Restoration of the Sediment Balance in the Danube River

DanubeSediment

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Sediment related problems in the Danube River

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Increasing discrepancy between surplus and deficit of sediment

→ increases flood risk
→ reduces navigation possibilities
→ reduces hydropower production
→ deteriorates the ecological conditions
→ decreases the ground water level

Project summary

- Project title:
  Danube Sediment Management - Restoration of the Sediment Balance in the Danube River (DanubeSediment)
- Project duration: 01/2017-06/2019 (30 months)
- Programme: Danube Transnational Programme
  - Programme Priority:
    PA2. Environment and culture responsible Danube region
  - Programme Specific Objective:
    SO2.1 Strengthen transnational water management and flood risk prevention
- Project Budget: 3.56M EUR
- 14 Project Partners (Germany, Austria, Slovakia, Hungary, Croatia, Slovenia, Serbia, Bulgaria, Romania)
- 14 ASPs
- **Main project outputs: Danube Sediment Management Guidance, Sediment Manual for Stakeholders**

Project methodology

- *WP1 → Manage the project*
- *WP2 → Communicate*
- ***WP3 → Sediment Data Collection***
  Collect all available sediment data
- ***WP4 → Danube Sediment Balance***
  Analyse sediment data and identify the problems
- ***WP5 → Impacts and Measures***
  Seek solutions to sediment related problems
- ***WP6 → Prepare Danube Sediment Management Guidance***

WP3: Sediment Data Collection

Do we have sediment data? Where? What sort of? From which period?

Sediment Data Collection

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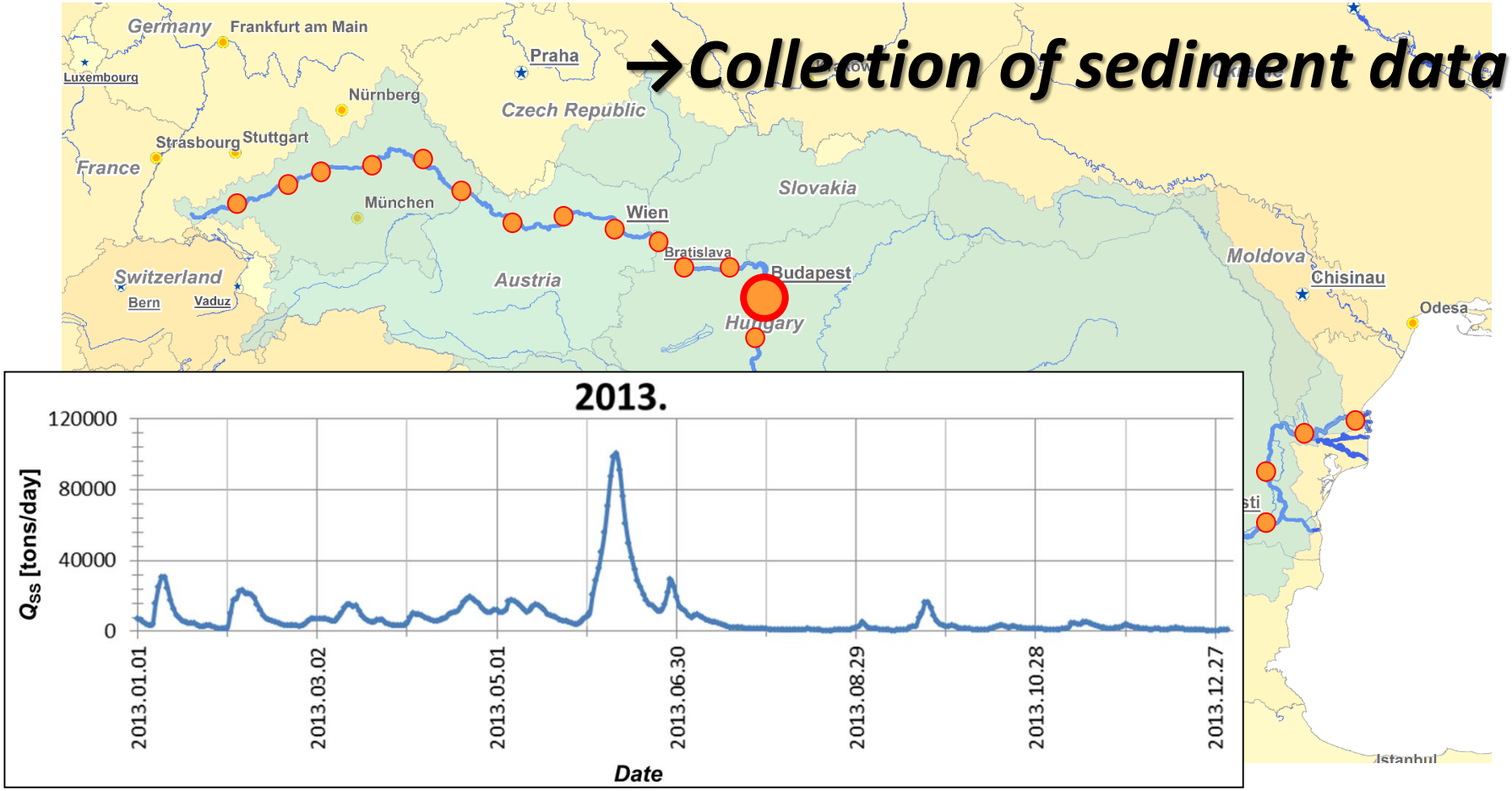
Do we have sediment data? Where? What sort of? From which period?



WP3: Sediment Data Collection

How do we measure sediment transport? Can we harmonize the sediment dataset?

E.g. measurement of bedload transport

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WP4: Danube Sediment Balance

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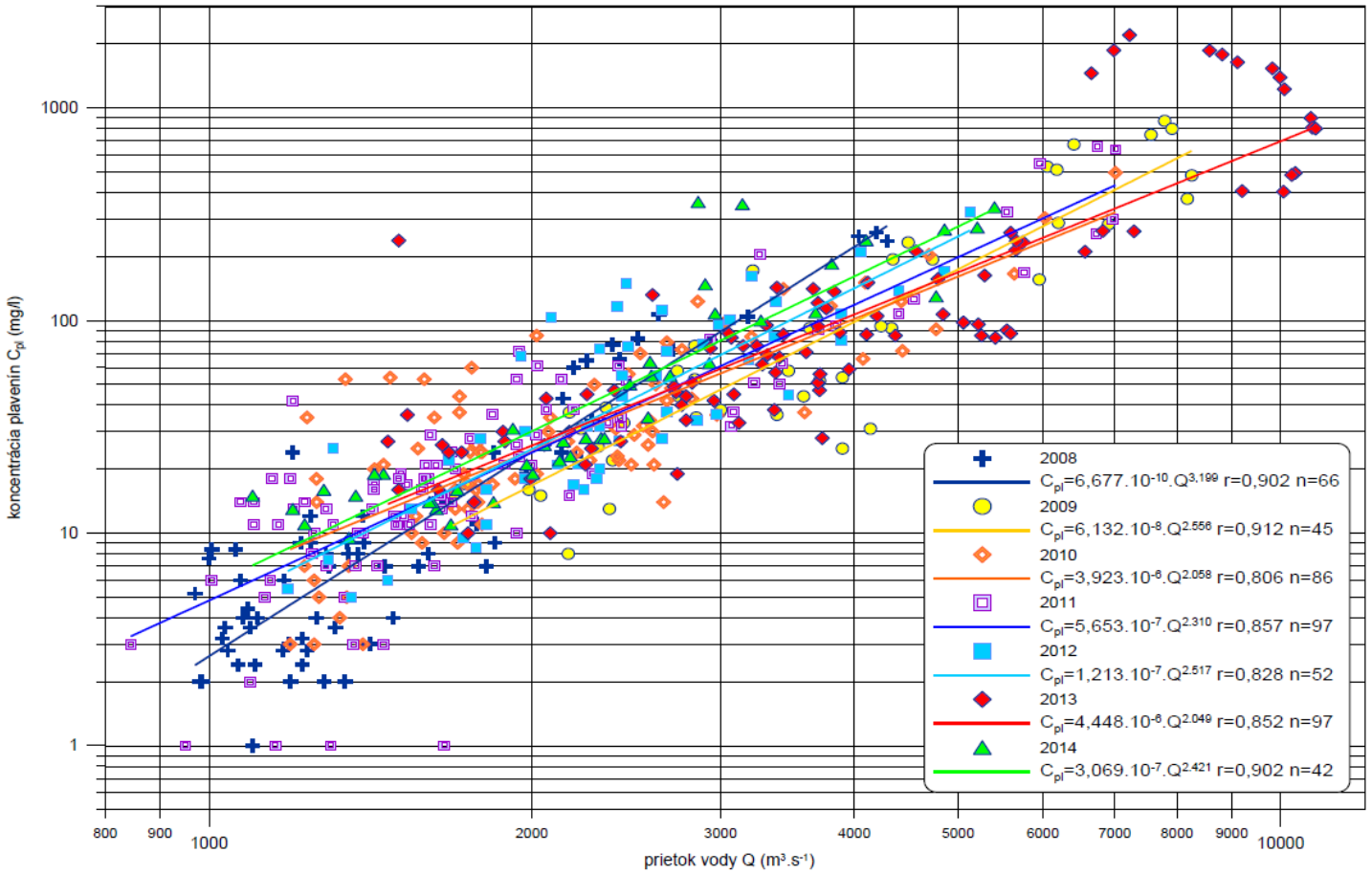
- *Statistical analysis of sediment data*



WP4: Danube Sediment Balance

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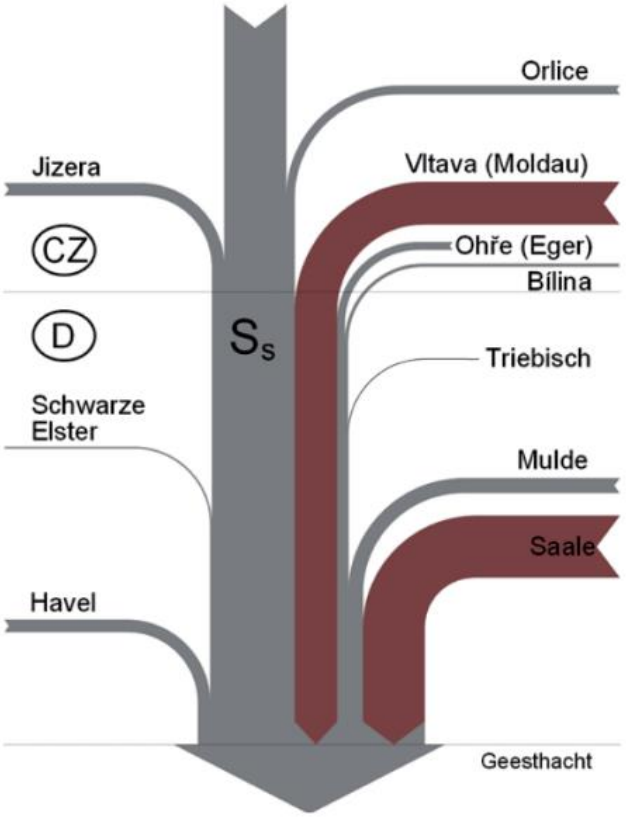
- *Setup of sediment balance*



ICPER (2015): The Sediment Management Concept of the ICPER
Elbe river basin

WP4: Danube Sediment Balance

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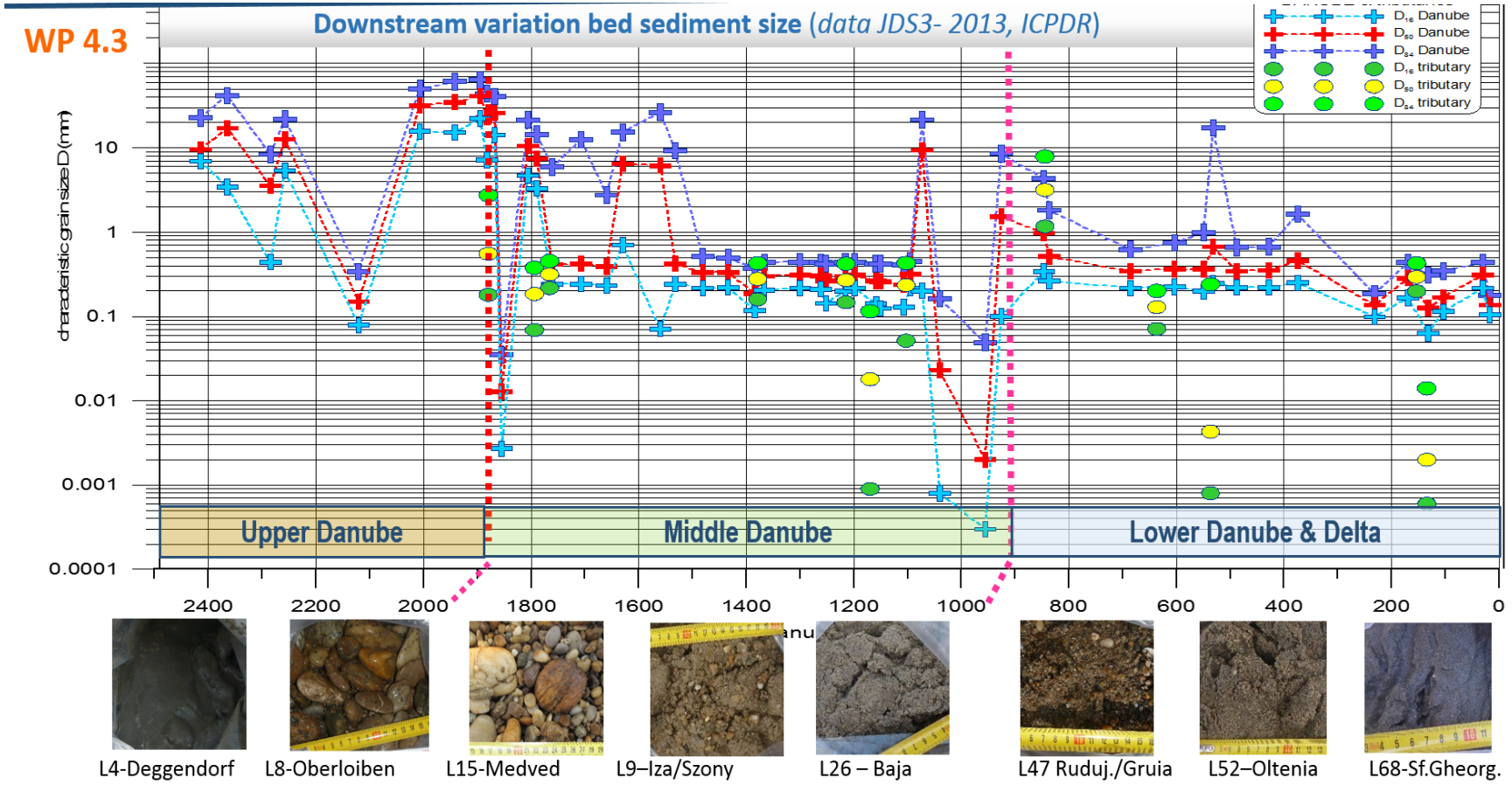
- *Morphological changes (e.g. longitudinal variation of bed material)*



WP5: Impacts and measures

- *Report on sustainable, practical measures and recommendations (e.g. reconstruction of groynes)*

WP5: Impacts and measures

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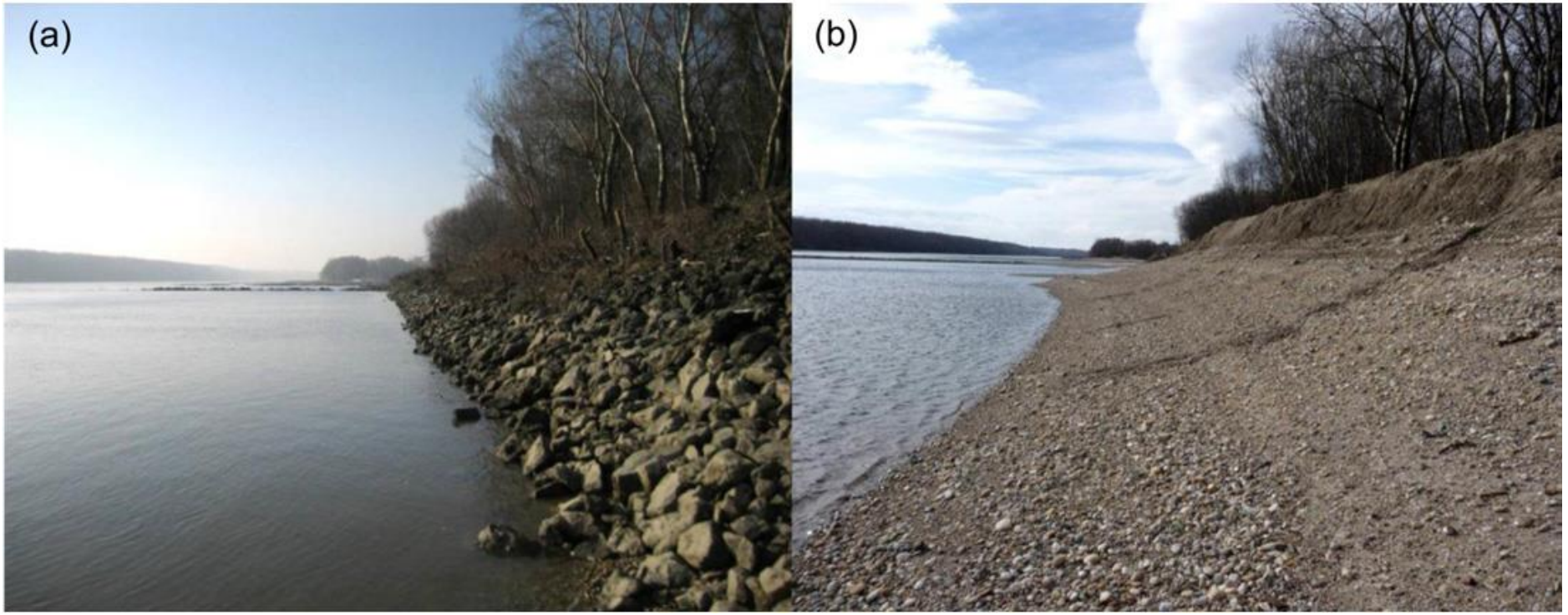
- *Report on sustainable, practical measures and recommendations (e.g. river widening – bank erosion)*



Danube Sediment Management Guidance (DSMG)

Contents

- Statement of problems and needs
- Suggestions for an improved monitoring
- Sediment budget
- Practical measures
- Key question → **Are sediments a significant water management issue?**
- Recommendations

→ **Danube River Basin District Management Plan and Flood Risk Management Plan for the Danube River Basin District**

Sediment Manual for Stakeholders (SMS)

Sediment Manual for Stakeholders (SMS):

will be prepared explaining how to implement the DSMG. This tool will provide **know-how** as well as **good practices** for all the **relevant stakeholders.**

The SMS will contain legal background information, boundary conditions, state of the art, research demands, organizational issues and fact sheets of measures.

Sediment Manual for Stakeholders (SMS)

Subdivided in topic related chapters:

Hydropower	Navigation	Flood risk management	River basin management incl. ecology
			

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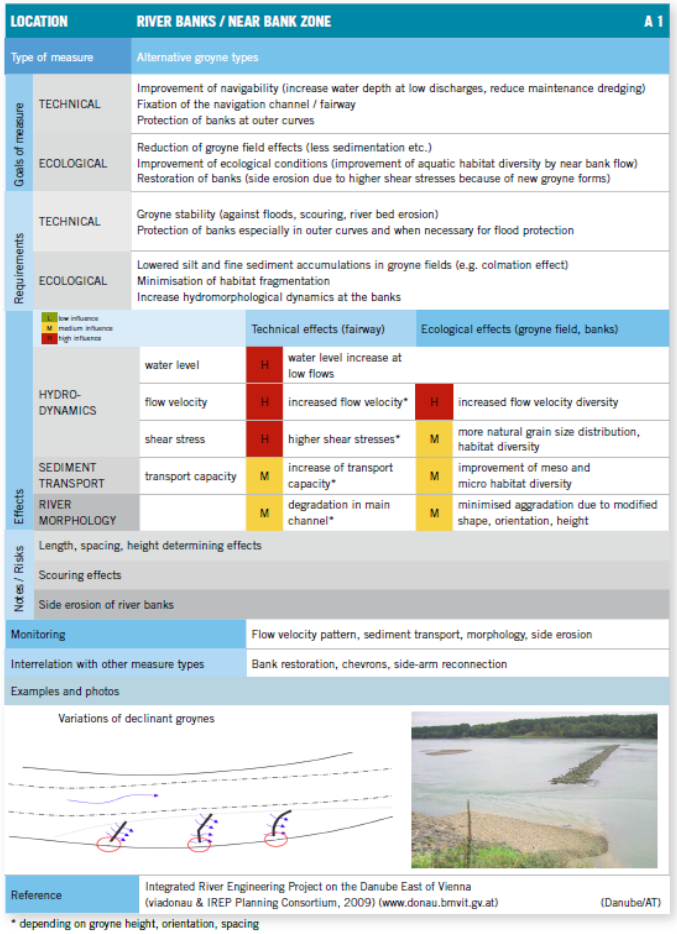
Sediment Manual for Stakeholders (SMS)

Good practice examples:
described in a standardized way
incl. figures, tables, photos and a
summary of practical experiences



LOCATION	RIVER BANKS / NEAR BANK ZONE					A 1
Type of measure	Alternative groyne types					
Goals of measure	TECHNICAL	Improvement of navigability (increase water depth at low discharges, reduce maintenance dredging) Fixation of the navigation channel / fairway Protection of banks at outer curves				
	ECOLOGICAL	Reduction of groyne field effects (less sedimentation etc.) Improvement of ecological conditions (improvement of aquatic habitat diversity by near bank flow) Restoration of banks (side erosion due to higher shear stresses because of new groyne forms)				
Requirements	TECHNICAL	Groyne stability (against floods, scouring, river bed erosion) Protection of banks especially in outer curves and when necessary for flood protection				
	ECOLOGICAL	Lowered silt and fine sediment accumulations in groyne fields (e.g. colmation effect) Minimisation of habitat fragmentation Increase hydromorphological dynamics at the banks				
Effects	L low influence M medium influence H high influence		Technical effects (fairway)		Ecological effects (groyne field, banks)	
	HYDRO-DYNAMICS	water level	H	water level increase at low flows		
		flow velocity	H	increased flow velocity*	H	increased flow velocity diversity
		shear stress	H	higher shear stresses*	M	more natural grain size distribution, habitat diversity
	SEDIMENT TRANSPORT	transport capacity	M	increase of transport capacity*	M	improvement of meso and micro habitat diversity
	RIVER MORPHOLOGY		M	degradation in main channel*	M	minimised aggradation due to modified shape, orientation, height
Notes / Risks	Length, spacing, height determining effects					
	Scouring effects					
	Side erosion of river banks					
Monitoring	Flow velocity pattern, sediment transport, morphology, side erosion					
Interrelation with other measure types	Bank restoration, chevrons, side-arm reconnection					
Examples and photos						

Variations of declinant groynes

Reference	Integrated River Engineering Project on the Danube East of Vienna (viadonau & IREP Planning Consortium, 2009) (www.donau.bmvit.gv.at)	(Danube/AT)

* depending on groyne height, orientation, spacing

Interaction with Stakeholders

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- Through Partners and Associated Strategic Partners (e.g. Plovput, ICPDR, WWF, VERBUND, ...)
- International Stakeholder Workshops
- National Stakeholder Workshops
- Interconnection with parallel projects

Thank you for your attention!

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