Abiotic characteristics of Lowland Rivers and the Challenges in Restoration

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Session 12: Lowland Rivers in Central Europe – Characters and Perspectives

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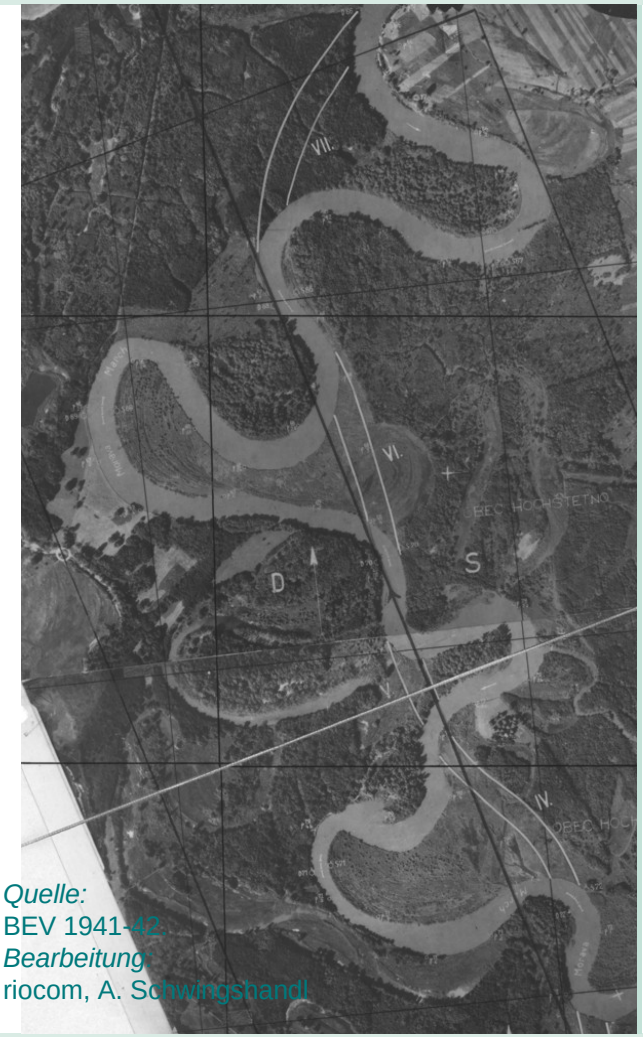
Morphological Characteristics



Quelle:
BEV 1941-42.
Bearbeitung:
riocom, A. Schwingshandl

Natural situation:

- sections with meandering course,
- low longitudinal slope, flat and wide floodplains,
- comprehensive network of side arms and channels,
- heterogenous spectrum of channel morphology (width / depth, structure of riparian zone and river bed),
- flood events and sediment dynamics as actuating variables in the ecosystem.

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River Training Works

Objectives of river training:

- Improvement of land utilization.
- Reduction of flooding.
- Improvement of shipping conditions.
- Fixing of border between neighbouring states.
- …

Source:
Archiv der Bundeswasserbauverwaltung im Bundesministerium für Verkehr, Innovation und Technologie, Abteilung IV/W3.
Digital reproduction: Gerald Benz
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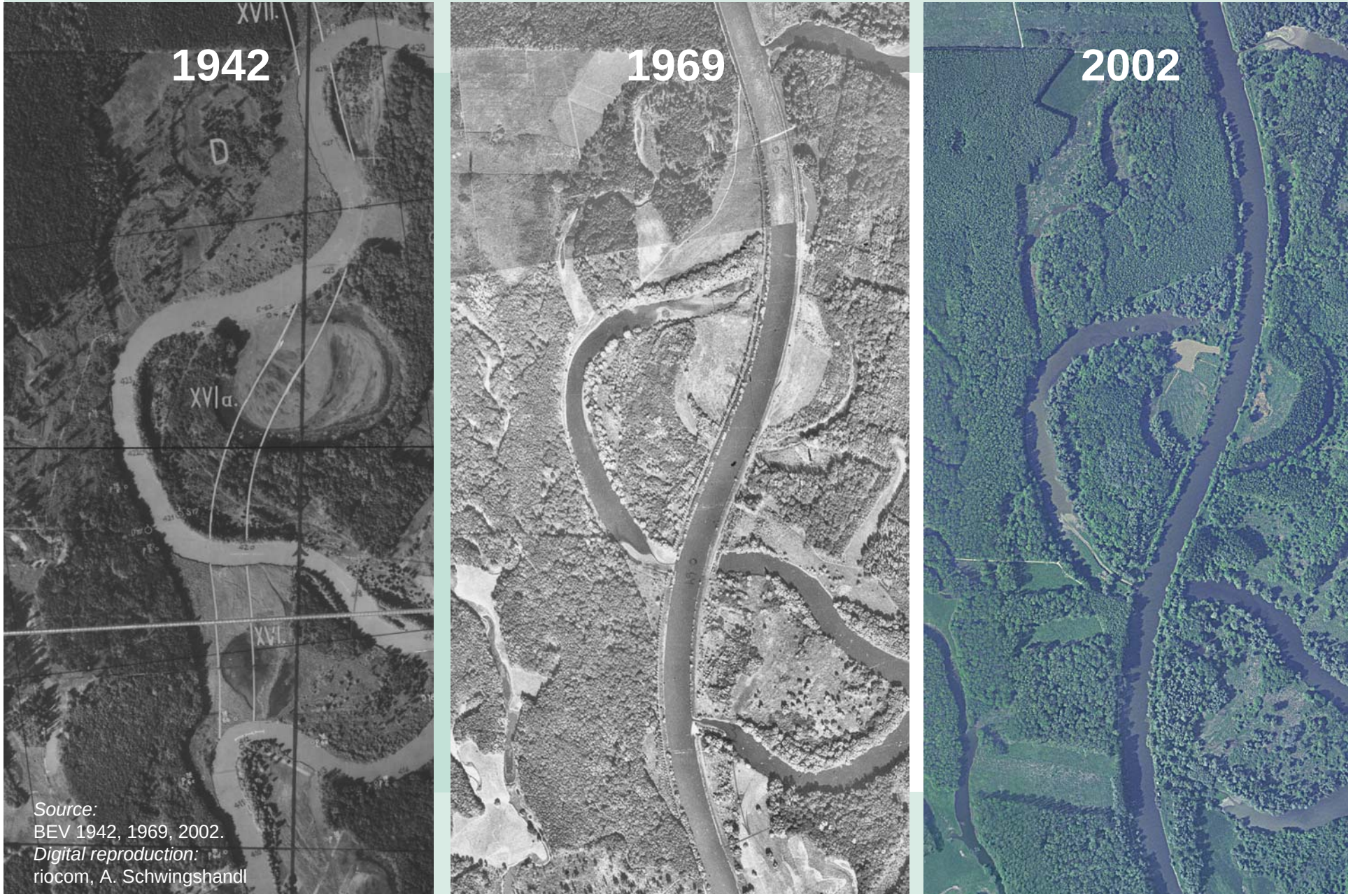
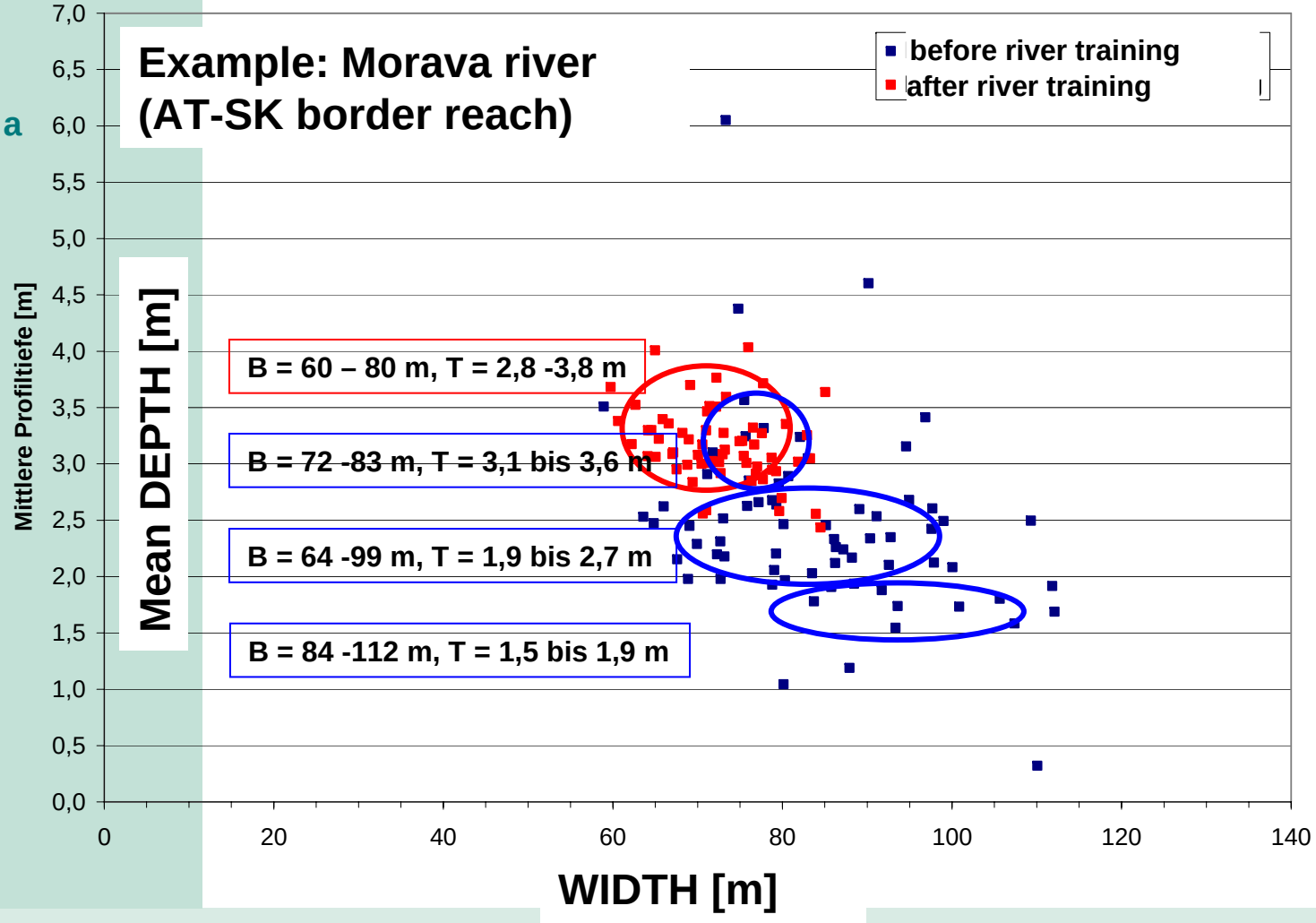
Results of River Training – example Morava river



River Training - Effects on River Channel Morphology

The situation before river training shows a wide spectrum of river channel geometry (depth/width ratio).

By river training works a standard cross section is implemented, indicated by a monotonous channel geometry.



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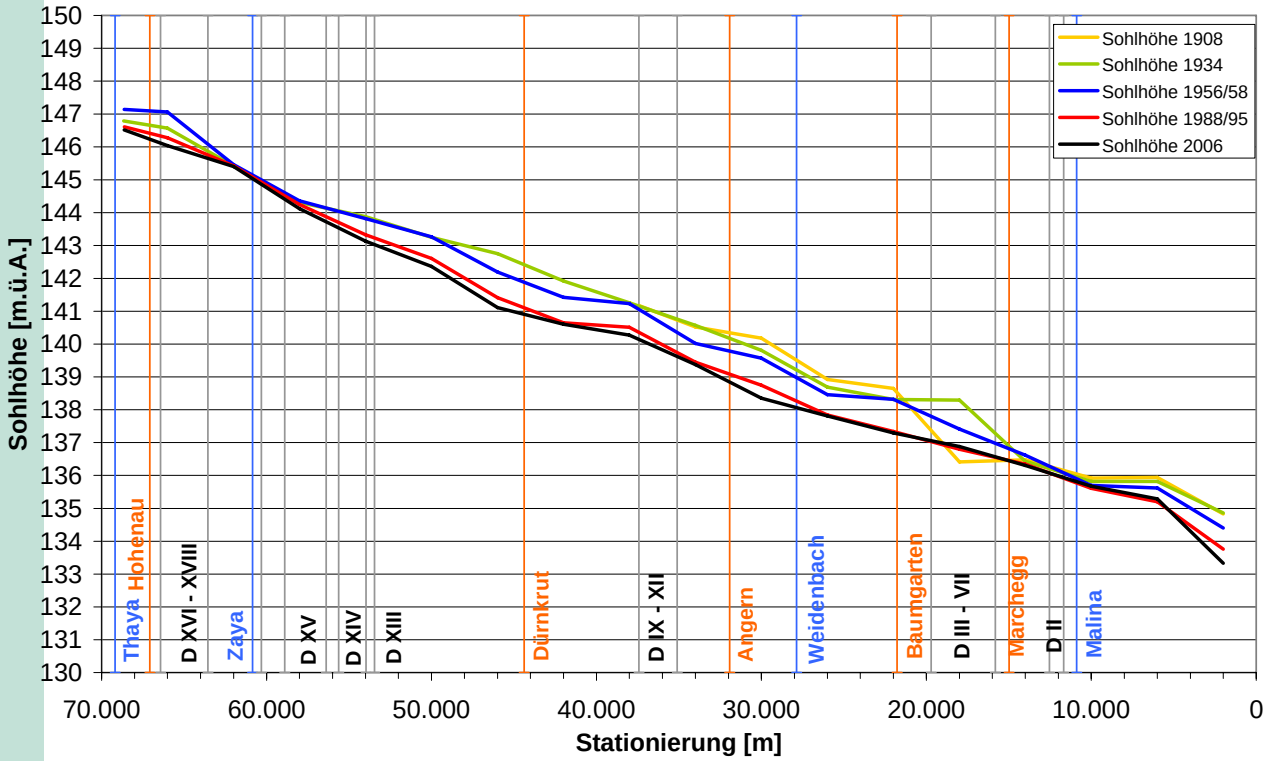
River Bed Elevation

Example Morava river (AT-SK border reach):

For river reach Km 59 to 16 a river bed erosion in a range of > 1 metre is to be observed (comparison measurement 1956/58 to 2006).

An ongoing process of the river bed erosion is not to be determined, except in the reach of river mouth (due to Danube bed erosion).



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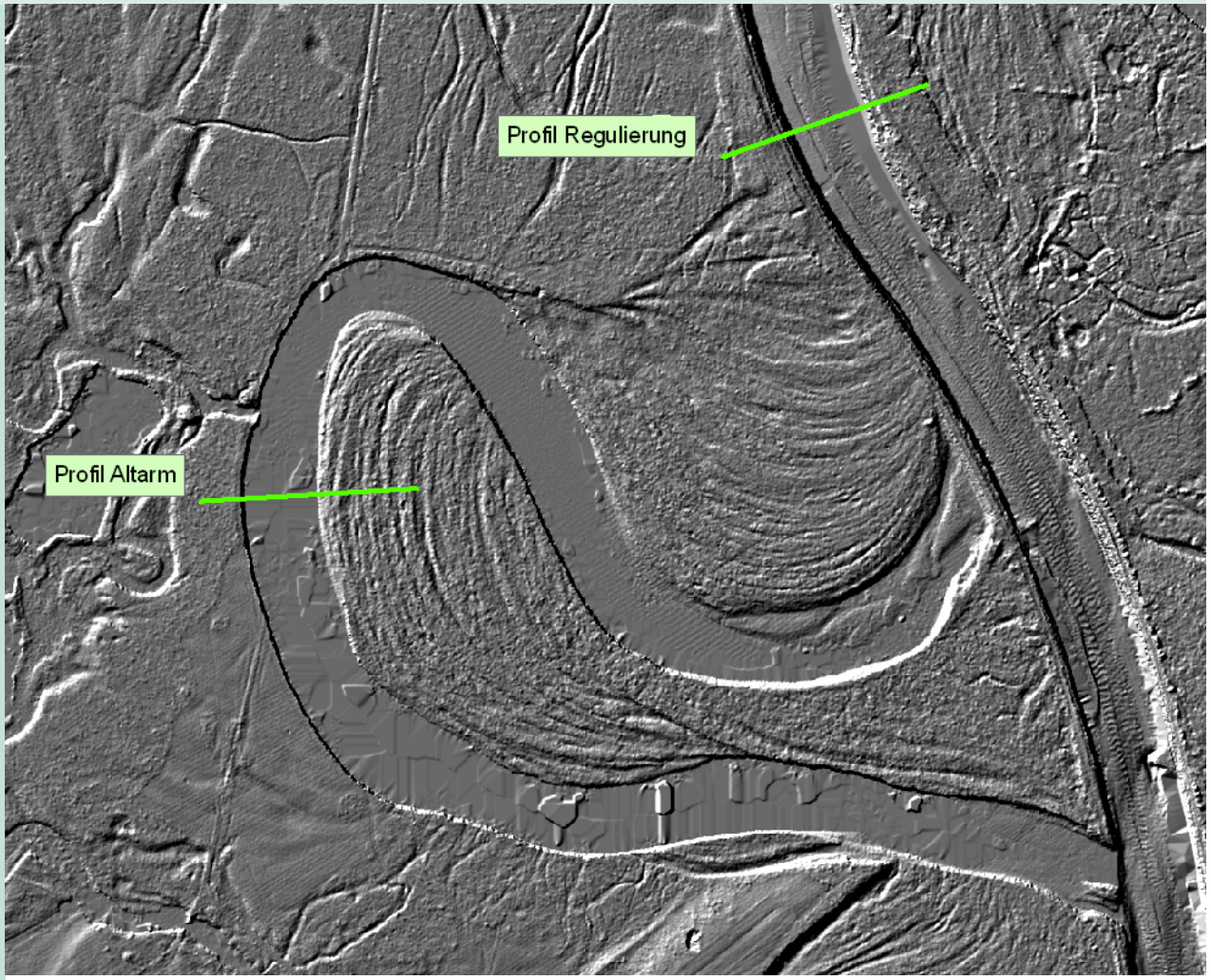
Morphological Dynamics: Erosion - Sedimentation

The laserscan DTM shows typical patterns of lowland river flood plain topography, which is generated by the dynamics of erosion and sedimentation:

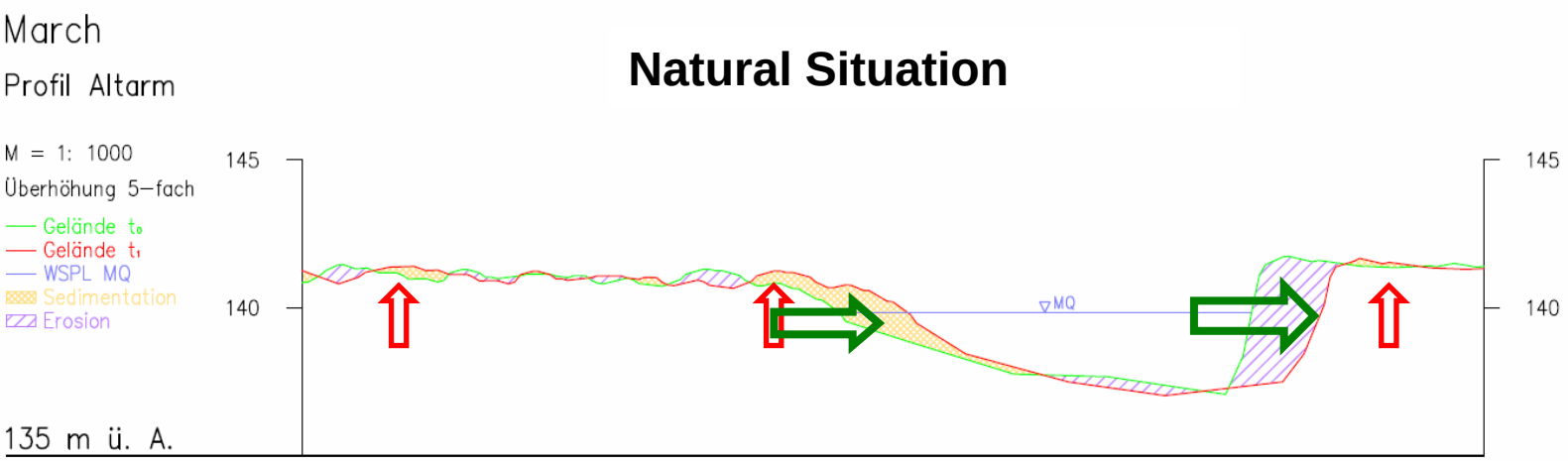
erosion on the concave river bank makes the river channel migrate, the ridge which has been sedimentated by prior floods, is eroded,

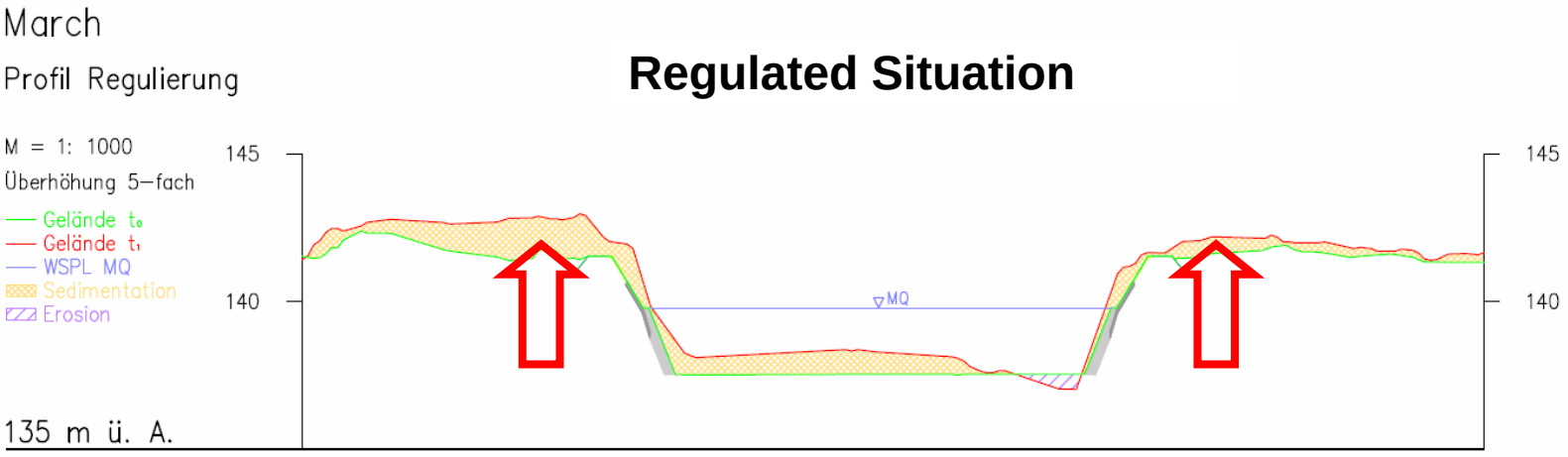
on the convex bank, the prior sediment ridge is left behind by the migrating channel and the sediment bank increases.



*Grafics source: N*um. 2D-Modell für March und Thaya in A, SK und CZ.
ARGE riocom-IB Humer-Aquasoli. *Contracted by:* **via donau und Land NÖ-WA2**

Morphological Dynamics: Erosion - Sedimentation





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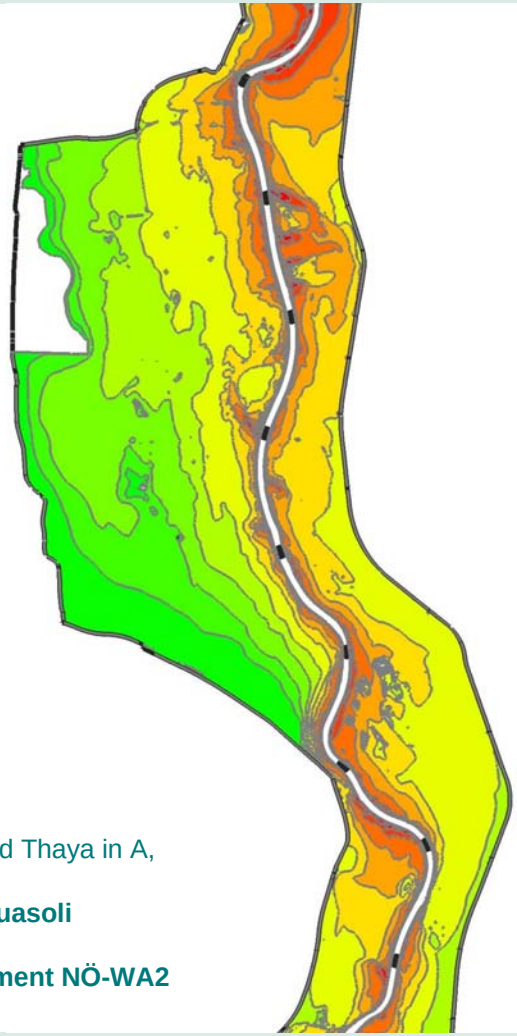
Suspended load dynamics

Suspended load modelling (31 years simulation horizon).



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Num. 2D-Modell für March und Thaya in A, SK und CZ.
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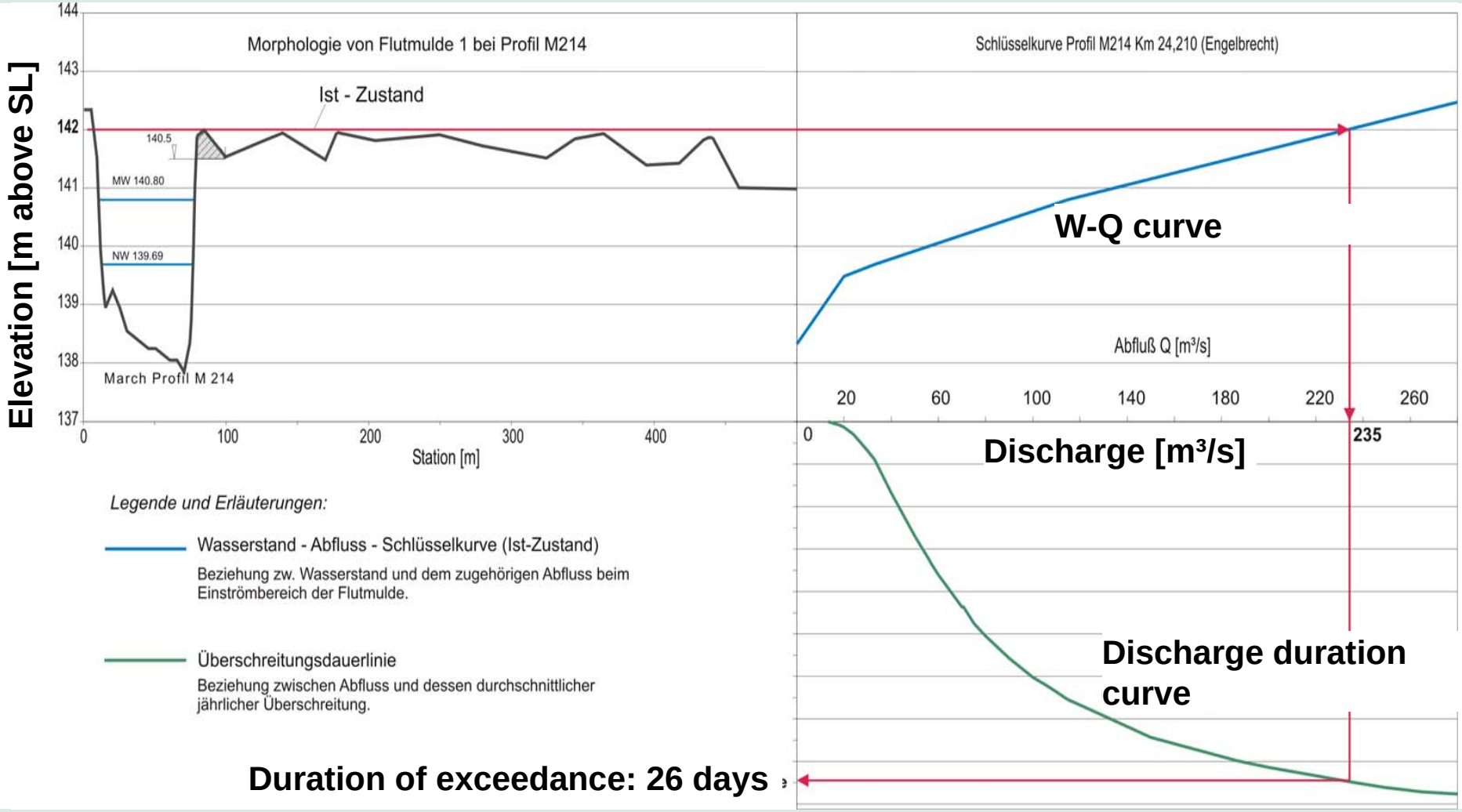
Morphologic changes – Effects on Lateral Connectivity



Duration of exceedance: 26 days

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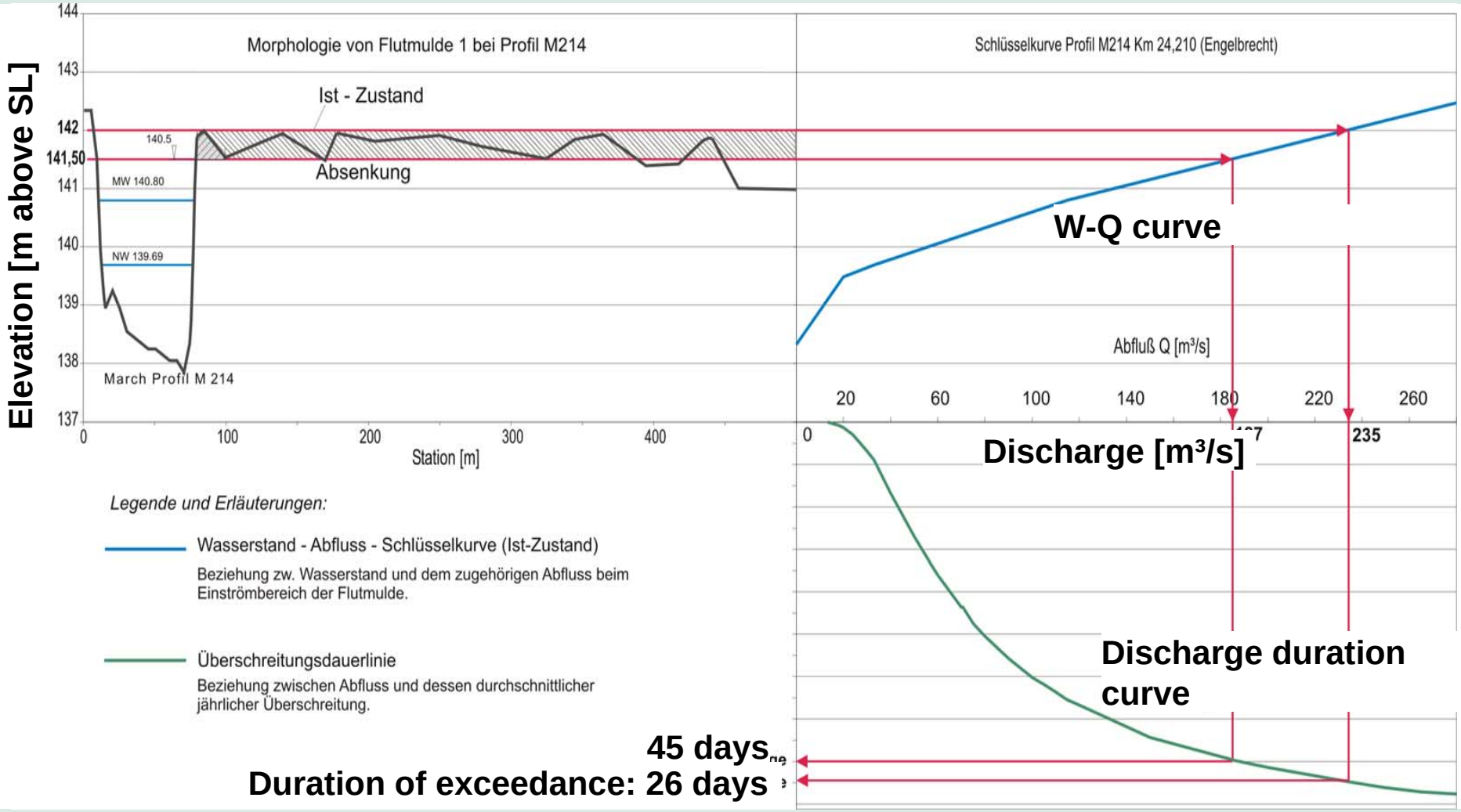
Quelle: Hydromonitoring für die Maßnahmen an der March in Marchegg Km 15-25. **riocom, A. Schwingshandl**
Im Auftrag: **Wasserstraßendirektion / via donau**

Morphologic changes – Effects on Lateral Connectivity



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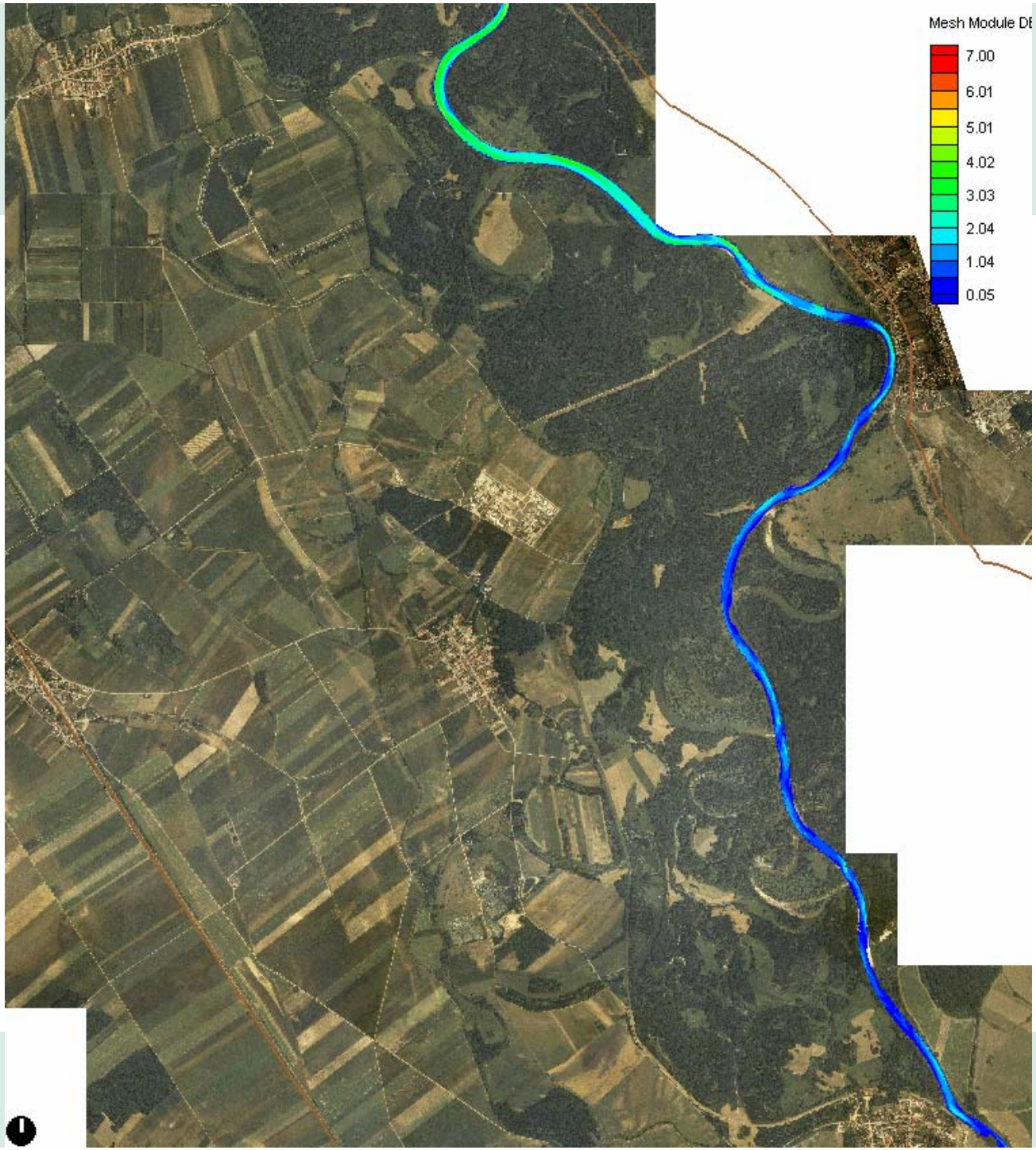
Conclusions for Restoration Strategies

Topografic impoundments and obstacles are of high significance for inundation dynamics of lowland river floodplains,
Measures of reactivating of side channels can improve lateral connectivity.



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Num. 2D-Modell für March und Thaya in A, SK und CZ.
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Im Auftrag:
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Conclusions for Restoration Strategies

- Lowland rivers which are highly modified by river training works „do not function“ on a mid and long term perspective:
  the sedimentation processes along river banks cause **continuous heightening of river banks**, lateral connectivity decreases,
  process of river bed erosion may be (re)started (again),
  with water management & land use deficits and further ecological degradation as consequences.
- Restoration works at lowland rivers need to be similar „reset-events“ as the training works, to **effectively restore the abiotic framework conditions** of the river ecosystem.
  As the hydrodynamic potential for a self-dynamic development is low, initial and punctual measures have small or no effects.

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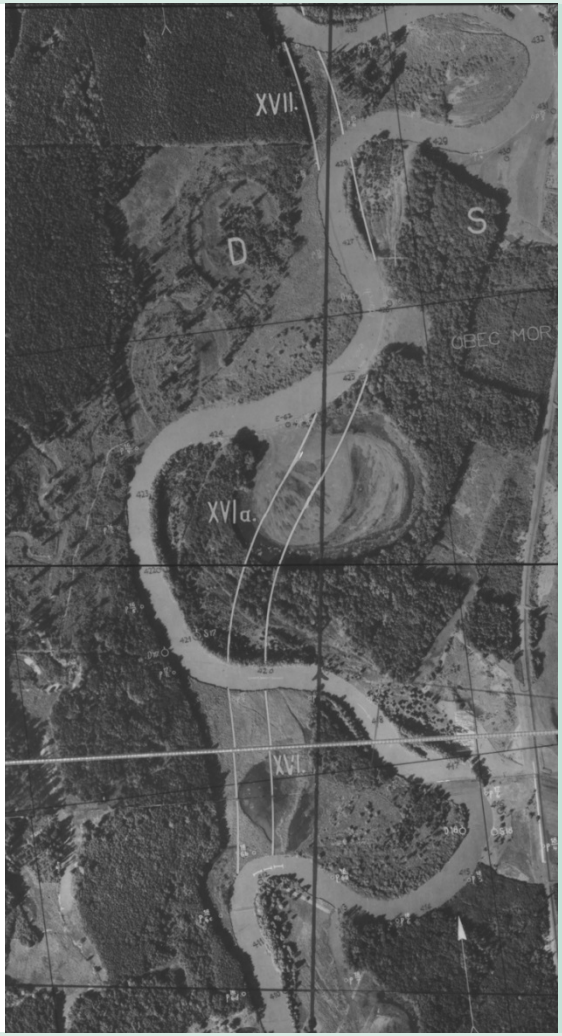
THANKS !



- We thank all clients

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  for great cooperation !

- Thank You for Your interest and attention !

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