



## Floodplain restoration potential and flood mitigation along the Danube

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Originally Danube floodplains would cover an area of approximately 26,500 km<sup>2</sup>, which is equal to about 3.3% of the total catchment area. In recent history, 80% have been cut off by dikes and dams for flood control, hydropower generation or to improve navigability. The reduction and degradation of floodplains causes the loss of large water retention areas that originally mitigated flood risks, the acceleration and unfavorable superimposition of flood waves (from tributaries), the local increase of flood peaks and the loss of functional wetlands and their resources and services.

The aim of the study commissioned by WWF International Danube-Carpathian Program was the assessment and prioritization of potential restoration areas in the former floodplain to support national and international activities in respect to the European policies of Water Framework Directive, Flood Directive and Flora-Fauna-Habitat Directive. The pragmatic selection of potential restoration sites (only >500 ha) is based on already existing governmental and non-governmental projects and proposals. In addition, new areas are proposed based on continuously available data including land use and habitats (settlements are “no go” areas), spatial configuration (size/length/width/position), hydromorphological intactness, overlapping protected areas, and floodplain function/purpose. Further socio-economic indicators, such as land ownership, usage concepts for specific areas and feasibility of projects (costs, legal framework, and administration) were considered in the evaluation matrix. In total 196 areas are identified for the Danube amounting to 810,228 ha in total for the Danube. For an initial prioritization approach only parameters with sufficient data coverage, such as overall hydromorphological intactness of adjacent river stretch, land use (percentage of agriculture as indicator for the intensity), protection status and area size (in relation to retention capacity) were analysed. Of the planned and proposed areas for the Danube, 33 (19%) receive a “very high” restoration potential rating, 98 (56%) a “high” rating and the remaining 45 (25%) only a “moderate” restoration potential rating.

The total proposed area would have a significant effect on flood mitigation (with or without technical polder solutions). Calculating conservatively at about 1.5 m average water depth for these areas, a total capacity volume of about 13.5 billion m<sup>3</sup> can be estimated. That's more than three times the entire remaining natural retention areas along the middle and lower Sava or the Hungarian “Century Vazarhely Plan” to build technical polders along the Tisza with a capacity of some 5 billion m<sup>3</sup>. As a comparison, the Austrian Danube floodplains had a retention volume during the 100-year flood event in 2002 of approximately 0.6 billion m<sup>3</sup> and substantially mitigated the flood peaks in Vienna and even downstream (downstream of Tullnerfeld from 11,300 m<sup>3</sup>/s to 10,100 m<sup>3</sup>/s).

If all sites proposed in this study were implemented over the long-term, e.g. in the third WFD planning cycle by 2026 and beyond 2032, this would mean that 1% of the proposed sites should be restored per year, with other words it would be necessary to restore 28,000 ha each year, or 2,150 ha per country (not considering the distribution of projects nationally). Based on past experiences of pilot projects, achieving this number would require strong and clear political direction and funding for implementation. Optimistically estimating that it costs about 500,000 €/km<sup>2</sup> for restoration across the basin (still considering moderate costs e.g. in RO), the overall investment needed to restore all sites proposed would amount to more than EUR 6 billion.