

Newsletter

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What did the DanubeSediment project achieve?

Between January 2017 and November 2019, the DanubeSediment project team worked on a large number of activities, each having the overall goal to improve sediment and water management in the Danube River Basin! Watch our [project videos](#) for a quick introduction!

First of all, we compared the different monitoring instruments and methods used to collect sediment data by the Danubian countries. Our [handbook](#) offers recommendations to improve sediment monitoring. For example, we recommend installing new monitoring stations and establishing a harmonized sediment quantity monitoring network on the transnational level.

The next major step was to analyse the sediment balance of the Danube and its major tributaries. Our results show that the sediment regime has severely changed, with free-flowing sections being prone to erosion, whilst impoundments lead to sedimentation. Read all about the [sediment balance](#) below and check out our [interactive maps](#), which visualise river course changes and pressures on the sediment regime.

In a preliminary risk assessment, our project analysed how these changes may cause an environmental risk for the water body. Find out more about the methodology and results for pilot sites in the Upper, Middle and Lower Danube in our [report](#). To support stakeholders in improving sediment management, we collected an array of [good-practice measures](#) that reduce erosion and sedimentation.

In the past three years, we reached a major milestone to convey the importance of sediment for water management: Building on our results, ICPDR has identified the alteration of the sediment balance as a new sub-item under the existing Significant Water Management Issue “Hydromorphological alterations”. This means that sediment will be directly addressed in their upcoming Danube River Basin Management and Flood Risk Management Plans.



What are the next steps for sediment management?

All our technical recommendations, the sediment balance analysis and the collection of good practices aim to improve sediment management in the Danube. In order to achieve this on the river basin scale, we need to cooperate both on the transnational and cross-sectoral level. We therefore emphasize that the development of an integrated sediment management concept for the Danube River Basin is a very important next step. This concept needs to be coordinated on a transboundary level, it should balance environmental and socio-economic values, operate on different spatial and temporal scales and include upstream–downstream relationships.

We also recommend that sediments, respectively sediment management, become an integral part of the National River Basin and the Flood Risk Management Plans. You can find all our recommendations for technical and governance-related aspects in the **Danube Sediment Management Guidance** on our [website](#).

International stakeholder dialogue on sediment management

One aspect that all our recommendations have in common is the need for direct cooperation between stakeholders. Any measure in the field of sediment management needs to involve all relevant stakeholders – on the regional, national and even international level.

To initiate this dialogue, our project consortium organised many stakeholder events and workshops and individual consultations during the past three years. Our main goal was to increase awareness for sediment issues, especially amongst stakeholders working in water administration. In total, over 500 stakeholders from the entire river basin were involved. Close cooperation with our stakeholders, especially with the 14 associated strategic partners, was crucial to complete our tasks and finalise our recommendations. Together, we developed new project ideas for the future, such as the implementation and monitoring of pilot measures to improve sediment management at hydropower dams. Read more about our [final stakeholder event](#) that took place in Budapest in November 2019.



Figure 1 Final Stakeholder Workshop. Source: BME, Hungary

To ensure that stakeholder involvement continues after our project ends, the ICPDR Secretariat will take over the task on the international level. For example, ICPDR plans to involve stakeholders in the next consultation phase of the Danube River Basin Management Plan or in the development of a sediment management concept. If you are not interested in receiving further information on sediment management in the Danube, please send us an e-mail (danubesediment@lfu.bayern.de). For information on national activities pertaining to sediment management, please contact your [national representatives](#).

The Sediment (Un-)Balance of the Danube

The first sediment balance of the Danube River is finished! For almost two years, our partners gathered, sorted and analysed sediment data. In summary, this analysis shows that the sediment regime in the Danube River has severely changed: free-flowing sections are prone to erosion due to higher transport capacities and a lack of sediment continuity, while the reduced energy slope in the impoundments leads to sedimentation.

In the Upper and Middle Danube, large-scale engineering transformed the formerly complex river morphology to a uniform channel over large stretches. By using historic maps, the changes in the length of the Danube were calculated (see example in Figure 2). The river length was reduced by 134 km, which means that the Upper Danube is now 11 % and the Middle Danube is 4 % shorter. In addition, the average river width was reduced by about 39 % in the Upper and by about 12 % in the Middle Danube. In the Lower Danube River, the length was marginally reduced by around 1 % and the width by 4 %. To see the river course changes in detail, check out our [interactive maps](#).

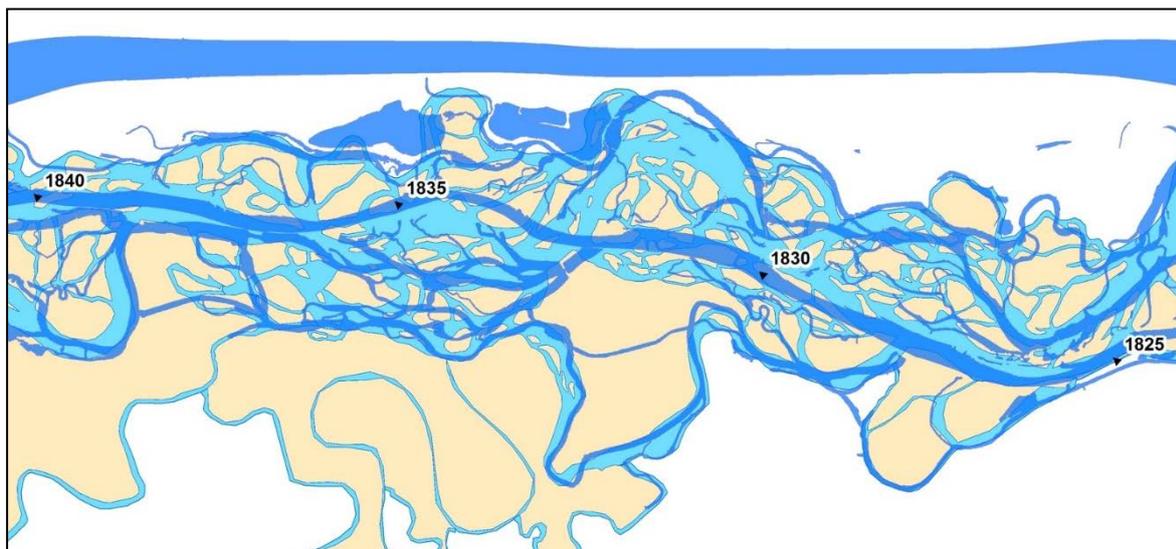


Figure 2 Changes in the Danube river course along the Slovakian-Hungarian border (see river kilometres). Light blue represents the historic river course with islands in beige from the time period around 1850-1900 and darker blue shows today's river course. Source: VUVH, Slovakia

Today, less than 60% of the total suspended sediment input enters the Danube Delta and the Black Sea. Former amounts ranged from about 60 Mt/yr and 40 Mt/yr versus about 20 Mt/yr and 15 Mt/yr that arrive in the Delta and the Sea nowadays. To calculate the whole sediment balance, our partners also analysed bathymetrical data, bed material as well as dredging and feeding. In total, about 733 river kilometres (rkm) (29 %) of the Danube River are dominated by erosion and 857 rkm (34 %) by sedimentation. In the Lower Danube, 670 rkm (27 %) show an erosional trend, but a lack of data hinders a detailed analysis, meaning local sedimentation may exist in stretches of general riverbed erosion. This means that over half of the Danube River shows a tendency to erosion, whilst only 10% (241 rkm) show a dynamic balance between sedimentation and erosion. Figure 4 shows details for the time period 1986 and 2016. More details can be found in the [Guidance](#), whilst the complete sediment balance analysis will soon be available on our website.

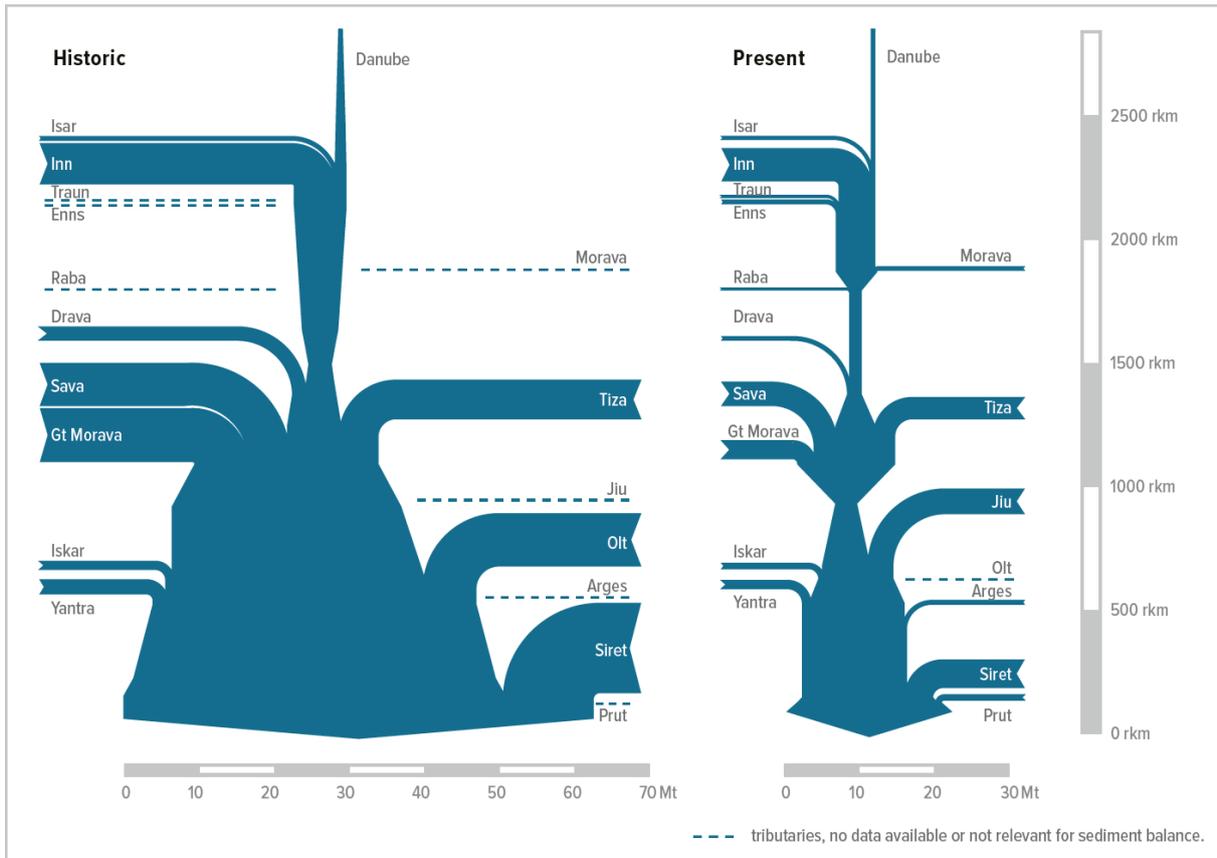


Figure 3 Suspended sediment balance along the Danube River and its major tributaries before (left) and after (right) construction of the HPPs on the Danube River. Source: BOKU, Austria

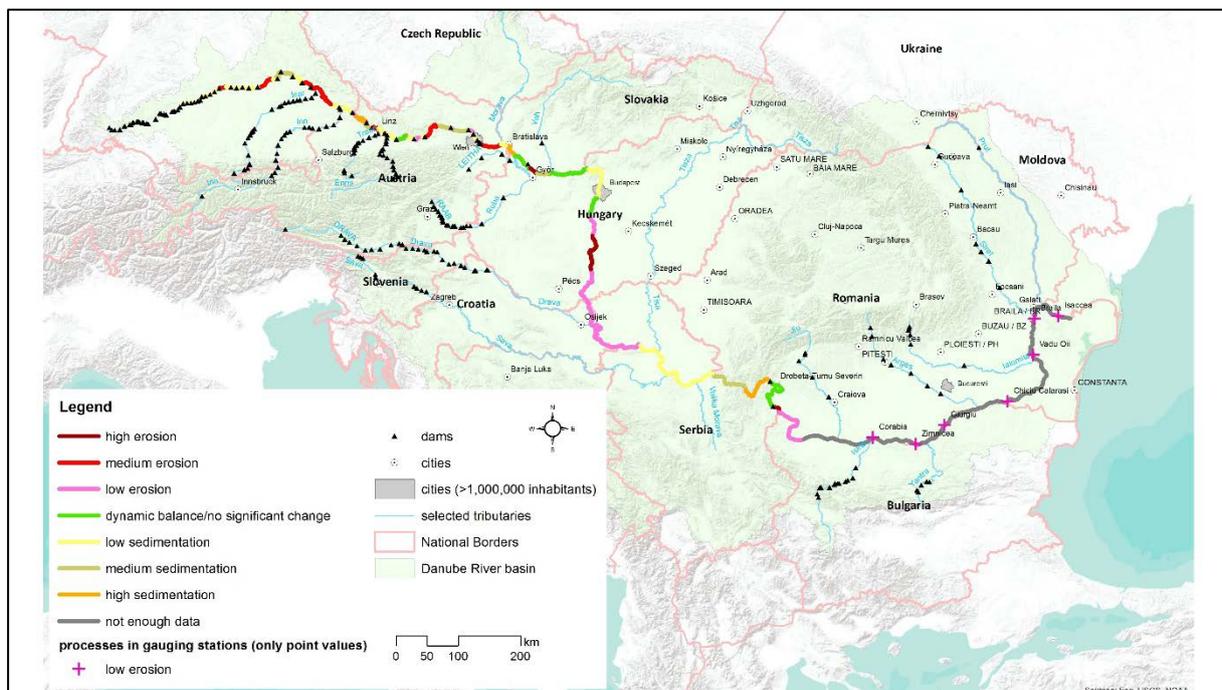


Figure 4 Reaches of the Upper, Middle and Lower Danube showing sedimentation and erosion (data from the period between 1986 and 2016). Source: VUVH, Slovakia

Measures to Improve the Sediment Balance

According to the results of our sediment balance analysis and the preliminary risk assessment, we need more sustainable sediment management in the Danube. Our project partners therefore collected over 70 different good practice examples that reduce erosion and sedimentation in rivers. We summarised them into 38 generic measures and divided these into four application areas: the free flowing section, the reservoir or impoundment, the catchment area and the embankment zone (see "[Sediment Management Measures for the Danube](#)").

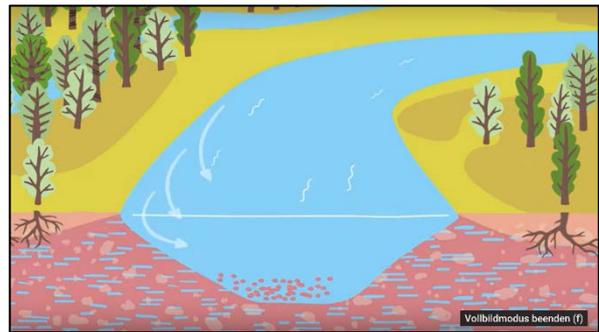


Figure 5 video scene showing "riverbed widening".
Source: LfU, Germany

When selecting adequate measures, one needs to consider how they impact the morphological parameters and how they act on a spatial and temporal scale. We also need to analyse the impact of a measure on ecology as well as the impact on water users such as hydropower, navigation, water supplies etc. In addition, we need to determine the feasibility of a measure, for example, the technical and economic feasibility as well as public acceptance. All of these steps require an integrated planning that includes the expertise of relevant stakeholders from the beginning, especially when it comes to measures relating to hydropower, navigation, flood risk and river management, including ecology. The **Sediment Manual for Stakeholders** will directly address these key stakeholders by categorising the measures relevant for each sector. We are currently finalising the publication, which will be available soon on our [website](#). In the meantime, enjoy our [project video](#), which introduces good practice measures to reduce erosion and sedimentation in the river.

Interesting links

- [Library](#) that holds all of our project reports
- [Project videos](#) (with subtitles)
- [Interactive maps](#), e.g. sediment monitoring, pressures, river course changes
- [Project flyer](#) in English, German, Romanian and Serbian
- [National editions](#) of our DanubeSediment newsletters

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For questions and feedback, please send us an email: danubesediment@lfu.bayern.de