Danube River Basin Water Management in Times of Climate Change: The Waters 2040 Recommendations

A long-term transition towards sustainable development in the Danube River Basin is not just a choice, but a necessity. Society´s ability to adequately address present and future challenges in river management will be a determining factor. The task requires cross-sectoral cooperation and involves securing water supply from various sources and for various purposes while safeguarding the Danube River Basin as a network of unique ecological systems.

The impact of climate change is already evident, with altered annual and seasonal discharge, including heavy rain events and droughts. Users are and will be confronted with changed water quantities and qualities. More frequent and higher floods will threaten livelihoods and infrastructure. Water shortages will affect farmers, navigation and hydropower production. Tourism will be impaired by altered local hydrological regimes. The river´s water quality is also affected by hazardous substances. War and conflict exacerbate the impact of climate change.

Societies in the Danube River Basin need to manage and reconcile possible competing demands, and the EUSDR has to define and prepare for its role in these processes. New ways to reduce the effects of floods and a fair distribution of water during periods of shortage have to be negotiated on local, regional, national and transnational levels. Directly concerned stakeholders, science and civil society must be involved in using co-creation and co-design approaches for future strategies.

Complementing the existing documents, the following specific recommendations have been identified for four main topics addressed in the Waters2040 Participation Day.

1. Extreme Hazards and Climate Change

1.1. Intensify integrated flood and drought risk management to improve the resilience of people and various water uses against extreme hazards increased by climate change

1.2. Review existing spatial planning regulations with respect to flood damage potential; improve and implement spatial planning regulations where these do not exist

1.3. Prioritize nature-based solutions (NbS) against pure technical measures, non-structural flood protection (adaption of usage) against structural flood protection (constructional measures), measures in the catchment area against measures in the channel, retention measures against linear regulation measures

1.4. Improve water retention, and groundwater recharge by river restoration to improve the situation during droughts

1.5. Protect and restore floodplains as Win-Win-Win measure to counteract biodiversity decline and reduce flood- and drought risk at the same time

1.6. Build blue-green infrastructures as climate change adaptation measures in urban environments

2. Biodiversity Crisis & Challenges in Water Quality

2.1. Implement NbS in catchments and riverine landscapes to retain water in the landscape, improve water quality and increase biodiversity.

2.2. Restore habitats and re-establish ecological connectivity using NbS and technical innovation within the whole river network; consider barrier removal in tributaries as a potential solution

2.3. Reduce soil erosion and nutrient transport through best agricultural practices, including NbS

2.4. Make use of innovative monitoring approaches and in-situ observatories to develop targeted management measures for surface and groundwater systems
2.5. Implement integrative and sustainable management plans and programs of measures, e.g., river basin management plans for all countries in the Danube basin, based on the ICPDR-River Basin Management Plan and foster their implementation

3. Energy and Transport

3.1. Implement measures and technologies (e.g., new hydropower types) to improve hydropower and ecology: reduce reservoir sedimentation, improve sediment continuity, reduce flood risk, increase safety, reduce impacts of residual flow or hydro-peaking
3.2. Establish new approaches to evaluate sustainable hydropower potential
3.3. Guarantee energy security in the context of wind energy and photovoltaics
3.4. Improve fairway conditions by joint navigation and ecological measures throughout the Danube network
3.5. Further develop the Danube waterway by using innovative groins, flexible infrastructure, river information services and river restoration where possible
3.6. Implement mitigation measures such as wave-protecting structures to minimize negative effects of ship-induced waves on aquatic ecosystems

4. Co-creation, Co-design and Citizen Science

4.1. Develop Co-creation and Co-design methods, applicable to practical, cross-cutting use and decision-taking in extreme hazard reduction, biodiversity increase and sustainable hydropower and navigation
4.2. Apply Co-creation and Co-design methods at all larger projects in the Danube River Basin to increase awareness of the people, derive better solutions, reach acceptance and even a push to implement sustainable measures and river restoration
4.3. Create and provide Citizen Science tools to interested and affected people along the Danube River and tributaries to collect data, create awareness, responsibility and stimulate engagement for minimising flood and drought risk, river restoration, sustainable hydropower and navigation
4.4. Establish a standard for Citizen Science application in practice, including technologies, such as virtual reality, apps, measurement instruments, digitalisation and databases
4.5. Link technical, natural and social sciences methods to improve the people´s participation capabilities and it´s success in projects
4.6. Foster cooperation and dialogue between stakeholders from hydropower, navigation, hazard management and agriculture and organisations involved in nature protection and restoration

Putting Waters2040 into action

In light of these recommendations, the EUSDR should start a process of a transnational, multi-level, and multi-stakeholder dialogue to develop a EUSDR action framework and, subsequently, a catalogue of targeted actions considering all implementation levels and stakeholders. The Waters2040 Participation Day offers its good services to start a process of facilitation and consultation within the framework of the EUSDR and the relevant international bodies and treaties. This joint effort should advise the EUSDR, the European Union and the EU Countries to support the necessary steps in its next financing period.