resources of the Dniester River is not equal today, and the interests of hydropower dominate over the interests of other stakeholders, and this applies not only to relations between the two riparian countries, but also to stakeholders within Ukraine. The loss of ecosystem services as an outcome of hydropower development should be taken into account. To improve the situation, such format of bilateral cooperation should be revised in favour of the equality of riparian countries and interests of stakeholders. The involvement of the European Union in the water cooperation on the Dniester would be useful.

Keywords: hydropower, Dniester River, ecosystem, impact, ecosystem service.

Rezumat. Hidroenergetica pe Nistru și necesitățile ecosistemice ale fluviului: posibilități pentru îmbunătățirea în cadrul cooperării bilaterale transfrontaliere. Articolul analizează impacturile reale ale Complexului Hidroenergetic Nistean asupra ecosistemului cursului din aval al fluviului Nistru și estimează în ce măsură noul document tehnic unilateral adoptat de partea ucraineană soluționează problema impactului negativ. Este demonstrat că, în pofida discuțiilor de lungă durată, regulamentul elaborat nu are aproape nici o prevedere care ar contribui la atenuarea efectelor negative. De asemenea se remarcă faptul, că formatul negocierilor privind ameliorarea gestionării apei și resurselor fluviului Nistru nu este actualmente imparțial, iar interesele hidroenergeticii prevalează asupra intereselor altor părți interesate, și acest lucru se referă nu numai la relațiile dintre cele două state riverane, dar la părțile interesate din Ucraina. Pierderea serviciilor ecosistemice ca urmare a dezvoltării hidroenergetice necesită a fi luate în considerație. Pentru a ameliora situația, un astfel format de cooperare bilaterală cere revizuire în favoarea egalității dintre țările riverane și satisfacerii intereselor tuturor părților interesate. Ar fi benefică implicarea Uniunii Europene în procesul cooperării transfrontaliere pe Nistru.

Cuvinte cheie: hidroenergetica, fluviul Nistru, ecosistem, impact, serviciu ecosistemic.

The Dniester River has been regulated since the 1950s, when the Dubăsari hydropower plant was built on it. During the 1980s, the Dniester hydropower complex was mainly built upstream in Ukraine on the border with downstream Moldova, consisting of a large Dniester reservoir and HPP-1 in Novodnistrovsk, to its downstream - a buffer reservoir with a dam, on which, in 1999-2001, three hydroelectric turbines were installed, and finally, the Dniester hydroaccumulation pumping plant on the right bank of the buffer reservoir, where four of the planned seven hydroelectric units are currently operating, and its task is to accumulate energy from nuclear power plants in Ukraine and produce energy during peak periods of its consumption. The remaining three uninstalled generators are being completed.

The officially formulated tasks of the Dniester hydropower complex (DHPC) were not constant in the operational rules, but over the course of 37 years they evolved depending on political and other factors as follows below.

According to the Operational Rules for the functioning of the DHPC, approved in 1987 (***. OPERATING RULES, 1987), its main tasks were:

- provision of compensating releases of water supply, irrigation and navigation in the area from the Dniester complex hydroelectric complex to the river mouth,
- power generation, and
- flood control.

The draft revised ***. OPERATING RULES (2011) did not set the objectives of the Hydropower Complex.

The main tasks of the reservoirs of the Dniester cascade, according to the draft ***. OPERATING RULES (2017), were:

- flood control by using a flood control tank in the Dniester Reservoir to cut off floods;
- electricity generation at HPP-1, HPP-2 and Hydropower Accumulation Pumping Plant (HAPP);
- provision of compensatory releases for water supply, irrigation and navigation on the Dniester section from the Dniester hydroelectric complex to the mouth;
- ensuring the nature protection function of the cascade by increasing the water content of the Dniester during an abnormally dry period by regulating the flow;
- stable supply of water to downstream settlements and enterprises.

The main tasks of the reservoirs of the Dniester cascade, according to the ***. OPERATING RULES approved in 2022 by the order of the minister of environment, are:

- reducing the negative impact of the harmful impact of waters due to cutting off floods;
- providing water to downstream settlements and enterprises;
- providing compensatory releases for water supply, irrigation and navigation on the Dniester section from the Dniester hydroelectric complex to the mouth;
- electricity generation at HPP-1, HPP-2, and HAPP;
- ensuring the nature protection function of the cascade by increasing the water content of the Dniester by regulating the flow.

As we can see, power generation never officially ranked first in the priorities of this expensive project, but dropped from second to fourth place as the new version of the Rules was worked out. At the same time, it is no secret to anyone that it is the generation of electricity in the post-Soviet period that is the main task of the hydropower complex, and the economic importance of this task has increased significantly in recent years, and therefore we will try to demonstrate that in the name of this goal, most of the other tasks were partially or completely ignored.

At the same time, the task “to ensure the environmental protection function of the cascade by increasing the water content of the Dniester River by regulating the flow”, objectively occupying the last place, was initially formulated quite primitively and does not reflect the full complexity of the impact of the hydropower complex on the underlying aquatic and near-water ecosystem.

As is known, the estimates (BACAL, 2022), also carried out within the framework of the transboundary GEF project on the Dniester, as well as many earlier and later studies (ZUBCOV, 2007; ***. ANALYSIS, 2019, COROBOV et al., 2021), have shown a variety of impacts of the Dniester hydropower complex on the ecosystem and biota of the Lower Dniester. At the same time, the losses of some ecosystem services were also economically estimated (COROBOV et al., 2020) to millions of dollars per year.

Among the main, undoubted impacts, the following should be noted:

- a sharp decrease in the solid runoff of the Dniester in the entire section downstream of the hydropower complex;
- significantly lower water temperatures in comparison with natural ones, water temperatures in the downstream of HPP-2 during the warm period of the year, causing a delay in biological processes and reformatting of ichthyocenosis with the loss of many autochthonous species of fish and invertebrates;
- cardinally higher transparency of water entering the downstream of HPP-2, which leads to an abundant development of higher aquatic vegetation and algae, which, when dying, cause secondary pollution and silting of the downstream of the Dniester, including pebble spawning grounds for fish;
- hydro-peaking (intraday fluctuations in the water level in the river) as a result of uneven releases from the buffer reservoir;
- disruption of natural flow and segmentation of the watercourse, making it impossible for aquatic organisms to migrate along the river;
- a rather arbitrary mode of spring ecological release and its actual observance by releases from the Dniester reservoir to optimize fish spawning.

Factors that the Operating Rules could influence in order to reduce the negative impact on the ecosystem and biodiversity include the following:

Significant difference of water temperature comparing with natural one. Since the Dniester HPP-1 takes in the cold lower bottom layer of water, in the medium and long term, one should think about its restructuring in order to use the upper layer of water, which has a natural temperature due to contact with the atmosphere. This is not a cheap solution, but it is technically feasible and important, given the cost of lost ecosystem services while maintaining the current situation. Such intentions are not reflected in the new ***. OPERATING RULES (2022).

High transparency of water compared to the natural one, as a result of the water intake of HPP-1 from the lower layers, causing abundant overgrowth of the underlying stream with algae and higher aquatic vegetation, which, when dying off, causes secondary pollution of the river and abundant siltation of both the pebble bottom and sandy beaches. The problem is technically solvable simultaneously with the previous one in the same way if there is political will.

Hydropeaking, i.e. significant intraday fluctuations in the water level below HPP-2 as a result of uneven flow. Technically, the issue can be easily solved by establishing and observing limits on fluctuations in intraday releases from the buffer reservoir through HPP-2. This will lead to some not very significant losses in the production of electricity, and it is precisely in this issue that the possibility of a compromise lies hidden, ignored by the authors of the ***. OPERATING RULES (2022), which could, as suggested by the Moldovan Party, ensure a uniform intra-day flow of water from the buffer reservoirs. It should be noted that the Rules of 1987 established that "the Buffer reservoir is designed to equalize releases from the Dniester reservoir during daily and weekly regulation of the power of the HPP". Moreover, from the final document, in comparison with the one proposed for consultations in October 2021, in general, the mention of the mode of operation of HPP-2 disappeared. The unwillingness of the authors to concede even in small things is a characteristic feature of this document. Obviously, after the level of the buffer reservoir rises, the effect of hydropeaking will increase significantly, because a larger level difference will make the possibility of obtaining more energy from HPP-2 even more attractive.

Impact on the volume of water runoff. The annual flow of the Dniester has decreased. It was demonstrated that this happened not only due to climate change, but also as a result of the impact of the Dniester hydropower complex [9]. Finally, it can also be noted that the total annual flow of the Dniester continues to decline, incl. in 2016–2019 up to 8.72 km³, in Bendery. If one looks at the last 10 years (2010–2019), then during this period the average annual runoff was already 7.64 km³ against 10.22 km³ in 1951–1980. and 9.15 km³ in 1991–2015. The accumulation of water in the reservoirs of the Dniester hydropower complex has led to a decrease in the annual flow of the Dniester by more than 6% at the nearest hydrological station downstream of the dam and by about 9% in the Lower Dniester. Finding out the causes of these losses could help to avoid or reduce them in the future.

Spring ecological release. The Rules establish the maximum size of the spring ecological release with a water flow rate of less than 75% - no more than 700 m³/s, and with a water flow rate of 75% or more - 300-400 m³/s. Obviously, such figures of releases do not meet the needs of the ecosystem of the lower reaches of the Dniester, where the wetlands of international importance of the two countries are located, since they do not provide proper flooding of breeding areas for fish and birds.

The current practice of establishing the eco-release regime in advance, before the appearance of a clear picture of the dynamics of spring temperatures, contributes to the premature useless waste of water accumulated in the Dniester reservoir. The lack of water for releases is also facilitated by the practice of early water discharge from the Dniester reservoir, in February-March, which does not allow to accumulate the volume necessary for a high-quality release.

Aspect of bilateral cooperation on the Dniester when developing and adopting the *. OPERATING RULES (2022).** The rules approved by the Ukrainian Party in 2022 were adopted as a result of more than 13 years of discussion with the Moldovan Party, first under the Dniester-2 and Dniester-3 projects, and then during the GEF Dniester project and meetings of the Dniester Commission and its working groups.

Moreover, in the same years, within the framework of the meetings of the bilateral Commission on Economic Cooperation, a draft intergovernmental agreement on the functioning of the Dniester hydropower complex was discussed, which the Ukrainian hydropower industry needed in connection with the need to strengthen the Moldovan section of the right bank before raising the level of the buffer reservoir. The stumbling block was Article 6 of the draft, devoted to environmental problems that arose in connection with the operation of the hydro complex. In turn, the Ukrainian side was required to obtain a long-term lease of 19,22 hectares of Moldovan territory along the right bank. As of April 2023, neither of the sides had not conceded to each other for any issue. It was assumed that the Operating Rules on the functioning of the Dniester hydroelectric power station would become part of the Agreement, but with the current content of the Rules, mutual approval of such a decision is very doubtful.

When discussing the Operating Rules, the proposals of the Moldovan side were very rarely taken into account, and as a result, we received a document reflecting the interests of the hydropower industry of Ukraine, and not neighbouring countries, and other stakeholders of both countries of the basin, as well as the ecosystem of the river. As an indirect formal index of trends in taking into account the cross-border aspect, we can cite the frequency of the use of the word “Moldova” and its derivatives in four documents. So, in the Rules of 1987, this word (“Moldova”, “MSSR”, “Moldova” and derivatives) is mentioned 11 times; in the draft Rules of 2011 - 186 times; in the draft Rules of 2017 - 18 times, and in the approved Rules of 2022 - 2 times.

Aaron Wolf and co-authors (WOLF et al., 2005) note that unilateral actions in the field of transboundary waters can increase tension and regional instability, which will provoke problems that require years after years or even decades to be resolved.

The European Union in response to the Eco-TIRAS appeal (letter dated April 6, 2017, signed by Lawrence Meredith, Director of the Neighbourhood and Enlargement Negotiations) noted: “... *The European Union believes that any program for development of energy in Ukraine, including development of hydro-power, should undergo a Strategic Environmental Assessment, and that European Impact Assessments are needed for individual hydro-power plants, taking into account cumulative and trans-boundary impacts. Implementation of the Environmental Impact Assessment Directive is also part of the Energy Community requirements. It is also important to consider the impact of hydro-power plants on the water bodies, in line with the Water Framework Directive. There is already existing EU assurance to Ukraine related to the implementation of the Association Agreement. I want to assure you that the importance of sustainable investments is regularly discussed as part of the dialogue within the EU-Ukraine Association Agreement as well as with other partner countries, and with European financing institutions, with a view to seeking sustainable solutions and coherence between energy, climate, and environmental policies*”.

When this letter was written, dedicated to the lack of SEA in the adoption of the governmental Program for the development of hydropower in Ukraine until 2026, the EU had not experienced energy shortage problems yet. It was also known that the Dniester hydropower package project was conceived to a large extent before Ukraine became a Party to the Espoo Convention and signing commitments to the EU. Because of this, the hopes expressed in this letter no longer had a legal basis.

Today, when the EU countries are seized by the fear associated with the lack of energy, hopes that it might become a political force capable of influencing the hydropower policy on the Dniester towards its sustainability are more than illusory. However, in 2012, Moldova and Ukraine signed the bilateral intergovernmental ***. TREATY (2012) on cooperation and sustainable development of the Dniester River basin, and the river basin commission operates within the frame of this treaty. It should play a role in the platform for further negotiations.

CONCLUSIONS

It seems that, in further cooperation, both parties should be more prepared for mutual compromises based on the equalization of interested parties in their rights to take into account interests on the principle of equality and reciprocity and in such a way that the needs of the current generation are satisfied without compromising the ability of future generations to satisfy their own needs, as proclaimed by the ***. UNECE Water CONVENTION (1992). The problem of causing significant damage to the ecosystem of the river needs to be addressed, and the sooner the better for both peoples of the riparian countries. Today, it is quite difficult for both countries to yield in their environmental interests and ecosystem services, given the corruption, insufficient transparency of decision-making processes, and their strong traditions. Such elements are valuable for the vast majority of the population and it is difficult for them to be exchanged for the economic benefits of individual structures, as well as traded when solving political and economic problems. The dispute is difficult to solve during the ongoing war, but a mutually acceptable decision should be found by the revision of Operational Rules in the coming period so that both peoples could use the benefits of the Dniester River ecosystem services. The involvement of the EU as a Party in the Moldova-Ukraine bilateral Dniester River treaty could have a positive impact on the efficiency of transboundary water cooperation.

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