

How and why should the Governments of Moldova and Ukraine suspend and amend the Strategic Action Program for the Dniester River Basin for the years 2021-2035?

Eight small amendments that can prevent tremendous costs.

Policy Brief

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| | |
|--|----|
| CONTENTS..... | 3 |
| INTRODUCTION..... | 4 |
| 1. The limited analytical background underlying the Program..... | 5 |
| 2. Selective inclusion of European Directives in the Program..... | 6 |
| 3. Forests and afforestation - the weakest link of the Program..... | 9 |
| 4. Climate change - a real but one-dimensionally discussed factor..... | 11 |
| 5. Hydraulic constructions..... | 13 |
| 6. Green infrastructure vs. gray infrastructure | 15 |
| 7. Compensation mechanisms | 16 |
| 8. The hasty signing and legality of the Transnational Program..... | 19 |
| RECOMMENDATIONS..... | 19 |
| CONCLUSIONS..... | 21 |

INTRODUCTION

On March 31, 2021 the Strategic Action Program for the Dniester River Basin for 2021-2035 was signed. The signature of this document was announced by the Ukrainian Deputy Minister of Environment Mihailo Horev via Facebook and countersigned by the Secretary of State on Environmental Issues in the Republic of Moldova, Ghenadie Iurco.

Although such a Basin Program was necessary, as it is a common practice in the governance of river basins at European level, especially after the European Parliament voted the Water Framework Directive 2000/60/EC, signing the Program focused on Dniester River was made in a hurry, with many shortcomings and inconsistencies that will cost Moldova high social and economic consequences, if this document is not suspended and amended in the near future.

The signing of such a document should be a good lesson for the diplomacy of Moldova and for the Government on how such Programs should not be negotiated and validated taking into account the strategic stake of the Dniester for Moldovan economy, inhabitants and ecosystems. Metaphorically speaking, the Dniester River is the "backbone" of the Republic of Moldova, which became in the past years more than an ecological issue, but a matter of national security. The above-mentioned document, that sets the limits and depth of cooperation in the Dniester Hydrographic Basin is of I importance, at least similarly to the Agreement on the Dniester Hydropower Complex Agreement. The latter has been under negotiation between Moldovan and Ukrainian Governments for several years already.

Preliminary examination of this document highlights few key issues as follows:

- The Program focuses on a single international project, that of the GEF/OSCE and eliminates virtually any other analytical input coming from relevant international projects carried out in parallel;
- Only a formal, selective and limited number of European Directives have been included in the Program, thus insufficiently covering the governance of water bodies and the ecosystems on which they depend;
- Ukraine's afforestation commitments are not commensurate with Moldova's, with virtually no clear commitment of afforestation in the Dniester River Basin of the first;
- Local climate change factors are neither specified nor taken into consideration;
- Ukraine's commitment to cooperate and exchange relevant hydraulic, hydrologic and hydropower information, provided in a timely and sufficient manner to the Moldovan counterpart is absent;
- Investments in green infrastructure are poorly outlined in the Program;
- Compensation mechanisms are completely missing;
- The program was signed in a hurry.

If the above-mentioned gaps are not going to be fixed as soon as possible, the Program is set to become a failure from the very outset. The ultimate cost of these unaddressed gaps will be the continuous degradation of surface and ground water, loss of biodiversity, damage to ecosystems and significant harm to the communities in the Dniester River Basin long before this Program reaches its end in 2035.

We will show what the limitations of this Program are and how to overcome them in the nearest time.

1. The limited analytical background underlying the Program.

As it could be noticed from the website of Dniester Commission, the Program¹ indicates that it will be guided by the conclusions of the Transnational Diagnostic Study, implemented by the OSCE from 2017 to 2020. Limiting the analytical background to the findings of just one international project represents one of the major shortcomings of this Program. In this regard, it should be recalled that in the Dniester River Basin there were several projects implemented that were not taken into account in the past three years.

More specifically, in addition to the *Transnational Diagnostic Study* and a small component dedicated to the impact of Dniester reservoirs and hydropower plants located in Ukraine (HPP-1, HPP2 and Dniester Pumped Storage Plant (DPSP) and Moldova (Dubasari Hydropower Plant) funded by GEF and implemented by the OSCE, there were two other Projects implemented in the same period. More precisely that is the *Environmental and Social Impact Study of the Dniester Hydropower Complex* (Dniester HPC), implemented by UNDP Moldova with the support of the Government of Sweden. In addition, there was a third Project implemented by a consortium of four academic and research institutions from Ukraine, Moldova and Romania called *HydroEcoNex* envisaging the elaboration of a system of monitoring on the evaluation of the influence of hydro energetic constructions and climate change on environmental state and ecosystem services offered by Black sea rivers, Dniester, and Prut rivers. The European Union program “Black Sea Cross Border Cooperation” funded the latter.

It is well known that all three of these projects attracted different national and international expertise, had access to different data sets with different teams, and probably reached different conclusions. Therefore, the Program of Strategic Actions on the Dniester for 2021 - 2035 must include the results, conclusions, and recommendations of all three international projects, not just the recommendations of a diagnostic study or its sub-study limited to hydropower plants.

This omission needs to be addressed urgently, as a single study cannot fully capture and reflect all the existing and probable, indirect, and indirect as well as short, medium, and long-term risks and impacts of this complex hydropower infrastructure.

Last but not least, it is worth mentioning that the Ukrainian counterpart insisted on the eve of the second meeting of the Dniester Commission held in Kiev in April 2019, that in addition to the GEF/OSCE project, the other two projects mentioned above should be also presented (UNDP/Government of Sweden and consortium “HydroEcoNex”). The Moldovan side accepted this proposal, and at the meeting of the Moldovan-Ukrainian Commission dedicated to the Dniester River in Kiev on April 4-5, 2019, the scope, objectives, and expectations of the other two studies were presented by the managers of these Projects in public meetings.

Summing up, it would make sense to have also presented the results and summary of these studies at the third meeting of the Dniester Commission expected to take place in Chisinau on 28-29 October 2021 and to take into account their recommendations for amending the Dniester Strategic Actions Program 2021-2035.

¹ See the English version of the Program of Strategic Action in the Dniester Basin for the period 2021-2035 at the following link https://dniesterc-commission.com/wp-content/uploads/2021/04/joint-statement-signed-4-languages-SAP_Eng.pdf. The Russian version of the Program at the following link https://dniesterc-commission.com/wp-content/uploads/2021/04/joint-statement-and-SAP_Rus-Md-Ukr.pdf

2. Selective inclusion of European Directives in the Program.

This Program does not mention in any way the Association Agreements of Moldova and Ukraine with the European Union neither the environment related commitments of the two countries within the Energy Community Treaty. The Program only mentions that it will take into account the water framework Directive 2000/60/EC, urban wastewater Directive 91/271/EEC; Nitrates Directive 91/676/EEC, Directive 80/778/EEC on the quality of water intended for human consumption and Habitats Directive 92/43/EEC.

What do these limitations involve? With the exception of the Habitats Directive, all the other Directives are targeting the issue of water quality and indirectly the problem (or non-existence) of the Moldovan town of Soroca of wastewater treatment plant² (despite the fact that there are similar problems in the towns of Moghilev Podolsk or Iampol, located on Ukrainian bank of the River Dniester). Other towns and communities located along this transnational waterway have similar difficulties. At the same time, mentioning the Nitrates Directive limits the sources of pollution of Dniester to chemical fertilizers used in the agricultural sector, although the sources of pollution on Dniester and number of European Directives that could potentially offer the framework to address them is much larger.

Is the above-mentioned approach comprehensive? Certainly not. The problems of the Dniester River are not limited to water quality, but especially to the water quantity, the way this amount and the water flow in the River is managed and the subsequent pressures on ecosystems, economic needs and communities arising from poor management.

Therefore, the block of European legislation mentioned above should be complemented by an additional block of Directives that exist in the international commitments of Moldova and Ukraine through the Association Agreements and the Energy Community Treaty. These additional Directives should guide, prevent, and reduce the wider range of problems and risks that exists in the Dniester River Basin.

What are the Directives in the Association Agreement to EU of Moldova and Ukraine that should complement this Program and why should they be included in this document?

- Directive 2011/92/EU on the assessment of the effects of public and private projects on the environment. Throughout the Dniester basin, there are numerous objects with a transboundary impact, the construction or extension of which requires the assessment of environmental impacts. This Directive has been amended several times and contains the framework and elements for conducting environmental impact assessments in a clear, detailed, uniform manner. Avoidance of this Directive from the Program till 2035 is obviously unreasoned. This Directive (known initially as Directive 85/337/EEC) was recommended for Sava River Basin Management Plan.³
- Directive 2007/60/EC on flood risk assessment and management. It is not clear how the two states will fight floods by not applying the relevant provisions of this Directive for this purpose, considering that the word "flood" is mentioned at least 26 times in the Program until 2035 and their probability in the coming years will increase.

² World Bank announced in 2021 that it will allocate funding to rehabilitate the sewage system and build the treatment Plant of this town <https://jurnalist.md/2021/09/01/statia-de-epurare-a-apelor-uzate-va-fi-construita-la-soroca-pana-in-2025/>

³ Please see Sava River Management Plan

http://www.savacommission.org/dms/docs/dokumenti/srbmp_micro_web/srbmp_approved/sava_river_basin_management_plan_approved_eng.pdf

- Directive 2008/98/EC on waste. This Directive is not limited to households or municipal waste, which is enshrined in the text of the Program until 2035. This Directive implements a wider waste hierarchy and in accordance with the "polluter pays" principle requires that the costs of disposing of waste to be covered by their holder. Therefore, fencing this Directive in the Program does not have a justification.
- Directive 2009/147/EC on the conservation of wild birds. There are at least 2 wetlands of international importance on the Moldovan side of the Dniester basin and protected areas. Similarly, there are several Ukrainian wetlands and protected areas in the Dniester Basin that are populated by numerous species of wild birds, some of them included in the Red Books of both states. Dniester Basin represents an important migration corridor for these species.
- Directive 96/82/EC on the control of major-accident hazards involving dangerous substances. The Annex of this Directive contains the set of substances that cause industrial accidents and the obligation to notify states that are affected in a cross-border context. Considering the existence of large number of objects in the Dniester basin (particularly upstream on the Ukrainian side of Dniester River Basin) with an increased risk of cross-border accidents, circumvention of this Directive is also unjustified. Some of these accidents actually occurred in the recent past.⁴
- Directive 2003/35/EC establishing public participation in the development of environmental plans and programs. In recent years, there has been a constant battle for the voice of the public and the communities in the Dniester River Basin to be heard. The inclusion of this Directive in the Program would institutionalize a practice so that the voices of these communities should be heard at least from now on.

At the same time, it is worth mentioning the logic and the block of European Directives on environment included in the Energy Community Treaty, whose signatory members are Moldova and Ukraine, and which have direct relevance for the way water resources are managed in a basin and transnational context:

- Directive 2014/52/EU on the evaluation of the effects of certain public projects. Since the accession of Moldova in 2010 and Ukraine in 2011 to the Energy Community Treaty, this Directive has been amended twice. It was initially known as Directive 85/337/EC, and later amended by the newer Directive 2011/92/EU before reaching the current state. Throughout this period, this "bible" of environmental governance at Community level has not been included in any transnational cooperation plan in the Dniester basin. Similarly, it has not been considered by any major project with a cross-border impact affecting water resources in the Dniester.

This Directive, be it the initial or updated formats, was not even mentioned in the 2012 Treaty of Rome between Moldova and Ukraine on the protection of Dniester basin. In this context, it should

⁴ For example the dam of a tailing dump with potassium waste could not withstand the pressure of "dead water" at around 4.5 million cubic meters reached Dniester in 1983. The vacated tailing dump hit Odessa before crossing all the Moldovan segment of Dniester. See <https://zn.ua/ECOLOGY/chernobyl.html>

be recalled that the negotiation and pre-accession period of Moldova and Ukraine to the Energy Community from 2006 to 2009 corresponded to the implementation period of the Dniester 1, Dniester 2 and Dniester 3 projects⁵, from 2004 to 2011 which actually prepared the signing of the Treaty of Rome. There would certainly have been room and justification for the inclusion of this Directive in the Treaty of Rome.

The sabotage of the application of this Directive in cross-border cooperation by the Ukrainian side and the passive reaction of Moldova is taking place at the expense of the welfare and interests of communities, people, and ecosystems in the Dniester basin area. This omission should be addressed by including this Directive in the Strategic Action Program in the Dniester River Basin by 2035. Be it under the older format of 2011, or the more recent one of 2014.

- Directive 2004/35/EC on liability, prevention, and remediation of environmental damages. The Dniester Strategic Program until 2035 does not establish the mechanisms for prevention, liability and compensation for damages caused by anthropogenic activities in the Dniester river basin in transboundary context. Even if there would be compensating mechanisms for activities that cause damage in the national legal space of Ukraine and Moldova, there is no such mechanism for activities with cross-border impact in a basin wide context. Likewise, there is no such mechanism covering the operation of large projects that extend to the territory of both states and may have cross-border impacts. Without such a mechanism, pollution and damage with cross-border impact will not be discouraged.

This Directive clearly sets out the directions for compensation: repairing damage to water, species, protected natural habitats and repairing damage to soil. The areas of coverage, however, could be supplemented by other affected categories that are not included in the Directive such as population and economic agents, taking into account that the Dniester River Basin is a densely populated area characterized by an intense economic activity.

The Environmental Damage Directive entered into force on 1 January 2021 in the Energy Community. From this point of view, it is difficult to understand why both Moldovan and Ukrainian Governments disregarded it, taking into account the fact that at the date of signing the Dniester Program 2035 it was already in force. The position of the Secretariat of the Energy Community on this omission is also unclear.

- Directive 2001/42/EC on the assessment of the effects of certain plans and programs on the environment. Article 7 of this Directive clearly explains that in the case of Plans and Programs with a cross-border impact, the affected party is also consulted, including the public in the affected country. Omission of this Directive is as minimum surprising as the Dniester River Basin for the period 2021 - 2035 will certainly not be devoid by development Plans and Programs.

⁵ See the web page of United Nations Economic Commission for Europe in regard to Dniester Projects at <https://unece.org/environment-policy/water/areas-work-convention/projects-eastern-europe>

- Directive 79/409/EEC on the conservation of wild birds. See the comment above on Directive 2009/147/EC.

In addition to the European legal framework mentioned in the two treaties above, it should also be specified that the Program is also lacking reference to the Directive 2006/118/EC on the protection of groundwater, even if the protection of groundwater is one of the tasks of this Program.

Summing up, the Programs and Basin Action Plans should not be limited to the European Water Directive 2000/80/EC. This Directive provides only the background and the general framework for cooperation in the basin context. The set of European legislation, regulations, and policies relevant to the protection of water and ecosystems that depend on this resource is much wider. To this end, European States signing river basin level programs or action plans are free and should include any other relevant Directive aiming to remove, mitigate and reduce the pressures and risks looming over transboundary bodies of water. Without the set of Directives suggested above, the Dniester Strategic Action Program remains a cumbersome and formal document which essentially is not touching and is not aiming to solve the most pressing environmental, economic, and societal challenges of Dniester River Basin.

3. Forests and afforestation - the weakest link of the Program.

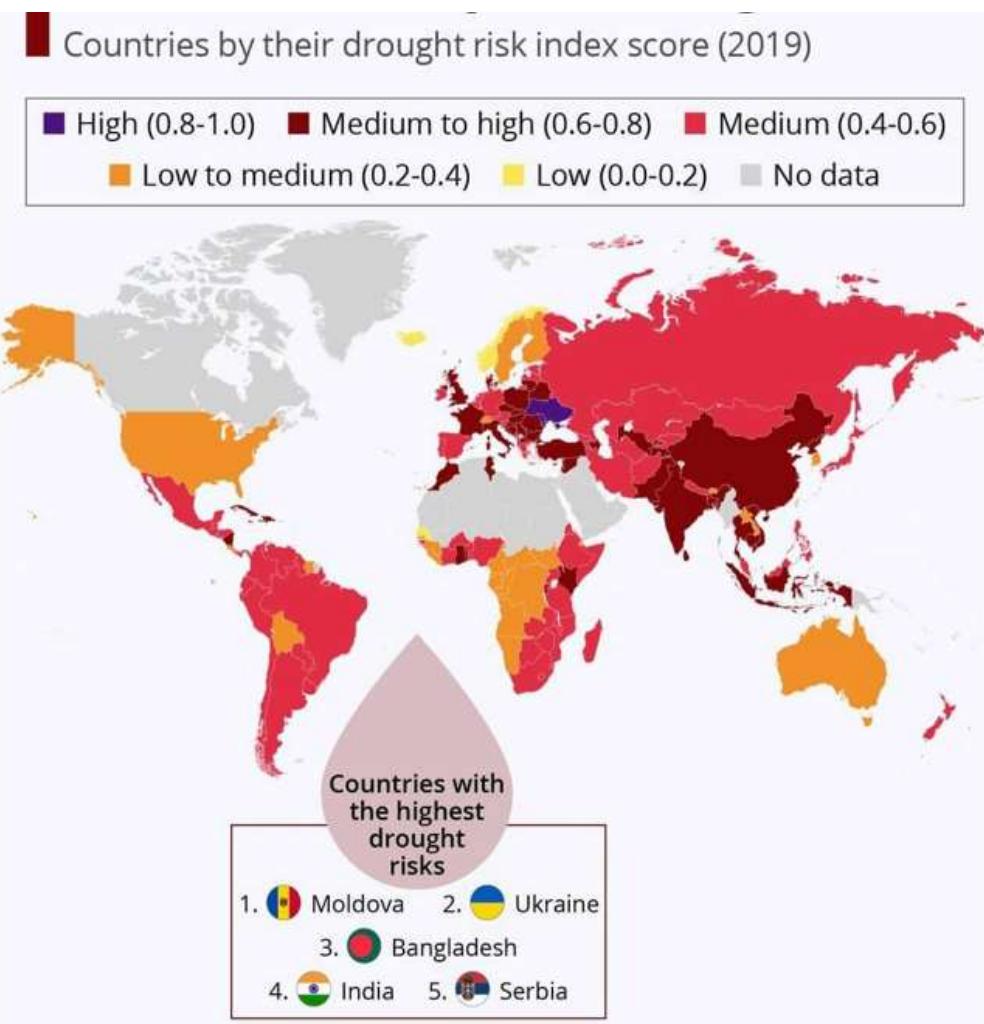
The subject of afforestation of the Dniester Basin area is among the major lapses of the Program if not the weakest link. Basic indicators such as the number of planted trees (millions or billions) or the area of planted trees (number of hectares) with specific short (5 years), medium (10 years) and long-term (up to 15 years) targets by 2035 are simply missing.

If on the Moldovan side the commitments seem clear, then on the Ukrainian side, the Government of Ukraine does not make any clear commitment to afforest the Dniester Basin on its territory.

Mitigating climate change impacts in the Dniester river basin without a massive afforestation plan would be an impossible mission. Nor can it be about conserving aquatic resources, preventing floods, and mitigating the effects of droughts without stopping large-scale deforestation in the Ukrainian Carpathians. It is known that up to 80% of the volume of surface waters of the Dniester is formed in the tributaries of the Dniester located on the Ukrainian segment of the River (in the Upper and Middle Dniester). The effect of massive deforestation in this country was most recently illustrated by the massive floods during the spring and summer of 2020 that affected large communities and areas in the Western part of Ukraine.

According to World Resources Institute, Moldova and Ukraine are the most affected countries by drought in the world. As it can be noticed in the Figure 1, excluding Sub-Saharan Africa and Canada, globally in a top 5 countries affected by drought, Moldova ranks 1st, Ukraine ranks 2nd, Bangladesh ranks 3rd, India ranks 4th and Serbia ranks on the 5th place. Estimations were conducted based on past drought intensity, water stress, drought vulnerability, population, crop, and livestock density.

Figure 1. The World map of drought risk



Source: Aqueduct by World Resource Institute

What are the implications of a lack of commitment and clear indicators of afforestation on the part of Ukraine?

In the scenario that at some point in the future Moldovan and Ukrainian Governments will sign the Agreement on the operation of Dniester HPP, which is a major point of disagreement between Governments of each country. Even if the Agreement will stipulate the figure for the water flows reflecting the minimum water needs for the survival for the ecosystems, local communities, and economies downstream to the HPP-2 (part of Dniester HPC) this flow will not be able to be released by the Ukrainian side. This flow was determined by different studies ranging from 130 m³/second as a minimum permanent water flow below which the ecosystem of Dniester gets destroyed. For the same purpose a few weeks peaking 800 m³/sec spring flow in order to replicate a natural spring discharge would be needed. Why would these figures be difficult to achieve? For the simple reason that this volume of water will be actually missing. It is well known that forested areas act as an accumulator or as a sponge that stores water during periods of heavy rainfall and other precipitations. The water stored in these periods is later on released during drier periods into the watercourses.

In other words, during periods of heavy rainfall, the forest areas of the Ukrainian Carpathians would have been preventing dramatic floods along the entire upper, middle, and lower reaches of the Dniester while the droughts periods would have been less aggressive as this forest “accumulator” would be ensuring a balanced water flow throughout the entire watercourse of Dniester.

The lack of water volume requested by the Moldovan side can be easily invoked by the Ukrainian side whenever necessary in determining the annual flows within the Ukrainian Interdepartmental Water Commission (with or without Moldova's participation in this Commission) for the segments of the Dniester such as the one located downstream to the Dniester Hydropower Complex.

In summary, the lack of clear indicators for afforestation with clear (short, medium, and long term) targets does not commit Ukraine to anything and does not guarantee Moldova the water flows it will require, even if these water discharges would be scientifically proven.

4. Climate change - a real but one-dimensionally discussed factor.

The Program till 2035 mentions more than 50 times the term “climate change”, thus suggesting in this way that climate change factors would be the main stressors of Dniester River. Even if the climate related factors cannot be neglected the pressures on the ecosystems of Dniester River have first of all anthropogenic roots. Examples in this regard represent the following:

- dams and accumulation reservoirs affect the hydrological regime of the Dniester in longitude and latitude
- faulty operational regime of the cascade of hydropower plants located on Dniester
- massive deforestation in the western part of Ukraine and illegal logging on the territory of Moldova
- contamination of this watercourse with oil products
- pollution with chemicals used in agriculture
- risks associated with chemical deposits located near important tributaries of the Dniester
- untreated waste municipal waters.

Cumulatively, these pressures induced by human activity exceeds in impact of the so-called climate factors.

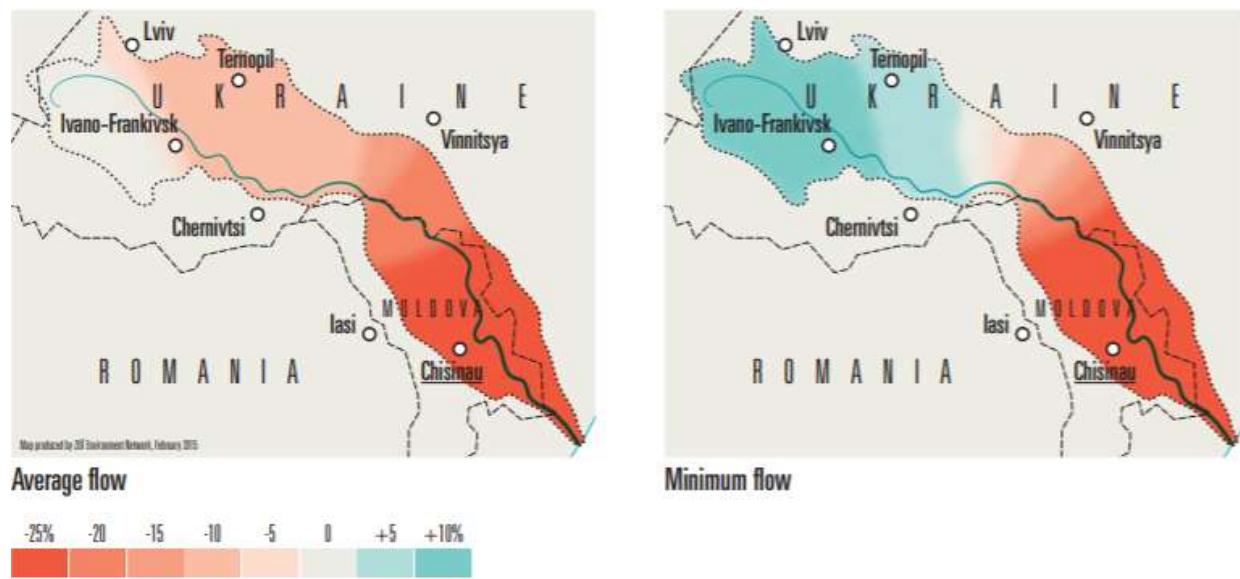
Therefore, precisely these risk factors should be illustrated with more data, quantified, and monitored with clearer indicators and ultimately linked to actions that can lead to measurable change.

Although it does not say directly, the ostentatious wording of the term “climate change” suggests that water resources, forest resources, biodiversity and the Dniester ecosystem as a whole are influenced by global climate change issues. The impact of climate change on Moldova is certain. UN data show that by 2040, the risk of a severe drought in the country will increase by 4.5 times, and by 2080, 2/3 of the water resources available today could dry up⁶. Climate change modelling comparing different periods shows also

⁶ “Republica Moldova este una dintre cele mai vulnerabile țări europene la schimbările climatice, arată rezultatele unui studiu al ONU”, Agora.md, 25 March 2021,
<https://agora.md/stiri/85899/republica-moldova-este-una-dintre-cele-mai-vulnerabile-tari-europene-la-schimbarile-climatice-arata-rezultatele-unui-studiu-al-onu>

that the Moldovan part of the Dniester River Basin will be hit harder with projected run-off changes decreasing by 25% by 2050.⁷

Figure 2 Projected run-off changes in the Dniester basin 2021-2050 vs 1971-2000



Source: Zoinet.org

However, it is necessary to delimit local factors from global factors of climate change. More specifically, it would be needed to scrutinize to what extent local factors amplify the climate change effects. In this sense, what the Strategic Program omits to communicate are two main issues:

- The first* is that the effects produced by climate change on the water resources of the Dniester River Basin are amplified by the accumulation lakes on this River. It is well known that the widening of the water mirror in these reservoirs increases the evaporation factor and ultimately leads to increased water losses. Therefore, it would be more than advisable for the Dniester Strategic Program to clarify the amount of water lost annually by the Dniester as a result of this process.
- The second* issue that was less examined by the projects of the last years in the area of the Dniester Basin is related to the change of the microclimate under the impact of the accumulation lakes and the hydroelectric infrastructure. More specifically, it is necessary to examine and highlight the fact that even the accumulation lakes are triggers of climate change at the local level. Solid climate studies show that the microclimate can be changed by the hydroelectric infrastructure through indicators such as air temperature, precipitation, cloud cover, fog, wind. For example, data examining decades long time series on reservoirs in Russian Federation indicates the influence on the local climate on areas ranging from a few tens of meters to a few tens of kilometers upstream to the accumulation hydropower reservoirs. At the same time the impact distance may reach up to several hundred kilometers downstream of the accumulation

⁷ "Strategic Framework for Adaptation to Climate Change in the Dniester River Basin", Zoi Environment Network, 2015, <https://zoinet.org/product/strategic-framework-for-adaptation-to-climate-change-in-the-dniester-river-basin/>

hydropower reservoirs⁸. Usually, the area of impact is narrowed from North to South. At the same time, research results on 92 large water reservoirs in the United States show that their greatest influence is on areas with Mediterranean and semi-desert climate, and the least impact is felt by areas of humid climate⁹.

Therefore, a second block on climate change related issues in the Dniester Strategic Program should define the relevant indicators and establish the impact on the microclimate and the areas affected by the Dniester HPC downstream and upstream of this infrastructure.

In conclusion, the emphasis on climate change factors in this Program should be focused on the risk factors that can be located, controlled, and prevented by current, recent, and planned socio-economic activities that are well known and less on variables that are vaguely described, difficult to quantify and explain such as global climate change factors.

5. Hydraulic constructions

The Program until 2035 lacks any references to the exchange of information on hydraulic constructions, their operating regime and joint control of Dniester HPC between Ukraine and Moldova. In this sense it is worth noting that Strategic Programs of some rivers in South-Eastern Europe contain specific provisions of cooperation for the exchange of hydraulic information and the mode of operation of hydropower plants between countries located upstream and downstream of these power generation facilities.

For example, in the Action Plan on extended cross-border cooperation of the Drina River Basin, which houses 3 large hydropower plants (CHE Zvornik, CHE Bajina Bašta, and CHE Višegrad) the exchange of hydraulic information is explicitly provided in the Plan.

What is happening in the case of Moldovan-Ukrainian "cooperation" nowadays? With the exception of the draft Technical Regulations for the operation of the Dniester HPC, that was made available for consultations to the Moldovan side in 2017, the Ukrainian side did not make available to the Government of Moldova any other relevant data sets that would bring more light on the impacts produced by Dniester HPC.

In this regard despite receiving at least 3 official letters from the Government of Moldova during 2019 and 2020, the Government of Ukraine neglected and did not provide the requested information. The requests related to detailed hydraulic documentation and data sets regarding dams, spillways and other hydromechanical equipment (dimensions, levels of weirs, gates) with the aim of understanding the real configuration of this hydropower infrastructure.

Additional key information aiming for the same purpose was not shared either. This includes the following:

- the works related to the deepening and widening of these lakes in the past 20 years
- the topography of the reservoirs and their adjacent area to understand the water losses and infiltrations produced by these lakes
- the degree of seismicity of the area

⁸ Tatiana A. Tashlykova "Changes in local climate in the neighbourhood of the Ust-Ilimsk water reservoir on the Angara, Russia", University of Silesia, *Environmental & Socio-economic Studies*, 2013, p.14, <https://sciendo.com/pdf/10.1515/environ-2015-0002>

⁹ Idem

- the bathymetries in the two large reservoirs of CHE-1 and CHE-2

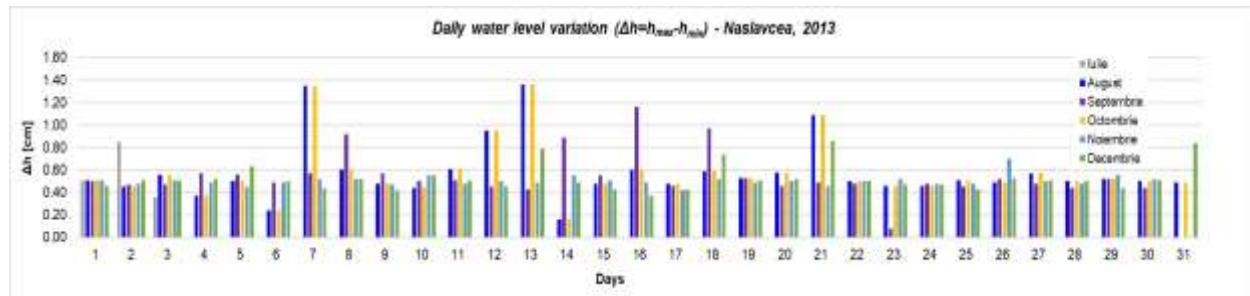
This information would have allowed the development of a hydraulic model to simulate the applicability of the Rules of operation of the Dniester HPC in different seasons of the year so that the Moldovan authorities have a basis for a clearer understanding of the implications and impacts of the future development of the Dniester HPC.

Furthermore, the Ukrainian side did not also provide access to the data on the volume of water discharged in real time (every 15 minutes or maximum every 60 minutes for 24/24 hours) from all three hydropower plants (HPP-1, HPP-2, Pumping Storage Plant). The daily, monthly, and yearly averages are not enough to make credible, sustainable, and final decisions for the analysis and approval of the Technical Rules proposed in 2017.

In the absence of these essential data, it is absolutely unclear what are the grounds of the technical documents, sketches, plans, recent constructions, calculations and simulations subject to which Moldovan side should assess the Technical Rules proposed by the Ukrainian side in 2017.

It is worth noting that even the existing Technical Rules of Operation of Dniester HPC dating back since 1987 are not properly applied by the Ukrainian counterpart. According to the Rules the daily level fluctuations of water in Dniester River downstream to HPP-2 should not exceed 20 cm per day, or 5 cm per hour. For the sake of illustration, we took a sample of daily fluctuations in one year at the hydrometric automated post of Naslavcea, a village located 5 km downstream to HPP-2. Data of the Moldovan State Hydrometeorological Service show that for all year round of 2013 the daily level fluctuations are more than double the value of 20 cm, while for some days the daily fluctuations go close to 140 cm, almost a seven-fold increase from the established thresholds in the Technical Rules of Operation.

Figure 3 Daily water level fluctuations at Naslavcea in 2013



Source: Moldova State Hydrometeorological Service

Bear in mind that in 2013, the Pumping Storage Power Station of Dniester HPC had installed only two turbines out of seven planned. It is fair therefore to assume that once all seven turbines will be installed the sharpness and frequency of daily fluctuations known as hydropeaking will increase. In this regard the consequences and impacts on ecosystems, people, and economy coming from this large hydropower infrastructure downstream to the River are expected to dramatically worsen.

Any long term Program on transnational cooperation in the Dniester River Basin should clearly specify the issue of hydropower as a major risk factor affecting the balance of River ecosystem and indicate a clear mechanism for monitoring, data exchange and ways to mitigate these stress factors.

6. Green infrastructure vs. gray infrastructure.

With the exception of afforestation commitments of Moldova, the Program is not very clear about the green solutions and infrastructure it proposes. With the exception of the sentence from the Joint Statement of the Program that “the ecosystems of the Dniester will be restored” and the reference to a secondary measure in the Water Framework Directive related to “restoration and rehabilitation of wetlands”, the Program does not contain any details, examples or indicators related to green infrastructure investments.

The program does not describe at least the general state of play of freshwater protected ecosystems, including explicit references to the conservation status of habitats or species. The quantity and quality of water required to obtain a good condition are not defined. Similarly, the gaps in the current management of the working condition in the Dniester River Basin are not identified.

The Program does not identify the freshwater ecosystems that will benefit from the restoration. The Program does not list the ecological restoration priorities and the criteria on the basis of which these priorities will be listed.

The Program does not indicate a final target for 2035 (e.g. number of km or km²) of freshwater ecosystems to be restored, addressing different types of ecosystems (e.g. rivers, floodplains, lakes, estuaries, etc.). The program also does not refer to intermediate targets (e.g. 2025, 2030) or to even more restricted targets. Indicators such as the quantity and dynamics of water flow, structure and substrates of riverbeds are not defined in the monitoring of this Program.

These shortcomings should be clarified at early stage of the Program as they represent the starting point for the reconstruction and green investment. Good practices and “green” technologies left long time ago the stage of laboratory testing or scientific research and are currently widely applied in the restoration of floodplains of rivers, forests, wetlands, and other applications associated with sustainable water management.

For example, in order to reduce the impacts of floods, the green infrastructure requires the planting of vegetation in the area of river springs and further on downstream to riparian areas to reduce heavy water washing and erosion. Green investments also include floodplain plantings. By comparison, “gray” infrastructure options include strengthening of riverbanks, dredging rivers and house elevation from the ground level.

The Dniester Strategic Action Program 2021-2035 says what the Water Framework Directive contains, offering some options that could be considered as green investments. Nevertheless, the Program does not say what the de facto investments will be. In addition, in the case of some “gray” investment options such as “desalination plants”, represents fancy options that are not grounded in the realities of countries like Moldova due to the extremely high cost, and also because Moldova lacks access to the sea or other large water sources that are basic prerequisites for such capital and energy intensive investments.

The results of green investments in other states illustrates that in almost all circumstances ecological rehabilitation options through “green” infrastructure have proven to be more cost-effective than “gray” infrastructure (e.g. engineering solutions). In other words, grass, vegetation, and trees are preferable to pipes, turbines, and concrete. For example, when considering both the damage avoided by floods and the benefits of ecosystem services provided by green infrastructure, green options have generally had net

present values (e.g. the value of all net benefits over time, expressed in the value of money in the present) were positive and superior to gray options.¹⁰ The example of Fiji indicates that planting riparian buffers was the most cost-effective option, with cost-benefit ratios of up to 21.6; afforestation of upper catchments providing the greatest absolute net benefits, even if they were achieved at significant costs.¹¹ This is just one example of many others that could be applied in the claimed interventions of this 15-years long Program.

At the same time, investments in green infrastructure may mitigate the effects of droughts, aridity, water scarcity and desertification, which according to the latest climate modeling will dramatically affect Moldova in the coming years.

The 2035 Program 2035 should therefore be revised, with a clear indication of each signatory's indicators, targets, areas and commitments of both Moldova and Ukraine regarding the green infrastructure investment.

7. Compensation mechanisms.

The Strategic Action Program for the Dniester River Basin for the years 2021 - 2035 refers to the "principles of cost recovery for water or water services. From the table with actions and activities it can be understood that they refer to investments in water treatment necessary for industrial processes and to the wastewater treatment used at municipal level by households. Wastewater treatment in factories and plants is evidently necessary to prevent pollution of water bodies. Similarly, the fact that households should pay or invest individually where there is no centralized water/sewerage service is also an obvious way to go.

Unfortunately, the Program does not refer to the economic principles of "polluter pays" cost recovery. The Program does not mention financing/compensation/restoration of freshwater ecosystems. Neither does the Program mention the compensation and recovery for possible damage to the population, communities and private sector produced by economic activities with cross-border impact.

In this regard, it should be emphasized that there is a series of activities and industries that are intensely polluting the Dniester in the upstream area. These are mining activities (potassium salts, sulfur, gas, oil, building materials, etc.); chemical industries, oil refineries, car factories, food and textile industries. The most polluting of these industries are concentrated in the upper part of the basin in Ukraine (Lviv, Ternopil and Ivano-Frankivsk regions), where the Dniester River collects 70-80% of its flow¹². Other sources indicate 90% of the flow.

In addition to these sources of pollution there are also large landfills for the storage of chemical waste (tailings) located near tributaries of Dniester located on the upper and middle of the Dniester River, located on Ukraine's territory.

¹⁰ Andrew WU "Green versus gray infrastructure: The economics of flood adaptation in Fiji", *Yale Environment Review*, 1 September 2016, <https://environment-review.yale.edu/green-versus-gray-infrastructure-economics-flood-adaptation-fiji-0>

¹¹ Idem

¹² OSCE/UNECE "Transboundary Diagnostic Study for the Dniester River Basin", November 2005, <https://www.osce.org/files/f/documents/4/8/104057.pdf#:~:text=The%20Economy%20Within%20Ukraine%2C%20the%20Dniester%20River%20sustains,oil%20refineries%2C%20machine-building%20plants%2C%20food%20and%20textile%20industries>

The existence of domestic regulatory frameworks at the national level of Moldova and Ukraine that is dealing with these sources of pollution are relevant but not sufficient. These mechanisms should be complemented and framed within a transnational compensation mechanism. In this way, there would be an additional filter of hazard prevention, making liable the operators of these industries and activities, and increasing the safety within the communities of 8 million people inhabiting the Dniester River Basin. This additional filter should represent a cornerstone to discourage the pollution of surface and groundwater in the Dniester. Ultimately this mechanism would bring predictability and confidence between the two states that in the event of unintended incidents the problems that may arise will be clarified in a mutually accepted legal space, with reasonable financial implications proportional to the caused damages.

In the absence of such a mechanism there will be no precautionary behavior and compensation scheme for the accidents and incidents that already took place in the Dniester River Basin in the past years. In this sense it is worth reminding the accident produced in Lviv region (Ukraine) on 14 September 1983 at the mining and chemical plant "Polymineral". At that time, a dam failure that was storing potassium fertilizers accounting over 1.5 million waste entered the Dniester and crossed the Moldovan territory before reaching the mouth of Black Sea, significantly affecting the river ecosystem. As Ukrainian newspaper *Zerkalo Nedeli* noticed "before Chernobyl, it was the largest environmental disaster in Europe".¹³

Later in 2008 due to dam failure waste products were again dumped from potash fertilizers tailings at the Kalush chemical plant into Dniester.¹⁴ The plant is located in Ivano-Frankivsk region, Ukraine.

Figure 4 Open storage facility of chemical waste



Source: Ukraine 24

A recent inventory of Ukraine industrial waste and tailings on Dniester River Basin identified 32 storage facilities with 162 million tons of waste. They are on the balance sheet of 12 enterprises. The three with

¹³ See *Zerkalo Nedeli*, 22 January 1999 at <https://zn.ua/ECOLOGY/chernobyl.html>

¹⁴ "Assistance in safety improvement of tailings management facilities (TMF) in Armenia and Georgia", UNECE, Aug. 2018, p. 5, https://unece.org/fileadmin/DAM/env/documents/2019/TEIA/Workshop_Nov_2019/BAckground/TMF_Methodology_en.pdf

the largest volume of waste are the state enterprise "Sera" (85 million tons), LLC "OrianaEko" (26 million tons) and the Stebnitsk mining and chemical enterprise "Poliminerall" (12.74 million tons).¹⁵ The risk of similar incidents could be recurring with more dramatic impacts, affecting Dniester, communities, communication infrastructure and networks.

Furthermore in 2008, due to the poor management of Dniester Hydropower Complex (Dniester HPC) under heavy rainfall conditions produced in the summer of that year, massive floods took place on the territory of the Republic of Moldova, downstream of Dniester HPC.¹⁶ Damages for Moldova produced by those floods on regions adjacent Dniester and Prut Rivers were estimated in an UNDP report at 300 million USD.¹⁷

In none of the three cases mentioned above, were there any transnational mechanism for recovering the damage caused. The lack of these mechanisms does not deter the operators of these facilities to pay attention to safeguard measures, which may lead in the future to even more disastrous effects.

The lack of a transnational compensation mechanism raises several questions:

- What are the measures, compensating modalities and the needed water flow that will have to be discharged by the Ukrainian counterpart in case of heavy pollution of the Dniester in order to clean the River, for example from large leaks of waste based on potassium fertilizers and other chemical wastes?
- Who pays the communities destroyed by the floods and how?
- Who and how is compensating the households and communities abandoned because of artificially induced hydrological drought over long period of times?
- Who would be liable to cover the cost of lost lives?
- Who is in charge of tackling epidemiological or health crises?
- Who are the subjects liable for destroyed local businesses and economic systems?

In this respect, the application of Directive 2004/35/EC on liability, prevention, and reparation of environmental damage, mentioned in section 2 of this policy brief as well as application of other compensation instruments known and accepted by international practice would fill the gap and bring consistency to this Program of Dniester 2021 - 2035.

¹⁵ "Как власть и экоактивисты не замечают проблему отходов", 24tv.ua, 24 July 2020,
https://24tv.ua/ru/vlast-jekoaktivisty-ne-zamechajut-problemu-otodov-novosti-ukraina_n1384893

¹⁶ As it was illustrated by research conducted by Meliniciuc and others shortly after the dramatic floods of 2008 affecting Moldovan territory downstream to Dniester HPC "*If a regime of discharge from Novodnestrovsk reservoir was accepted with debit 2600 m3 /s during 110 hours final volume of discharge was 1030 mln. m3 and the volume of affluent 1594 mln. m3. Thus forced volume represents 564 mln. m3 , which is lower on 36 mln. m3 compared with projected one. Such regime of exploitation and management of flood debit permit to avoid negative effects of flooding from July - August 2008*". For more details see Мельничук О.Н et al. "Анализ причин и характеристик катастрофических наводнений в бассейнах рек Днестр и Прут", in Buletinul Institutului de Geologie și Seismologie al AŞM, N 2, 2009,
https://www.researchgate.net/publication/294693797_Analiz_pricin_i_harakteristik_katastroficeskih_navodnenij_v_bassejnah_rek_Dnestr_i_Prut/link/56c2f6c308aee3dcd416306f/download

¹⁷ UNDP "Climate Change in Moldova. Socio-Economic Impact and Policy Options for Adaptation", 2009/2010 National Human Development REPORT, p. 25, http://hdr.undp.org/sites/default/files/nhdr_moldova_2009-10_en.pdf

8. The hasty signing and legality of the Transnational Program

This Program of Dniester 2035 is at least as important if not more important than the Agreement of Dniester HPC currently under negotiation between Moldovan and Ukrainian Government. Why? Once the actions and interventions of this Program would be determined for 15 years in advance, things will practically be nailed down, while the document would no longer be substantially amended.

Based on the observations and prior practice of previous international projects dedicated to the Dniester, it would be fair to assume that the planned actions and program design would be difficult to amend substantially due to financial constraints.

At the same time, it is not now and it has never been in Ukraine's interest for such transnational Programs and Plans to be very detailed on the major stressors of Dniester with cross-border and transnational impact. If this Programme is not detailed at this stage with the most burning elements affecting Moldova, then any potential amendments will not be relevant later. Conversely, it will be too late to fix anything that could be prevented and mitigated at the early stage. The amendments could take years, with irreversible consequences for the River that could be prevented now at the design phase.

Therefore, the re-discussion and amendment of this Programme should take place in the coming weeks, not at the end of a 5 years' cycle.

There should be also outlines that on behalf of Moldova, the Program was signed by an ad-interim Secretary of State in a Provisional Government with no competence on environmental issues.

In this regard, the Law on International Treaties and the Law on Government should be consulted in order to check the legality of the signing of this transnational Program.

RECOMMENDATIONS

- i. The analytical background of the Program 2021-2035 should not be limited just to one study as a result of a single project. Focusing on a single study cannot capture the entire picture of pressures and risk factors that affect the ecosystems of the Dniester. Similarly, a single study cannot cover in depth even the most significant risk factors. Consequently, the Governments of Moldova and Ukraine should take into account all relevant studies and projects dedicated to water management in the Dniester River Basin as the background analysis in the formulation the Program of Strategic Actions on Dniester 2021-2035.
- ii. Sabotaging the inclusion of the key environmental directives included in the Association Agreements of Moldova and Ukraine to the EU (e.g. environmental impact, strategic environmental impact and compensation of produced damages) as well as the environmental directives covered by the Energy Community Treaty should not be admitted. The sacrifice of these Directives takes place at the expense of the well-being of the population, communities, ecosystems and local economic systems of Moldova and Ukraine. Therefore, the Dniester Strategic Action Program until 2021-2035 should be complemented by an additional block of European Directives that exist in the above-mentioned international commitments of Moldova and Ukraine.

- iii. The lack of afforestation commitments in the Dniester River Basin on behalf of Ukrainian Government with no clear indicators, targets and areas of afforestation undermines from the very outset any idea of a Program that is claiming to prevent the degradation of water resources in a cross-border context. Therefore, basic indicators such as the number of trees planted (millions or billions), planted areas (number of hectares) with specific short-, medium- and long- term targets by 2035 should complete this Program.
- iv. Consideration of loss of ecosystem services is mandatory in order to identify and establish compensatory measures for the partial recovery of ecosystem losses associated with the negative impacts caused by economic activities on the ecosystems of the Dniester River.
- v. The Program until 2035 should take into account climate change factors in the Dniester basin that are a source of local climate change (microclimatic pressure factors). The explanation of climate change pressures on the Dniester river basin only through global causes of climate change reflects in a partial and incomplete manner the pressure sources over this River.
- vi. Without a clear, systemic, and detailed exchange of information on hydroelectric constructions and their operation regime on the Dniester, the Program has a formal, shallow, and inefficient content. Under these circumstances the goal of improving the hydrological regime of the Dniester is compromised from the very starting point. To avoid the Program design failure the following is needed:
 - a. The Ukrainian side should make available to the Moldovan side not only the draft Technical Rules for the operation of Dniester HPC, but also the complete set of data underlying the elaboration of these Rules (all technical documentation and designs prior to construction, environmental impact assessment report prior to construction "OBOC", extensions and other changes produced in the past 30 years on accumulation reservoirs and dams, bathymetries of reservoirs, seismicity reports, topography of the reservoirs;
 - b. Similarly, the Ukrainian counterpart should provide access to data related to water discharges and flows in real time (every 15 minutes or maximum at every 60 minutes for 24/24 hours) from all three hydropower plants (CHE-1, CHE-2, Dniester Pumped Storage Power Station) in the past 30 years. The daily, monthly, and yearly averages are simply not relevant to make reliable, sustainable, and final decisions for the thorough assessment and approval of the Technical Rules proposed in 2017.
 - c. In addition, access of technical experts from Moldova and international ones to these hydroelectric facilities and reservoirs for reality checks and data collection from the ground should be allowed.
- vii. Investments in "green" infrastructure should be encouraged throughout the Dniester basin, both in the riparian and in the urban areas. However, making these investments real and

- consistent would require a clear stipulation of the indicators, targets, areas and commitments of each signatory of this Program. For the moment they are missing.
- viii. The Moldovan Law on International Treaties and the Law on the Government of the Republic of Moldova should be consulted in order to verify the legality of the signing of this transnational Program.

CONCLUSIONS

The Government of Moldova voluntarily and unconsciously gives up to the international legal instruments that may protect its interests related to the country's strategic water resource.

The Strategic Action Program for the Dniester River Basin during the years 2021-2035 is at least as important as the Agreement on the Operation of the Dniester Hydropower Complex currently being negotiated. It needs therefore a proper consideration.

Maintaining this Program in the state and content of March 31, 2021 will have nothing but the impact of further degrading the ecosystems, well-being of the population and communities of Moldova and Ukraine that populate the Dniester River Basin.

The suspension and amendment of this Program is necessary and should take place as soon as possible.