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# Work with nature – not against it

## WWF's perspective on Adaptation to Climate Change in the Danube River Basin

Christine Bratrach, WWF Danube-Carpathian Programme, Vienna  
Sergey Moroz, WWF-European Policy Office, Brussels  
Georg Rast, WWF-Germany, Frankfurt

### Unique values at risk

The Danube impacts the lives of more than 80 million people. 20 million people rely directly on the Danube in their daily lives, i.e. for drinking water. Therefore, the ecosystems of the Danube River Basin are highly valuable in economic, historical and social terms. The Danube is also home to a unique mix of species, with about 2,000 plants and more than 5,000 animal species. The Danube is one of Europe's richest rivers with regard to fish species, supporting 103 species in total; this includes seven fish species found nowhere else in the world.

### WWF's expectation for the Danube basin

During the last century, temperatures have shown a relatively uniform increase of 0.95 °C across Europe. Future shifts in mean annual precipitation are expected to have distinct regional differences. An increase of precipitation values in northern Europe by 10-40% and a decrease in areas of central Europe by up to 20% have been predicted. Most likely, the Danube Basin will need to prepare for direct climate change impacts such as more frequent flooding, longer periods of drought and an increase in water temperature. Indirectly, this will deteriorate water quality, limit ground water recharge, support distribution of invasive species, disconnect functional habitats and harm the natural biodiversity and overall river integrity.

### Natural river systems are already impaired

However, climate change just precedes other drivers that have already reduced the natural ability of the Danube system to adjust and absorb disturbance. Healthy, free-flowing rivers respond to natural disturbance through dynamic movements and flow adjustments that buffer against impacts. Adjustments to the Danube include lateral migration of channels and dynamic interactions between the main channel, floodplains, riparian zones and groundwater. Over the last decade, however; the Danube has been sufficiently altered so that its natural ability to absorb disturbances is already severely limited. Ecologically sound climate change adaptation must consider all drivers and their cumulative impacts.

- *Significant land-use changes* have already caused a loss of more than 80% of the historical floodplains along the Danube.

- *Impacts of hydropower use are severe both in upstream and downstream reaches:* A chain of reservoirs and 58 dams has left only three free flowing sections in the upper Danube. This has created problems for fish migration, trapped bed load, loss of habitat and species as well as reduced water quality. In the lower Danube in particular, the construction of the Iron Gate dams has led to a significant reduction of the suspended load. Trapping efficiency of the Iron Gate reservoir is between 66% (year with flooding) and 85% (dry year), and on the average is 80%.
- *Waterway construction, fairway maintenance, and river regulation for navigation* in combination with trapped sediments resulted in a significant loss of habitats, incision of river bed, and lowering of ground water tables.

### **WWF's principles for climate change adaptation in the Danube river basin**

The Danube's ability to respond to altered climate condition is not infinite. Climate shifts will occur rapidly and lead to flows outside the natural range of variability that have important consequences for the river ecosystem and the people who depend on it. Therefore, WWF calls for four basic principles to be followed to ensure sustainable climate change adaptation:

1. Work with nature not against it
2. Find the right balance between use and protection & support innovative technology
3. Turn agriculture from problem driver to solution facilitator
4. Integrate European policy and ensure wise use of EU funds

***'Work with nature in the Danube basin and not against it'*** should focus on sustainable land-use management (e.g. support afforestation, stop settlements in risk zones), protection of functional river and wetland systems, dislocation of dykes and removal of embankments wherever possible, and reconnection of side-arms, floodplains and wetlands. After the Danube flood in 2006, WWF investigated the potential of remaining natural retention areas and potential floodplain areas for restoration. Forty-three different floodplains with high potential for flood risk mitigation were identified including a total of more than 10,500 km<sup>2</sup> remaining areas and more than 7,000 km<sup>2</sup> restoration sites (Fig. 1). WWF recommends these sites to be included in the Danube River Basin Management Plan for proactive restoration, rehabilitation and management actions to enhance the resilience of riverine ecosystems and minimize all direct and indirect effects of climate change impacts.

***'Find the right balance between use and protection & support innovative technology in the Danube'*** relates mainly to hydropower production and navigation. It includes avoiding new dams in the main Danube system but calls for empowering existing facilities. Furthermore, applying criteria for ecologically sound hydropower (e.g. the *greenhydro* concept) should become a standard in the Danube river basin. In addition, the use of existing dams to mitigate effects of flood and droughts needs to be considered for climate change adaptation. This again involves sound forecast systems and perhaps incentives mechanisms for hydropower companies to take financial risks. Climate change adaptation also requires that navigation fairway conditions are defined according to ecological needs. Flexible adaptation to changing weather conditions will be key for an economically viable navigation. This includes renewing the old Danube fleet with new ship technology, supporting intelligent logistic chains and better river information systems.

***'Turn agriculture from problem-driver to solution facilitator'*** could set a landmark for climate change adaptation in the Danube region. There are many measures that farming can undertake that would help mitigating effects of climate change. The critical function is to reduce peak run-off and enable gradual release of rainwater. Also increased water efficiency and equal distribution will be of key importance in the future. Effective agricultural measures include improving rainwater infiltration by changing tillage practices, reducing run-off by introducing natural barriers such as grass buffers and

temporary ponds, providing more vegetative storage by increasing mature forestry areas with build-up of leaf litter, slowing drainage by breaking up field drainage systems, providing flood storage through creating wetlands, increasing river channel flood flow capacities by re-instating natural water courses and reducing or setting-back flood protection dykes in agricultural land.

***'Integrate European policy and ensure wise use of EU funds for the Danube'*** calls for applying the solidarity principle and integrating different EU legislation (i.e. Water Framework Directive, Floods Directive, Marine Strategy Directive). The impacts of floods and water scarcity are not shared equally by all Danube regions. It is those least affected by floods and droughts in hilly up-stream areas that will need to implement significant measures to mitigate damage further downstream. But also, the middle and lower Danube region with their large number of disconnected floodplains will play a major role to alleviate the effects from accelerated flood flows. The EU's Cohesion Policy provides funding for helping regions to co-operate across frontiers. INTERREG programmes supported cross-border co-operation. Recognizing the principle of solidarity underpinning Cohesion Policy, the next programming period for Regional and Cohesion funds should allow financial resources to be allocated to the implementation of whole river basin district management plans, including measures to tackle floods and droughts, instead of allocating them on a project-by-project basis. Finally, the European Agricultural Fund for Rural Development (EAFRD), 2nd pillar of the EU Common Agricultural Policy (CAP), offers a vast range of measures and a budget of Euro 77.66 billion for the period 2007-13 which can cover for land-use measures to support sustainable measures for climate change adaptation in the Danube basin.

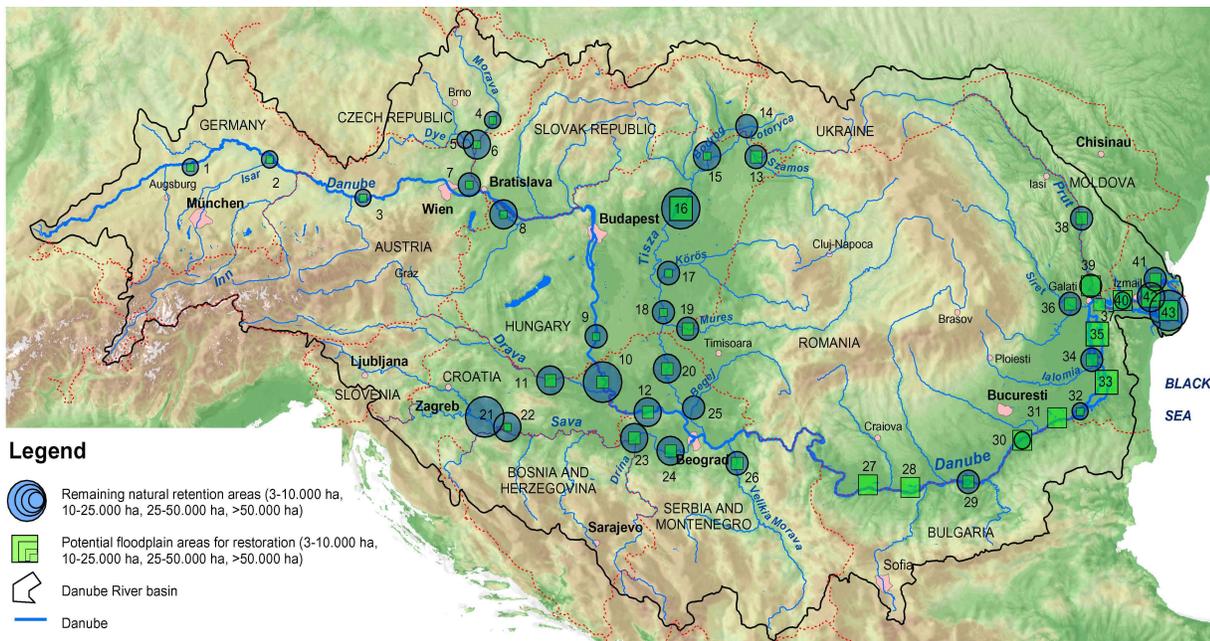


Fig. 1: Large floodplain areas with high potential to mitigate negative effects of climate change (blue dots: Remaining natural floodplain areas; Green rectangles: Floodplain areas with high potential for restoration; source: WWF 2006)

**Contact:**

Christine Bratrich, Head of Danube/Freshwater, WWF Danube-Carpathian Programme, [cbratrich@wwfdcp.org](mailto:cbratrich@wwfdcp.org)

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