Interreg Danube Region

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HARMONMISSIONS

Multisectoral action plans to rehydrate landscapes:

Territorial Adaptation Action for Water–Soil–Climate Resilience in the Danube Basin

Policy brief:

Preparation of Territorial and Regional Action Plans and their integration into national climate change adaptation strategies and river basin management plans, ensuring consistency between water retention measures, soil health and land use

Key Messages

- Current land management and land use practices have been characterized for decades by long-term drainage, including rainwater, which has a number of consequences.
- Land use and land use changes have a fundamental hydrological, thermal and biotic impacts on changes in the stability of water cycles, yet we do not monitor this.
- Restoring water cycles stability begins with the restoration of the dynamics of small water cycles (evapotranspiration water/green water) due to increased soil rehydration.
- The transition from the current culture of landscape drainage to systematic landscape rehydration represents a necessary paradigm shift with a number of benefits.
- Key tools for climate risk reduction are multisectoral territorial action plans for landscape rehydration, which use the water-soil-climate system (NEXUS) framework.

Policy Problem

In previous agricultural, forestry and construction practices, the ability of soil and land to retain rainwater periodically during year has been significantly reduced and the land has been drained. New rainfall comes in torrential waves between long periods of drought, further reducing ecosystem use of rainwater throughout the year, which is later absent. The deepening of this negative development is a consequence of the depletion of the water-holding capacity of the soil and the long-term practice of land drainage of our territories without knowledge and assessment of the impacts of land use on changes in the stability of water cycles. In water cycles, we are thus accelerating the drainage of the area in favor of large water cycles at the expense of small water cycles in the Danube basin.

The problem is compounded by the fact that the problems that have arisen (increasing drought, heat islands, flood risks, climate change, etc.) are managed on a sectoral basis and within separate departmental policies. However, the problem concerns the entire surface of the landscapes and the conditions under which natural water cycles function in the countries of the Danube basin, in forests, agricultural as well as urban areas. Water cycles represent the temporal and spatial continuity of the vertical and horizontal flow and distribution of water and heat between the troposphere, land, and oceans, which traditional public policies do not address.

Why Action is needed

In an effort to systematically reduce the risks of drought, floods and weather extremes, the most effective solution is the area-wide rehydration of the landscape, improvement of the soil moisture regime and elimination of risky surface water runoff from the territory (including measures against soil erosion and compaction), as well as excessive rainwater drainage throughout the year. The implementation of these measures will increase the production of area wide green water (including biomass growth), rehydration of the landscape and the stability of small water cycles in the landscape. These measures directly contribute to the decrease in land overheating and the restoration of local water resources. Failure to implement these measures would further exacerbate climate risks and water supplies. The new generation of water and spatial planning should thus include maintaining and restoring the stability of the water cycles of the territory, maximizing the ecosystem use of rainwater throughout the year. Relevant nature-based solutions (NBS) and practices of regenerative agriculture and regenerative hydrology should be a natural part of forestry, agriculture, as well as the new blue-green generation of architecture and infrastructure.

Evidence from the region

For more than three decades, a team of experts and institutions in Slovakia have been developing experience in implementing a systemic (holistic) approach within the water-soil-climate watershed system (the entire water cycle of the territory). The expert team is expanding the knowledge base of the New Water Paradigm WEFE NEXUS, within which it has formulated, further developed, and made available a methodology for monitoring and restoring small water cycles on land—the foundation for restoring the stability of water cycles and improving the climate at the local and regional levels.

The preparation and implementation of water retention and erosion control measures (including NBS) affect agricultural landscapes, forestry, protected areas, as well as river floodplains, including urban environments, small settlements, and rural landscapes. They provide positive ecosystem and climate feedback for the river basin and its territories. The planning part of adaptation action also concerns land-use planning, building permitting, land consolidation and optimization, land management, stormwater management, strategic resilience infrastructure planning, as well as the management, renovation, and reconstruction of existing infrastructure and buildings; therefore, it requires a multisectoral and interdisciplinary approach.

The BioEAST initiative for a circular bioeconomy, particularly its Freshwater-Based Bioeconomy working group, has gained expertise in this approach. It has already presented its experiences and recommendations at several high-level conferences and events during the European Union presidencies in the Czech Republic, Hungary, and Poland, as well as within the framework of the current Horizon Europe missions. In 2010, the Government of the Slovak Republic approved the Landscape Revitalization Program to increase the landscape's water retention capacity by 250 million cubic meters (national KPI).

It was a collaboration of several ministries and multi-source financing with the involvement of the unemployed. Similarly, in 2021, the Košice Self-Governing Region approved the Landscape Restoration Program with the aim of increasing water retention capacity within its territory by 60 million cubic meters (regional KPI). Based on numerous verifications in practice, in a municipality with an average cadastral area of 1000 hectares, the average potential for increasing water retention capacity is up to 150,000 cubic meters. This can be achieved by implementing adaptation and management measures widely distributed in landscape structures within about 5 years. If we also take into account the built-up part of the territory, it is on average up to 10, max. 15 years. Similar programs have also been approved in several municipalities across Slovakia, including City of Košice.

Policy Recommendations for Danube Region Countries

Strategic objective is to reduce flood, drought and heat islands risks on systematic base through the restoration of ecosystem function of land and landscape by means of integrated planning (focus on entire water cycle and its function within climate system) and regenerative soil and water management through:

Policy 1: The principle of neutrality of artificial water outflow and rainwater drainage from the cadastral territory of the municipality

Only natural surplus water should leave the territory through a network of local streams and creeks. The goal of an integrated approach should be the retention and ecosystem use of rainwater in area.

Policy 2: Empowerment of local communities in climate action by active involvement in local water planning, preparation and implementation of landscape adaptation measures and regenerative soil and water management by stakeholders

Policy 3: Establishing national monitoring units within hydrometeorological services for rainwater budget accounting and impacts assessment to stability of the water cycles in cooperation with municipalities and regions (bottom-up water planning component)

Policy 4: Preparation, creation, approval and implementation of multisectoral national and regional action plans and road maps for land rehydration across forestry, agriculture and urban areas

These plans define target values for increasing the landscape water retention capacity of entire area for increased reuse of rainwater throughout the year.

Policy 5: Systematic assessment and financing of ecosystem functions of land

With the aim of ensuring the stability of hydrological cycles stability as common good within forestry, agriculture, urban planning and building industry development sector.

Policy 6: The implementation of water retention and anti-erosion measures needs debarrierization in permitting processes, because they are generally beneficial

Conversely, everyone who accepts these measures on their land should receive adequate financial and social support, as well as compensation for their long-term maintenance in good condition. It is necessary to provide consulting services for this.

Expected Impacts

Targeted water retention and landscape restoration measures could increase the water retention capacity of the Danube basin by up to 12 km^3 (which is equivalent to 12 billion m^3) repeatedly throughout the year. It will allow at least an additional 48 km^3 of rainwater per year for higher ecosystem use significantly improving the resilience to climate change across the region.

This is a significant improvement compared to the total annual precipitation of 600 km^3 in the Danube basin. This overall target can be achieved under the guidance of territorial action plans within 10 years by implementing a broad set of nature-based solutions and introducing regenerative water and soil management, while slowing down the negative practice of land drainage, both open and urban.

The overall target for the entire Danube basin is further broken down for each country in the basin (see Annex 6 of the Strategy for coordination of involvement of EU Missions in the Danube region developed within Harmonmissions project), its regions and cadastral areas. The synergistic benefits of the systemic landscape rehydration include reducing the risks of extreme weather events (floods and droughts) and their impacts, creating new water resources, increasing CO_2 sequestration into biomass and soil,
measurable reduction in land surface overheating (heat island effect) and improving its moisture regime, as well as creating new jobs, especially in rural areas.

Conclusion

Harmonizing sectoral and departmental approaches towards fostering water cycles stability based on multisectoral action plans can bring: the fastest synergistic results across entire river basins, especially after their implementation begins each new year; strengthening the capacity of the Danube River Basin regions and territories to restore its small water cycles, rehydrate soils, and enhance resilience to climate change and data-driven, nature-based solutions, water and soil regeneration action using the Water–Soil–Climate NEXUS framework coordinated by multisectoral action plans.

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