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Policy Brief : Assessment of the water-food-energy-ecosystems nexus and the benefits of transboundary cooperation in the Drina River Basin



UNITED NATIONS

Coordination between the water, energy, food and environment sectors is fraught with difficulties at the national level and the complexity increases substantially in transboundary basins. The “nexus approach” to managing interlinked resources has emerged as a way to enhance water, energy and food security by increasing efficiency, reducing trade-offs, building synergies and improving governance, while protecting ecosystems. Such an approach supports reconciling different sectoral objectives and progressing towards the Sustainable Development Goals, which are closely linked.

This Policy Brief highlights the main results of a participatory assessment of the water-food-energy-ecosystems nexus in the Drina River Basin,

Improving the management of the Drina River Basin’s resources is of high importance for the socio-economic development in the basin, for the three countries, and for the region.

carried out under the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention). Shared by Montenegro, Serbia, and Bosnia and Herzegovina, the Drina River Basin is a water-rich river basin characterized by untouched landscapes and high levels of biodiversity and that is often described in terms of unexploited potential. The Drina Nexus Assessment builds on the results of a similar assessment at the level of the Sava River Basin (which includes the Drina River Basin). The process mobilized multi-disciplinary local and international expertise to assist the sector authorities and stakeholders identify through a transboundary dialogue key linkages between energy, water, land and ecosystem resources, as well as potential solutions to help ensure that the basin’s resources are developed and managed sustainably and efficiently.

The basin is characterized by high levels of unemployment, in particular among the youth, which is driving migration towards large cities as well to other countries. In addition to the global economic crisis, the population of the Drina Basin has also been severely affected by the floods of 2010 and 2014. The key economic activities in the basin are resource-based: power generation, mainly small-scale agriculture, and nature-based tourism. Hydropower generation in the Drina is key in terms of contributing to energy security, delivering on international commitments on greenhouse gas emission reductions, and electricity export potential. Important for energy supply is also the cooling provided by the river water for thermal power generation. The Drina River is the main tributary of the Sava River, and groundwater represents the main source of water supply for communities in the basin. Surface water resources also support significant power generation (both hydropower and thermal power) that is key for the energy security of the three countries and also produces revenues from exports. Another key resource is biodiversity, the upper parts of the Drina River Basin in particular being well preserved and the basin is home to rare and endangered species including brown bear, wolf, chamois, wild cat and otter.



The assessment of the Drina River Basin, carried out in cooperation with the International Sava River Basin Commission, is part of the project “Greening economic development in Western Balkans through applying a nexus approach and identification of benefits of transboundary cooperation” funded by the Italian Ministry for the Environment, Land and Sea.

¹ United Nations administered territory under Security Council Resolution 1244 (1999)

There are strong nexus linkages in the Drina River Basin.

This nexus assessment has identified three key clusters of resource issues that have a major impact on the sustainable development in the basin: river flow regulation, rural development, and water quality and solid waste. Intersectoral (nexus) linkages found in those three key clusters include: (i) the importance of the use of water resources to support hydropower and thermal power generation, (ii) the negative impacts of hydropower dams on the river ecosystems and on the ability of the river to clean itself and maintain a high water quality, (iii) the impact of water flow regulation for hydropower on the availability of water for other current or potential uses, including irrigation, (iv) the potential use of hydropower reservoirs to mitigate the impact of floods on land-based assets, (v) the negative impact of pollution from land-based activities on water quality and water ecosystems, (vi) the central role of environment and ecosystems in the development of rural economy, through sustainable agriculture and eco-tourism.

Improving the management of the Drina Basin's resources requires improvements in the governance setting.

Intersectoral coordination within each country is a challenge, as each sector has its own geographical scope in planning and operation, multi-level authority framework, planning cycle and stakeholder engagement characteristics. While there is no specific basin-level cooperation mechanism for the Drina River Basin, the basin benefits from well-developed water governance mechanisms – in particular the Framework Agreement on the Sava River Basin (FASRB) provides the legal framework from cooperation while the International Sava River Basin Commission (ISRBC) is the implementing body of the FASRB². Basin-level coordination in other sectors (such as energy and agriculture) is weaker. For example, the operation of hydropower facilities which used to be coordinated in Yugoslav times is no longer coordinated.

International cooperation experiences in different sectors and fora may contribute to the development of stronger cooperation between the three riparian countries. The Drina countries meet regularly in many regional and sub-regional fora to discuss trade, investment, transport, energy, or agricultural cooperation. These fora, however, mainly remain focused on specific sectors.

Co-optimising the regulation of water flows taking into account different objectives is the top priority area.

Power generation is a key economic activity in the Drina Basin, and is likely to increase: The basin currently holds 9% of the combined capacity of the three countries for thermal power and 32% for hydropower (see box 1). Impacts of power generation on the river flow are at the heart of the nexus in the Drina Basin, while authorities in the basin are not yet well equipped to deal with these impacts. Currently the hydropower plants in Drina operate on a single unit basis to best meet the needs of each country, rather than working as a coordinated system to optimize hydropower generation for the region. The uncoordinated operation of the dams may cause or aggravate flooding situations.

A nexus approach to the management of the basin's resources can help to promote rural development.

Rural development in the basin is currently hampered by low agricultural productivity and lack of infrastructure – including for irrigation and drainage, roads, drinking water supply, flood protection, wastewater treatment, and solid waste management. At the same time, traditional agriculture in the Drina Basin offers the potential for higher value through converting to certified organic agriculture or potentially establishing standards for certified origin of local products. There are also opportunities to make a productive use of currently

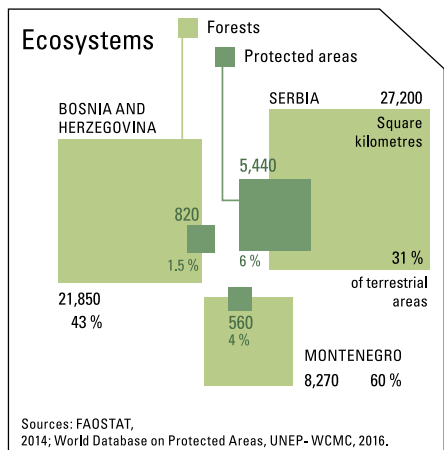
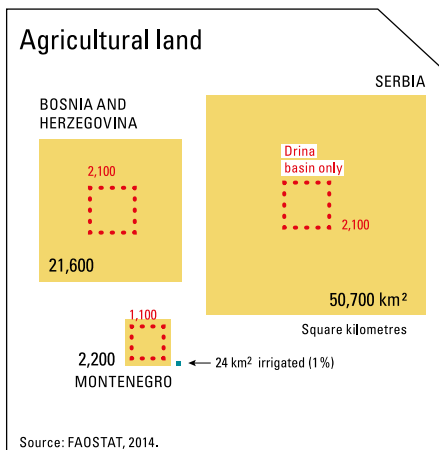
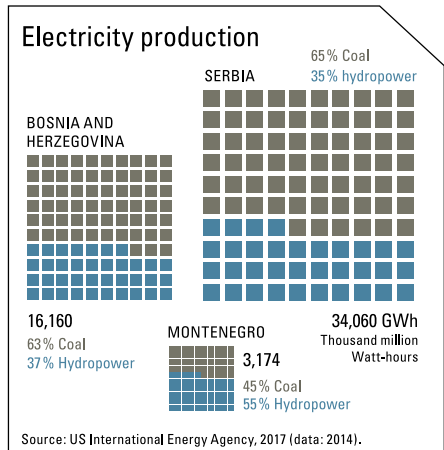
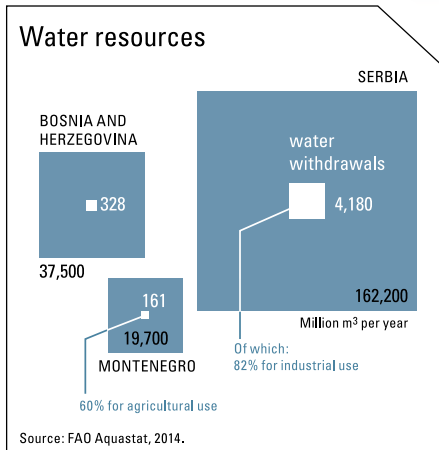
² While Montenegro is not presently a party to the FASRB, it has signed a Memorandum of Understanding on cooperation with ISRBC and in practice already cooperates on matters such as hydro-meteorological issues, flood management, and river basin management.

Protecting water quality and improving management of solid waste is the third key area of action.

unused land, without compromising ecosystems – grasslands could be used for livestock rearing, and use of abandoned and degraded lands for biofuel production could be explored. Expanded irrigation using water-efficient technologies and exploring options for water reuse in agriculture would sustainably increase climate resilience of agricultural production. The mostly untouched landscapes and wildlife offer significant opportunities for further developing ecotourism – which could bring multiple benefits if properly managed – enhanced by transboundary cooperation.

The quality of groundwater is largely unknown. And while surface water quality of the Drina River Basin in general is “good” to “excellent” in the upstream areas, it has been declining in the downstream areas and is only “moderate” at particular areas of concern. The main pressures on water quality are largely unchecked. They include organic and nutrient pollution (mostly due to lack of wastewater treatment plants and to inadequate solid waste disposal), and hydro-morphological alterations (hydropower dams). Within the Drina basin there is only one wastewater

Key indicators describing the resources of the Drina countries



treatment plant in operation, and municipalities often dump solid waste in illegal sites along the river. There are also concerns about heavy metal contamination from industrial and mining sites, some of which are abandoned.

Cooperation in the management of the basin's resources is not new and has already delivered significant benefits.

Before the break-up of the Socialist Federal Republic of Yugoslavia jointly developed infrastructure projects were often able to coordinate the different interest of the constituent republics, and hydropower plants were operated to maximise power generation in the whole basin. Since then, some bilateral agreements as well as coopera-

tion in the framework of the International Sava River Basin Commission has continued to deliver benefits. Strengthening the current cooperation efforts around nexus issues would generate more and greater benefits. The improvement in resource management would generate additional economic, social and environmental benefits. Significant benefits can be gained from: (i) protecting the quality of groundwaters and surface waters, (ii) coordinating the operation of reservoirs, (iii) reducing water use, (iv) developing economic activities that are environmentally-friendly, and (v) protecting biodiversity. Strengthened cooperation would also contribute to achieve regional economic integration, and peace and security objectives thanks to the increased trust generated by cooperation at the technical level.

Box 1. The benefits of cooperation in hydropower generation

A modelling exercise carried out as part of this assessment shows that cooperative operation of hydropower dams could deliver more than 600 GWh of electricity over the 2017-2030 period. Setting aside 30% of the dam capacity for flood control would have a cost, through a change in the energy mix, of about 4% of the operational cost of the whole electricity system in the three countries. Pressure on hydropower generation could be reduced by increasing energy efficiency – by as much as 4.1 TWh in the combined Drina Basin in the 2017-2030 period – and would also deliver significant reductions in greenhouse gas emissions (from 38 Mt in 2017 to about 28 Mt in 2030) representing about 21% of the combined emissions of the three countries in 2015.

Selected benefits of transboundary cooperation in managing the Drina Basin's resources

Economic benefits

- Increase in electricity production (e.g. by optimising water release regimes)
- Increase in agricultural production (e.g. by improving irrigation systems through coordination and experience exchanged)
- Reduced damage from floods and droughts (e.g. by better modelling of flood and drought risk, developing protective infrastructure and cooperating in flow regulation)
- Development of the tourism sector

Regional economic integration benefits

- Increased transboundary cooperation in all areas by making the Drina an item of connection and not division
- Strengthened process of accession to the EU and better use of EU funds
- Increased energy trade and integration, and energy security
- Increased number of people employed thanks to cross-border economic activity

Social and environmental benefits

- Reduced human costs of floods
- Creation of jobs and reduced rural-urban migration (thanks to new economic opportunities)
- Increased resilience of local communities to climate change (including through increased awareness)
- Protection of water quality and ecosystems (including through improved wastewater treatment and solid waste disposal)

Geo-political benefits

- Increased trust between countries from working together in flood protection
- Facilitated compliance with international obligations to the EU targets (on renewables, water status, etc.)
- Avoided conflicts and adoption of cheaper solutions, thanks to the development of connections between experts and officials and the sharing of information

The Drina nexus assessment has identified a menu of options to address resource management issues in the Drina River Basin.

Improvements in governance at many levels (improved coordination between sectors within each country, more formal cooperation arrangements between countries, broader engagement of stakeholders, greater focus on compliance) are critical, but technical solutions and in particular greater and better coordinated investments are also needed.

- **Take decisive steps to co-optimize flow regulation.** Strengthen and formalize the coordination of hydropower operations. Develop a basin-wide approach to sustainable development of new hydropower plants that takes into account good international practice and guiding principles. Implement energy efficiency measures and assess the technical potential for other renewable energy options, including solar power. Deepen cooperation on flood management beyond emergency response. Advance towards the development of a common environmental flows standard.
- **Promote integrated rural development in the basin by exploiting the synergies between eco-tourism, agriculture and renewable energy production.** Establish Farmer Based Organizations to increase cooperation among farmers at local level and across borders. Support farmers to increase agricultural productivity and climate-resilience. Invest in infrastructure that supports sustainable rural development. Take steps towards the establishment of a transboundary protected areas, notably the Tara-Drina.
- **Develop a common approach to effectively protect water quality.** Continue to improve regular systematic monitoring and analysis of water quality, particularly regarding pollution sources and impacts. Develop further sharing of related information, building on River Basin Management Planning processes and existing database of the ISRBC.
- **Control illegal dumping, and promote sustainable practices in the agriculture, industrial and mining sectors.** Undertake investments to comply with the law, particularly in wastewater treatment and solid waste management facilities, progressively under realistic timeframes.

- **Take full advantage of current governance structures and consider complementary arrangements.** Use existing platforms (such as the ISRBC, the Regional Rural Development Standing Working Group or the Energy Community) to extend the intersectoral dialogue, to share experiences, and potentially agree further action, in the management of basin resources. Take advantage of EU accession processes (and funding) to increase cooperation and improve the management of the basin's resources. At the national level, set up arrangements for monitoring and reporting on progress towards the Sustainable Development Goals may support intersectoral coordination.
- **Consider how to maximise the generation of (net) benefits from cooperation around nexus issues.** Approach cooperation based on the aggregated benefits provided by a broad range of actions, where not all countries and stakeholders would benefit in every single issue but larger gains might be reaped. Agree on and carry out additional more detailed work on the benefits on cooperation in managing the basin's resources, leading towards plans to achieve such benefits.
- **Develop of a basin investment strategy.** Making significant progress in the different clusters requires substantial investments in hydropower plants and other renewable energy generation facilities, energy efficiency, flood protection works, rural roads, tourism-supporting facilities, wastewater treatment plants, and solid waste disposal sites. Investments - beyond energy - require further development of markets as well as transparency, predictability as well as accountability, and adequate checks and balances in the regulatory system. The development of a basin investment strategy may help to prioritise investments (analysing trade-offs) and attract funding. The strategy should include a financing component exploring all possible sources of funding (user charges, local taxes, national budgets, EU funding, donor funding and climate funding).

Cover photo: Miroslav Jeremić

The main objective of the nexus assessments under the Water Convention is to foster transboundary cooperation by identifying intersectoral synergies and determining measures that could alleviate tensions related to the multiple needs of riparian countries for shared resources.

Website: <http://www.unece.org/env/water/nexus.html>

Nexus assessment methodology:

<http://www.unece.org/index.php?id=41427>

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