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Global Water Partnership Mediterranean

UNECE

Phase II Nexus Assessment for the Drin River Basin

Summary

NEXUS

The *Phase II Nexus Assessment for the Drin River Basin* was developed within the framework of the "*SEE Nexus Project*", funded by the Austrian Development Agency (ADA) and implemented by GWP-Med in partnership with the UNECE. It builds upon the findings of the qualitative "Phase I" Nexus Assessment, which was prepared in 2018-2019 as a "*Thematic Report on the Nexus*" in the context of the Transboundary Diagnostic Analysis (TDA) for the Drin Basin.[1]

The Phase II Assessment explores in detail, two key Nexus issues identified during Phase I, namely:

- The interface of hydropower operations and floods risk, and
- Aspects of sustainable biomass and forest management and related interlinkages

The Assessment was developed with feedback and data provided from related stakeholders from the Drin Riparians, using the institutional platform of the Drin Coordinated Action process (Drin CORDA) including the Drin Stakeholders Conferences and the related Expert Working Groups. The Drin Core Group (DCG), a joint body comprising representatives of Water-related Ministries and Institutions of the Riparians, provided steering and guidance for the development of the Assessment.

HYDROPOWER OPERATIONS AND FLOODS RISK IN THE DRIN BASIN

SUSTAINABLE BIOMASS AND FOREST MANAGEMENT IN THE DRIN BASIN

1. The TDA was developed within the framework of the GEF-funded Drin Project ("Enabling Transboundary Cooperation and Integrated Water Resources Management in the extended Drin River Basin"), implemented by UNDP and managed by GWP-Med in cooperation with the UNECE.

HYDROPOWER OPERATIONS AND FLOODS RISK IN THE DRIN BASIN

The Drin Basin presents high risk for floods. On one hand, the Basin is naturally prone to flooding, primarily because of the hydraulic capacity of the Drin River and the limited extension of the floodplains. On the other, the flow regulation practices of hydropower plants (HPPs) along the river can aggravate the risk: The intensity of floods depends on, among other factors, the quantity of water released by the most downstream dam (Vau-i-Dejës HPP), which in turn depends on supply-demand dynamics in the electricity sector (i.e. electricity demand and operation of the dams upstream).

In order to enhance understanding of the physical relations between hydropower operations and flood episodes in the Basin and to inform decisions related to the operating rules of HPPs, a quantitative analysis of some of these dynamics was implemented. An integrated water-energy model was developed [2] in this regard, one capable of representing the impact of different types of hydropower operations and different types of cooperation on water discharge along the Basin, consisting of two linked parts:

- The “Panta Rhei” [3] hydrological model that simulates the rainfall-runoff process and water budget at any point of the Basin.
- A long-term energy investment optimisation model[4] that calculates the least-cost energy supply mix meeting electricity demands.

2. By researchers from the KTH Royal Institute of Technology, Sweden and the Polytechnic University of Tirana.
3. Panta Rhei was developed and is continuously maintained Leichtweiss Institute of Hydraulic Engineering and Water resources (LWI), in collaboration with the Institute of the Water management (IfW), in the Technical University of Braunschweig.
4. Based on the OSeMOSYS (Open Source energy Modelling System), an open-source systems optimization tool for long-run integrated assessment and energy planning.

Four scenarios were identified and explored with the modelling analysis, each representing alternative ways that the water-energy system could evolve in the Drin River Basin over the next two decades:

A reference scenario representing the situation where there is no cooperation among hydropower plant operators in the Basin.

A “flood-smart” operations scenario investigating the impact on floods downstream from increases in the available buffer volume in the HPP reservoirs.

A climate change scenario assessing potential impacts of drops (by 3% and 6% in 2025 and 2050 respectively) in the average annual precipitation rates in the Basin, on the production by the HPPs in the cascade.

Another scenario investigates the effect that the **Skavica HPP**, currently under construction in Albania, could have on the electricity generation and import dependency.

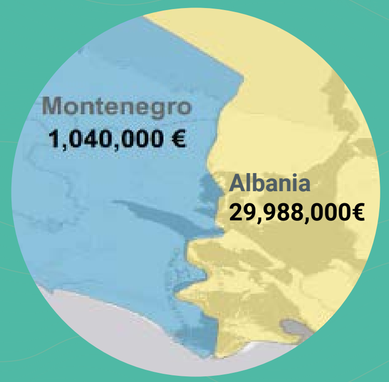
The key insight from the modelling analysis is that *changing the operational rules of the HPPs to accommodate floods has* ***a minor impact on the security of electricity supply but a potentially significant impact on flood control.*** Increasing the buffer volume by 20% in the wet season in the Spilje reservoir provides an additional capacity of about 26-34 million cubic metres (MCM), and in the Fierza reservoir by 144-270. These buffer increases have a nominal impact on electricity generation: The average reductions in generation are 2.7% for Spilje and 1.9% for Fierza, or in absolute terms -8 GWh and -34 GWh respectively.

Two sets of scenarios were then explored [5], in order to assess the effects on flooded areas downstream resulting from increased buffer volume in the selected reservoirs. Results were compared between the present situation (BAU – current operational rules) and the maximum possible flood control in the reservoirs (increasing buffer volumes by 20%) in the scenarios of:

- Floods with a 10-year return period
- Floods with a 20-year return period

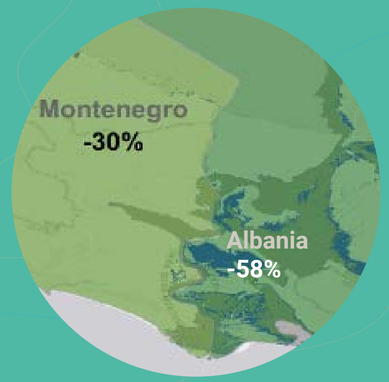
The results from the hydraulic modelling were then used to estimate[6] how the flood damages downstream (in Albania and Montenegro) would be affected under the above scenarios of "flood-smart" operational rules. The results from the tool indicate that in terms of economic (and human) losses, in the case of the HP-10yrp scenario, damages are significantly reduced compared to the BAU-10yrp scenario. In the case of the HP-20yrp scenario, the damages in Albania could be significantly reduced, while the economic losses in the Montenegrin areas would remain broadly unchanged.

5. By UNDP experts using the hydraulic model developed by GIZ
6. The estimation was implemented using the related application developed by DHI Hungary Ltd



Estimated damages of 10-year return period flood event BAU scenario

Estimated damages of 10-year return period flood event HP scenario



Difference in the estimated damages between the 10-yrp BAU and the 10-yrp HP scenarios

Figure 1: Estimated flood damages in Albania and Montenegro for events with a 10-years return period, under the Business as Usual (BAU) and "flood-smart" (HP) scenarios, and their difference

2

A second insight from the modelling analysis is that **climatic changes reduce the generation and thereby profitability of the HPPs in the Basin to a non-negligible extent.** Under the basic assumptions of the analysis, the generation by the North Macedonian HPPs decreases by about 10% by 2030 and 14% by 2050, while for the Albanian cascade, the decrease in average annual precipitation rates results in a similar trend. The estimated reductions are 6-8% in 2030 and 7-10% in 2050. These estimates are in line with those in the Climate Risk Management Plan prepared by the Albanian utility company KESH in 2018.

3

Finally, the analysis reveals that the construction of the ***Skavica HPP will improve Albania's energy independence,*** beyond the expected significant benefits in flood mitigation. The introduction of the Skavica dam (2300 MCM of storage) and hydropower plant (196 MW) increases the generation in Albania by about 550 GWh from 2025 onward. This improves energy dependency by reducing electricity imports by more than 9 TWh or 16% between 2025 and 2042. Due to lack of specific data, including on operational rules, of the Skavica HPP, its effect on reducing flood risk was not assessed – an important aspect to consider in any future work.

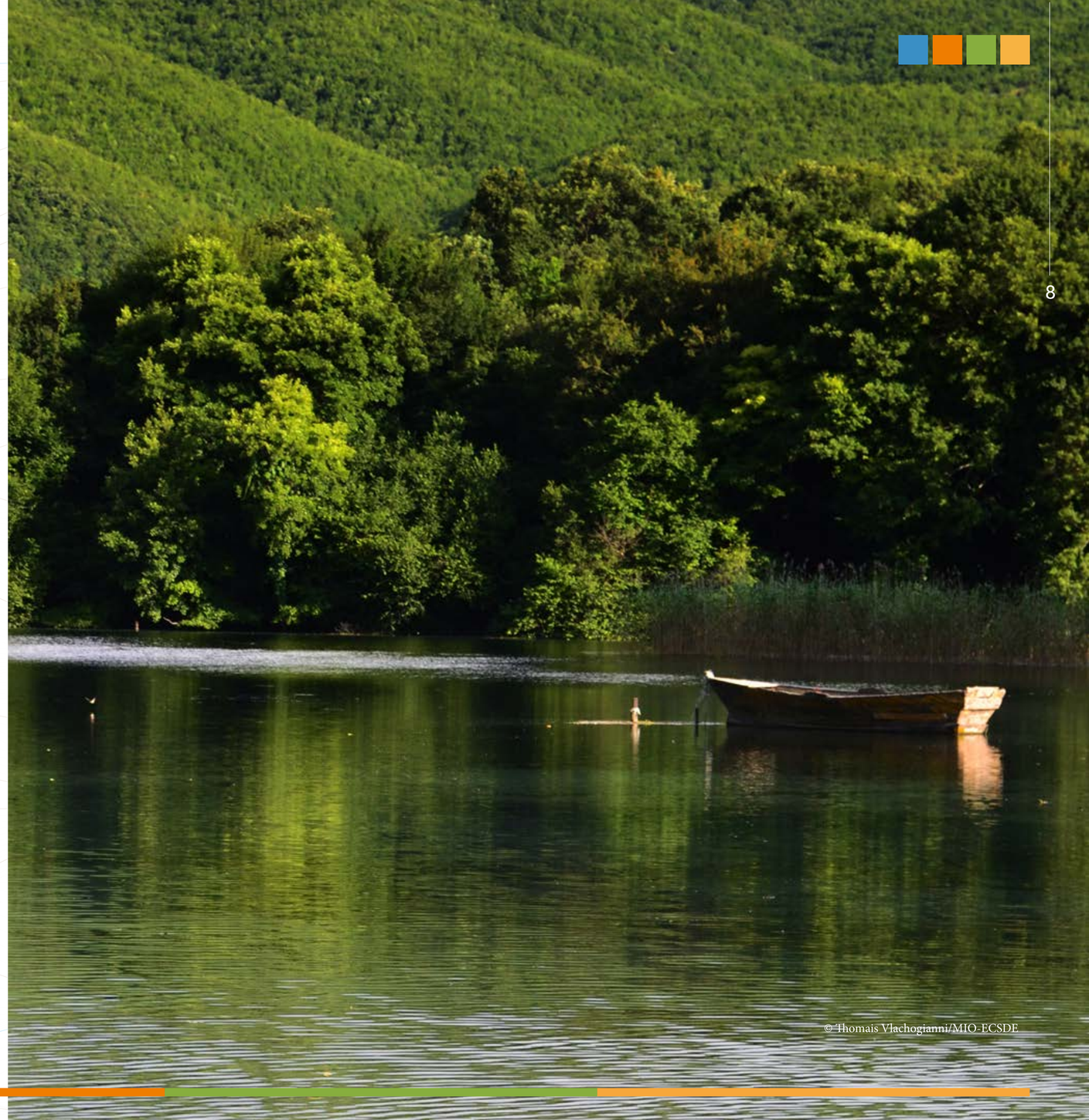
SUSTAINABLE BIOMASS AND FOREST MANAGEMENT IN THE DRIN BASIN

The Nexus Assessment Report also includes a chapter[7] that aims to provide a picture of various interdependencies around the value chain of energy biomass and the sustainable management of forests in the Drin River Basin, and to identify potential policy responses.

7. Based on the Report "Strengthening the value chain of energy biomass in the Drin River Basin for a more sustainable management of forests, and related Nexus implications", prepared by CNVP for UNECE within the framework of the project.

In the Drin Basin, the most important source of biomass is forests. With a negative balance of 0.5 million m3/year, wood biomass harvest is directly contributing to forest exploitation and degradation. Forest products such as fuelwood, pellets, woodchips residues, roundwood, and sawn and processed wood are used for energy purposes. Biomass (fuelwood) is especially used for space heating, making biomass one of the main sources for fulfilling the energy demand within the Drin Basin. The vast majority of fuelwood is produced for internal markets, with only approximately 1% of the total annual fuelwood harvest exported as processed biomass.

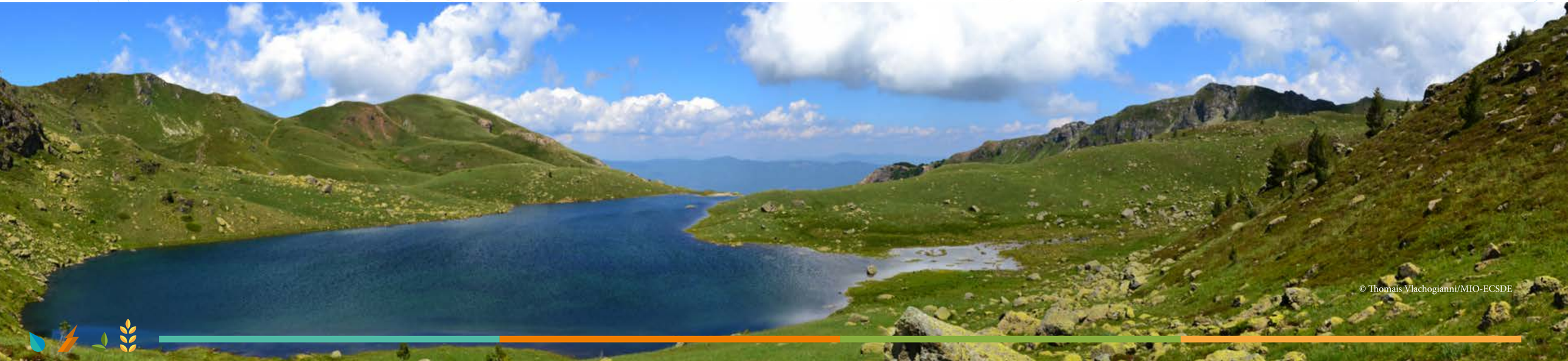
Overexploitation of forests leading to land degradation has a direct negative impact on irrigation, hydropower and other water uses. Erosion and floods can damage infrastructure like irrigation systems, and increase sediment loads in hydropower reservoirs, complicating operations, increasing costs and reducing the lifespan of infrastructure, such as hydropower dams. They also lead to insecure water availability (peak run-off, reduced infiltration and sustained water provision). In North Macedonia, yearly soil losses – at country level – are 17.1 million m3, and over 2 million m3 in Montenegro. In Albania, the yearly rate of soil loss is estimated at 10.9-15.1 t/ha.



Sustainable forest management has a positive impact on soil and water conservation and can reduce flood risks and sediment transport, while also maintaining water quality and availability. Understanding these relationships is crucial to ensuring overall sustainable transboundary river basin management. Close cooperation between the water and forest sectors at national, regional and transboundary level, is necessary in order to tackle the challenges that forest management is facing today in the region. Moreover, in order to further invest in and develop the biomass sector, it is important to ensure sustainable forest and land management. Based on the current data available per country, the harvest is either verging on a sustainable balance or more likely, unsustainable.

The analysis concludes with a set of recommendations that take into account the interlinkages between biomass and the water-land-ecosystem-energy sectors, highlighting ways for the promotion of sustainable management of forests and their products within the Drin Basin.

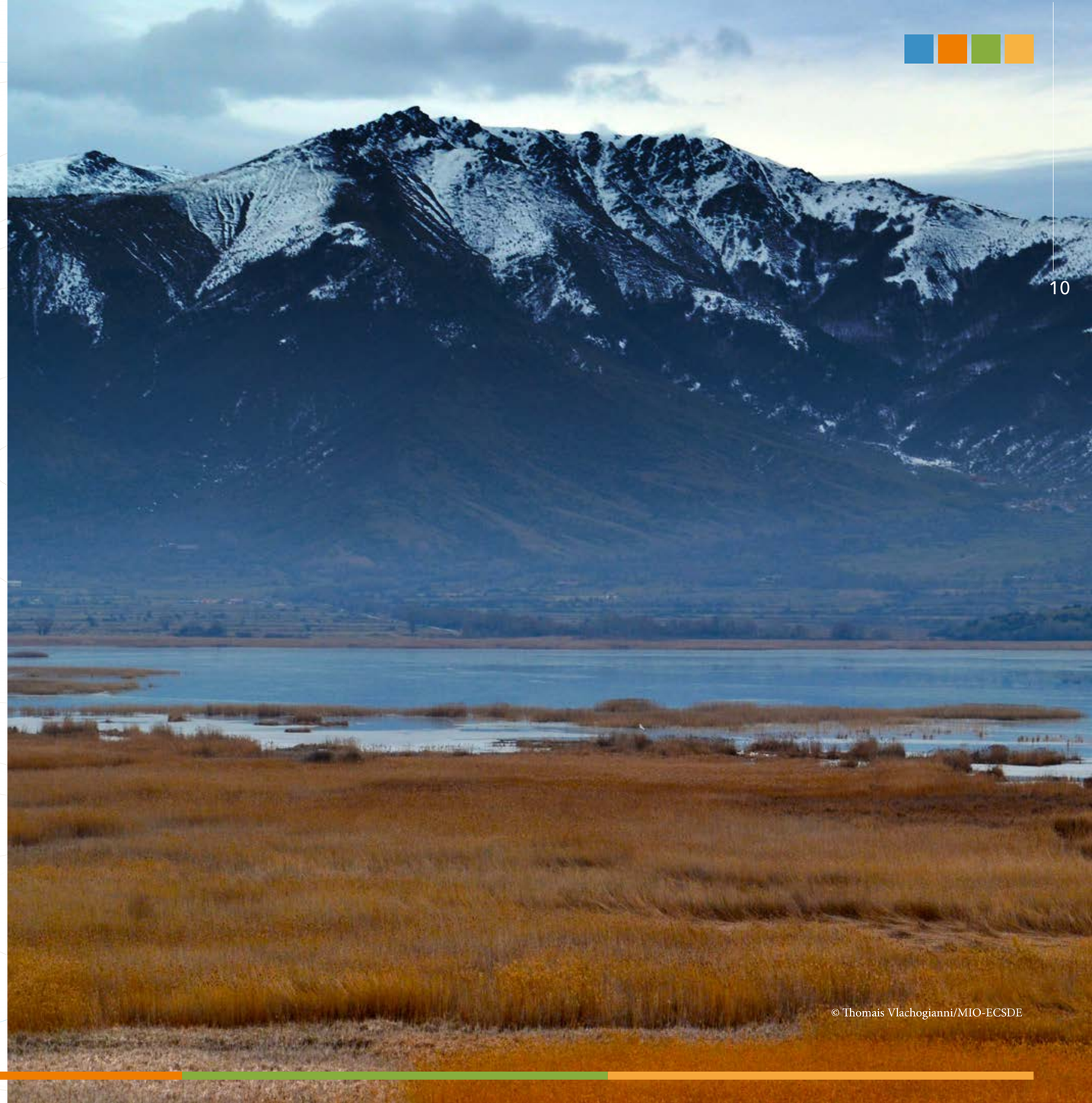
An appropriate regulative and legislative framework can ensure and monitor the sustainable use of natural resources, embedding river basin management planning and implementation into government structures at national and regional levels for natural resource management but also water and ecosystems management. while also establishing certification schemes (FSC or PEFC) for wood-related products.



There is a need to provide forest managers, industries, farmers and all related stakeholders with scientific information including sets of tools that will ensure sustainable management of natural resources, use of sustainable harvested wood products by households at affordable prices and establish a Payment for Ecosystem Services within the river basin that will ensure that, for example, downstream water users pay for improved forest management or reforestation upstream.

With support through the Instrument for Pre-accession Assistance (IPA III) soon to become available from the EU, priorities and operational rules at national level should be established by the Drin Riparians to support sustainable use of natural resources and biomass (in line with Chapter 11 of the EU acquis on agriculture and rural development [8]). This requires adequate administrative capacity of the agricultural administrations, in particular in the area of formulation, analysis, implementation, payment support and control of agricultural policy.

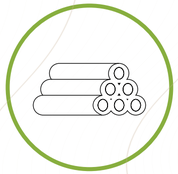
8. See more: https://ec.europa.eu/info/food-farming-fisheries/farming/international-cooperation/enlargement_en



In practical terms, measures could be designed to support:

Forest restoration and Sustainable Forest Management practices,

SMEs to expand production of processed biomass products (pellets, woodchips, briquettes) for local consumers and related heating and/or combined heat and power systems,

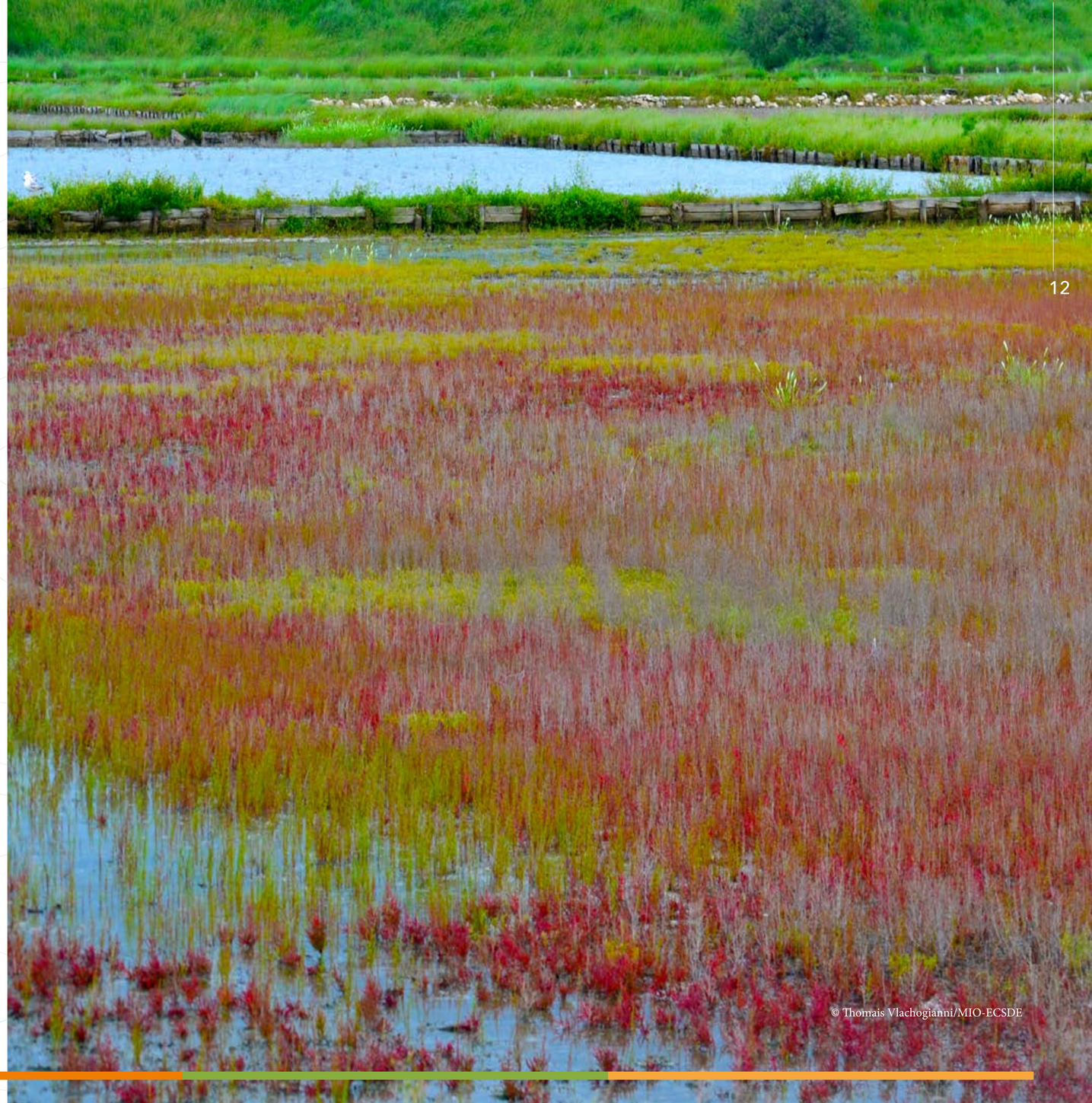


Sustainable wood harvest practices for small forest holders,

Forest restoration and Sustainable Forest Management practices,

The Riparians could set up market mechanisms, including price reporting and quota management, while incorporating a gender perspective to address specific needs and opportunities. They could also identify options for establishing cooperation with development and commercial banks for the provision of micro-credit options/soft loans for households, businesses and public organisations to shift into alternative heating fuels (e.g. pellets, briquettes) as market-based measures to reduce illegal forest exploitation. Small and Medium-Sized Enterprise development support is recommended within the biomass value chain to promote the further development and use of these renewable energy sources. Support for biomass production should not, however, compete with agricultural crops nor endanger forest conservation.

Finally, cooperation on a regional level on issues such as biomass markets, renewable energy transition as well as wood and agro-products markets and sustainable management of natural resources should be properly integrated into national policies and implemented on a regional level among the Drin River countries. Clear interlinkages existing between the different sectors (natural resources, water, energy, food) and their link to climate change need to be translated, defined and agreed among relevant sectors/stakeholders at regional, national and local levels. Concrete actions are essential in order to enable an environment for safeguarding the ecosystem services through the implementation of sustainable forest (natural) resource management.



The **“Phase II Nexus Assessment for the Drin River Basin”** was prepared within the framework of the project “Promoting the Sustainable Management of Natural Resources in Southeastern Europe, through the use of the Nexus approach” financed by the Austrian Development Agency (ADA), the operational unit of Austrian Development Cooperation, and implemented by Global Water Partnership-Mediterranean (GWP-Med) in partnership with the United Nations Economic Commission for Europe (UNECE).