



River restoration in Austria

Current situation | potential | case study: Morava River



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Situation of rivers in Austria

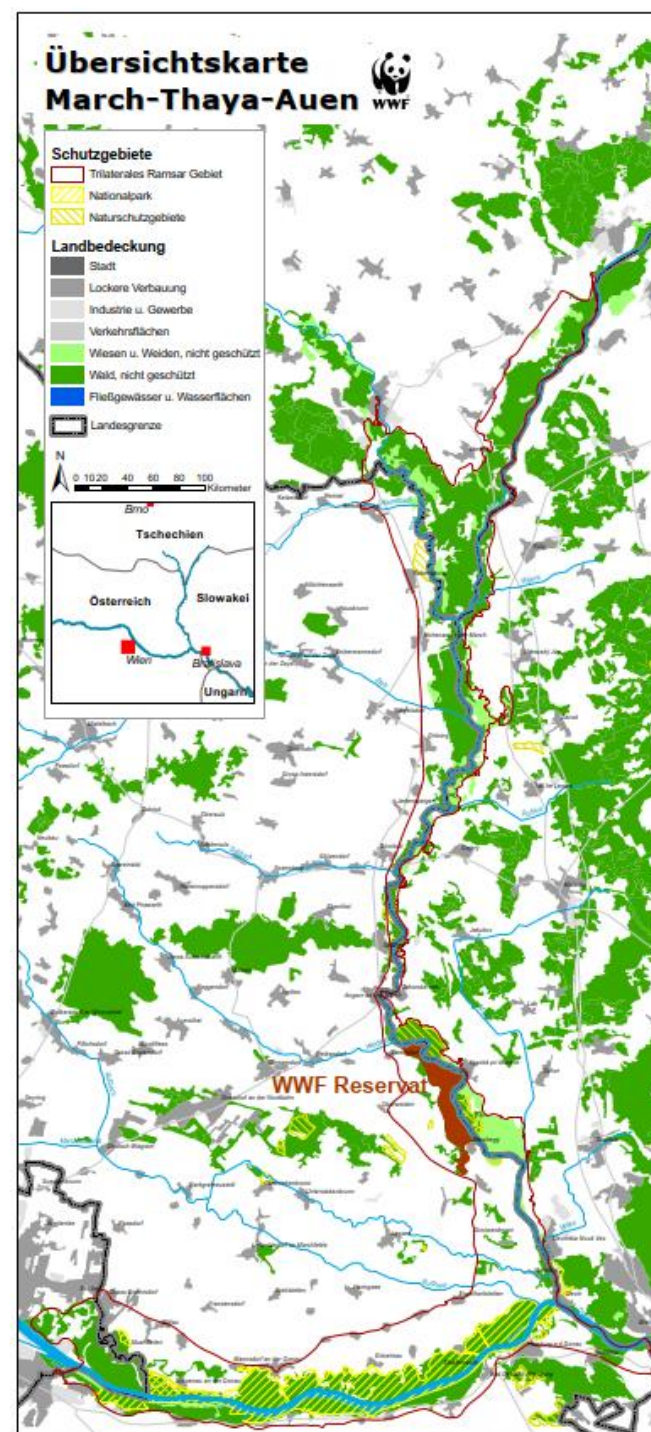
The Morava – overview

The Morava – threats and needs

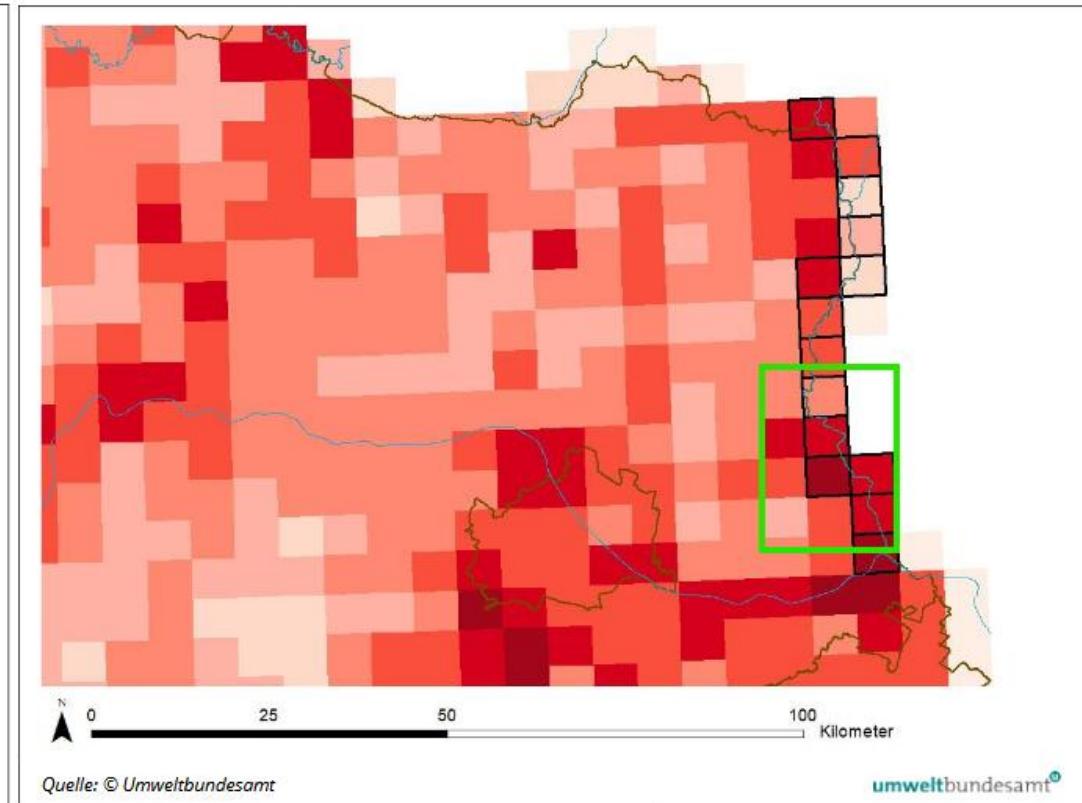
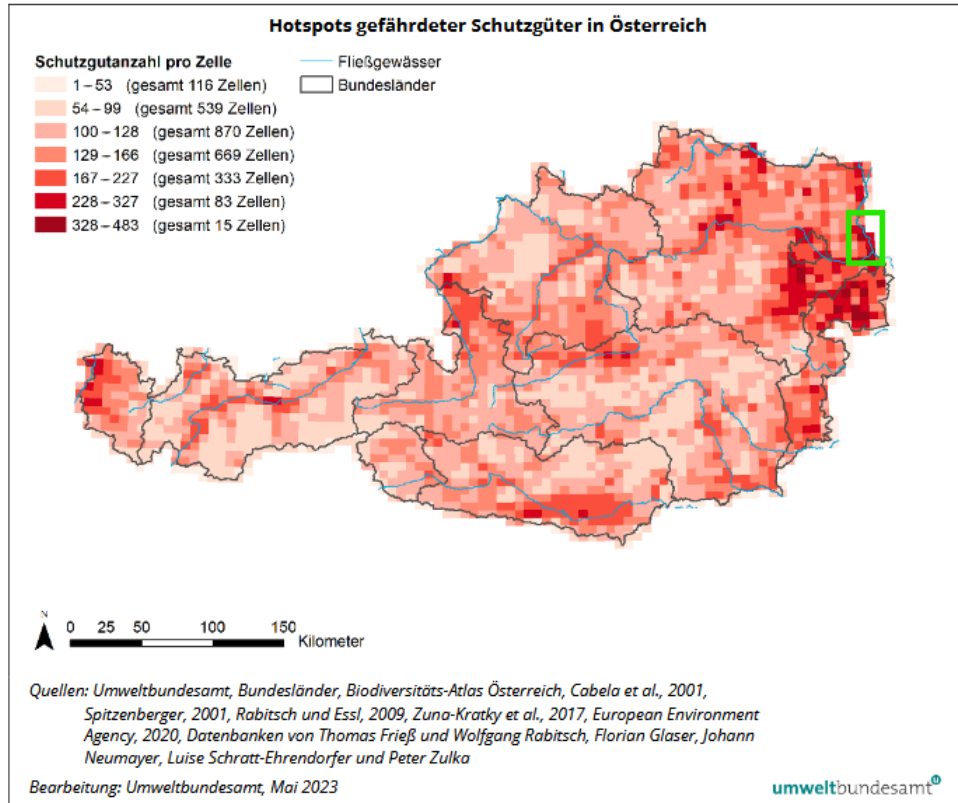
The Morava – restoration projects

The Morava – Presence and future plans

1. Overview



Danube and Morava floodplains: biodiversity hotspot





2. Threads and needs

The situation of our rivers

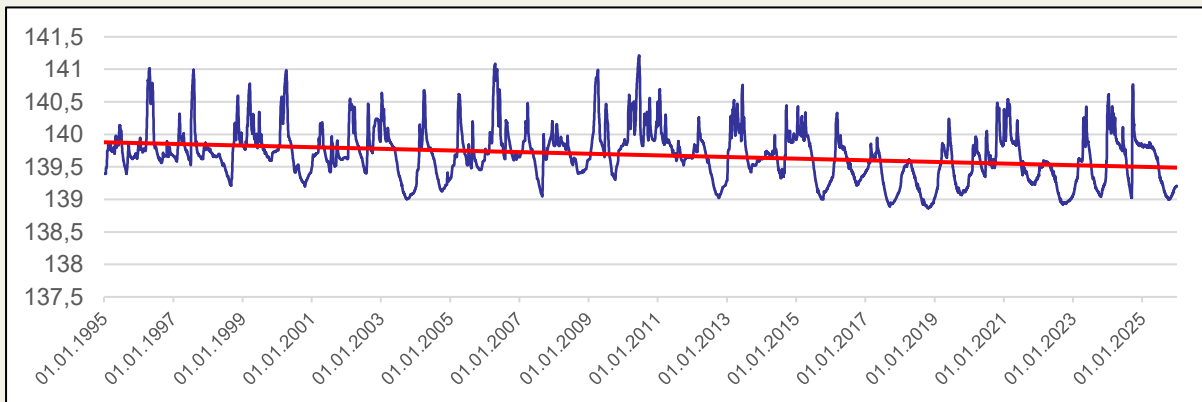
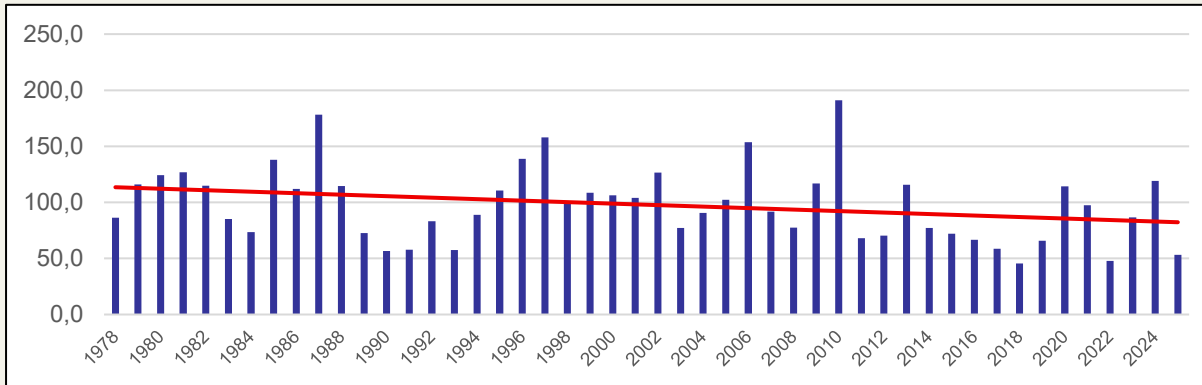
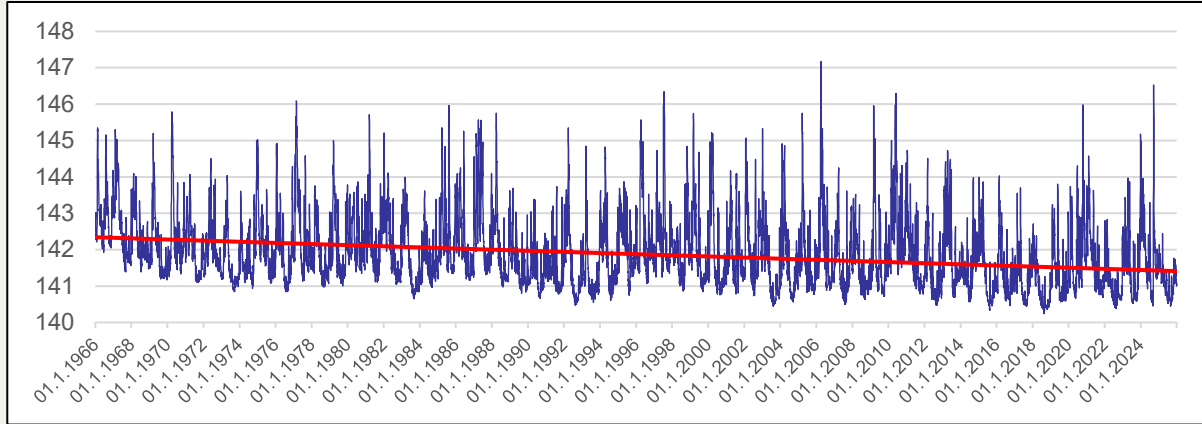


How many of our rivers and landscapes look like that?





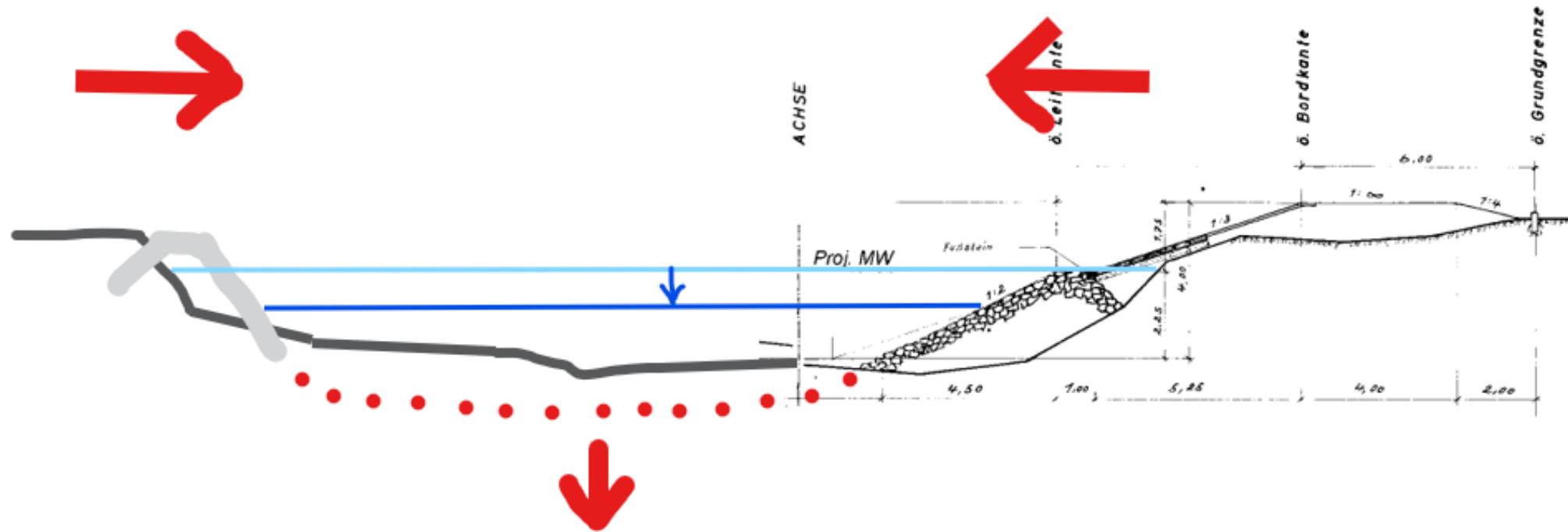
Morava: tendencies in river water level, river discharge and ground water table



Datenquelle: Land Niederösterreich – atlas.noel.gv.at



River regulation: narrowing of river bed leads to stronger soil erosion



Natural rivers: **dynamic balance between river, bank and bed**

River shorter and narrower -> water flows faster -> more erosive force

Banks artificially protected by stones -> no more bank erosion

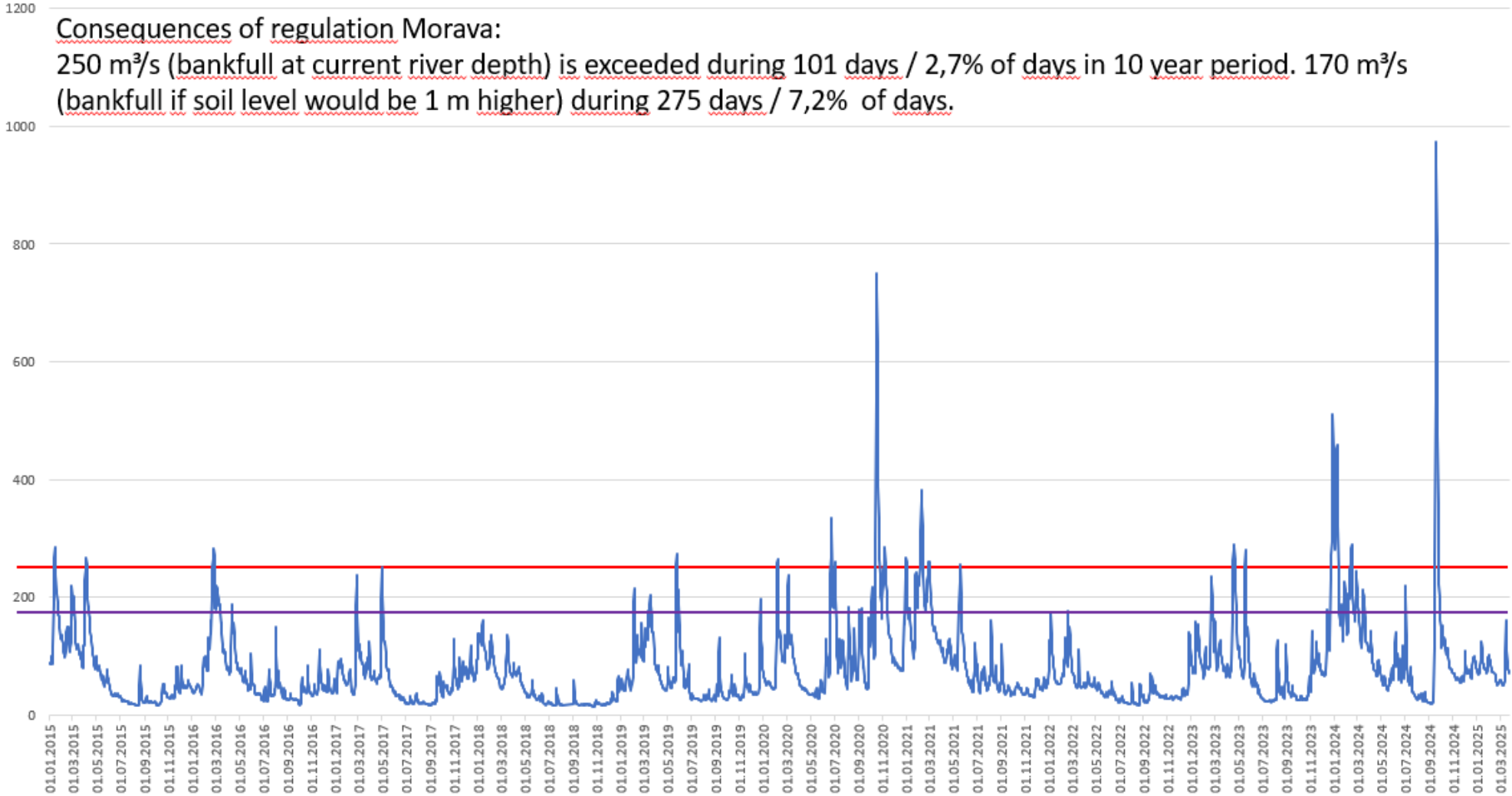
Instead only soil erosion -> rivers digs itself into bed, water table and groundwater table fall



Morava: regulation during 20th century strongly reduced duration of 'bankfull events', flooding dynamics and erosive potential

Consequences of regulation Morava:

250 m³/s (bankfull at current river depth) is exceeded during 101 days / 2,7% of days in 10 year period. 170 m³/s (bankfull if soil level would be 1 m higher) during 275 days / 7,2% of days.



The Morava river - regulation



River regulation and dike (border reach AT-SK)

Channelization

cutting off every side arm and meander, longitudinal and transversal regulation

Straightening and shortening the river course (border AT-SK: from 80 km to 69 km)

River bank stabilization

riprap and concrete blocks on 75 % of the river bank

Regulated and standardized width of ca. 70 m (before varying between 30 and 300 m)

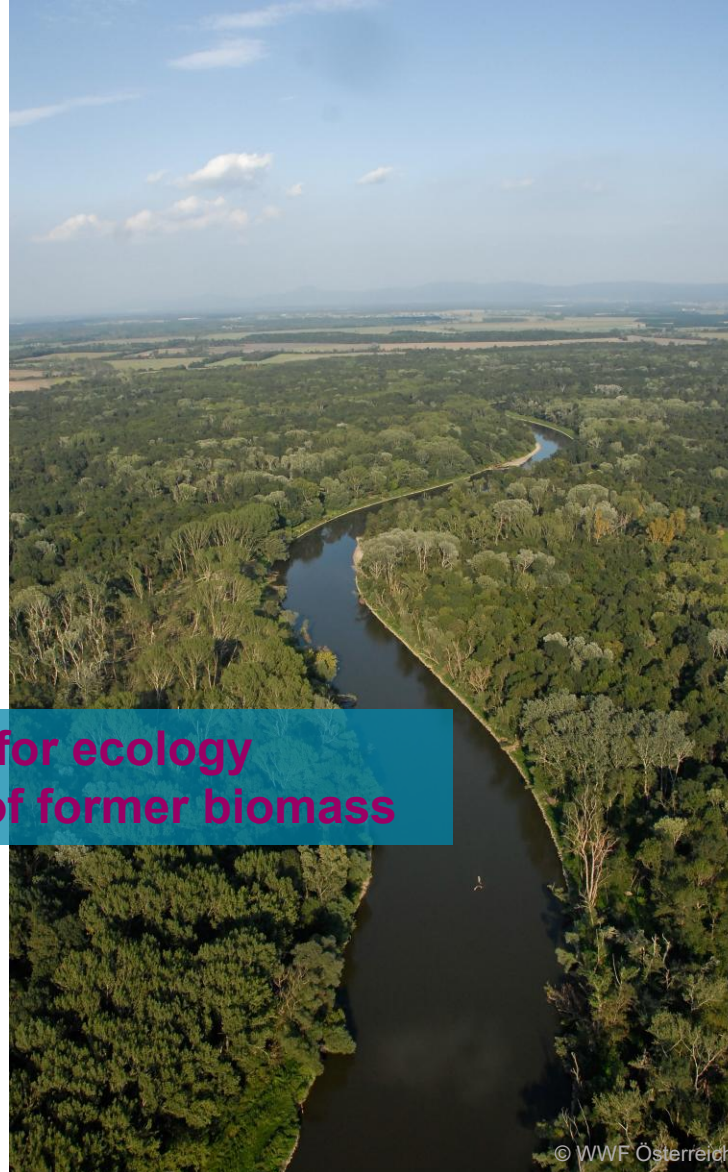
Flood protection dike

built between 1911 and 1967 in AT and SK (HQ₁₀₀)

Reasons

- Flood protection (drain water quickly from the landscape)
- Gaining land for agriculture and infrastructure
- Border security (easier surveillance of the "Iron Curtain")

The Morava river - regulation and consequences



→ Dramatic consequences for ecology
e.g. for fish: only 5-10% of former biomass

River regulation and dike – the consequences

Channelization

Increase in flow velocity → increase in drag force → regressive erosion river bed deepening (up to 2 m) → falling groundwater level (> 1 m)

Bank stabilization

Lateral erosion no longer possible → promotes deepening
Sediment is deposited on the bank during floods → no erosion due to bank stabilization → Decoupling of river and floodplain → Water supply to the floodplain severely restricted

Flood protection dike

Reduction of the alluvium by two thirds of the area and in width to 300 m - 3 km (previously 3-8 km!) → Floods have less space, higher waves



3. First restoration projects

The Morava river – first restoration projects



1. EU LIFE project 1995-1998

Focus on floodplain meadows (grazing)
forests (pollard willows, deadwood) and
creeks and pits, and certain species

No restoration work in / on the river



2. EU LIFE project 1998-2003

Focus on river

Re-connecting meanders, break up riparap, re-
structuring river banks (in small reaches) by
small groynes

Lessons learned:

→ just short term effects

→ too few, too small measures



The Morava River – LIFE „Untere March-Auen“ „Lower Morava floodplains“



3. EU LIFE project 2011-2019

Mixed focus on river and floodplains

Connection of more than 7 km of *side arms*

Total removal of more than 400 m of *riprap*

Linking river and floodplain by improving the water supply to a more than 20 km system of backwaters

Securing more than 20 ha of *temporary waters* by management agreements

Restoration and protection of more than 18 ha of FFH *floodplain meadows*

Pilot project for *year-round grazing* (Konik horses) on over 70 ha of pastureland

Specific measures for certain species



© Michael Stelzhammer



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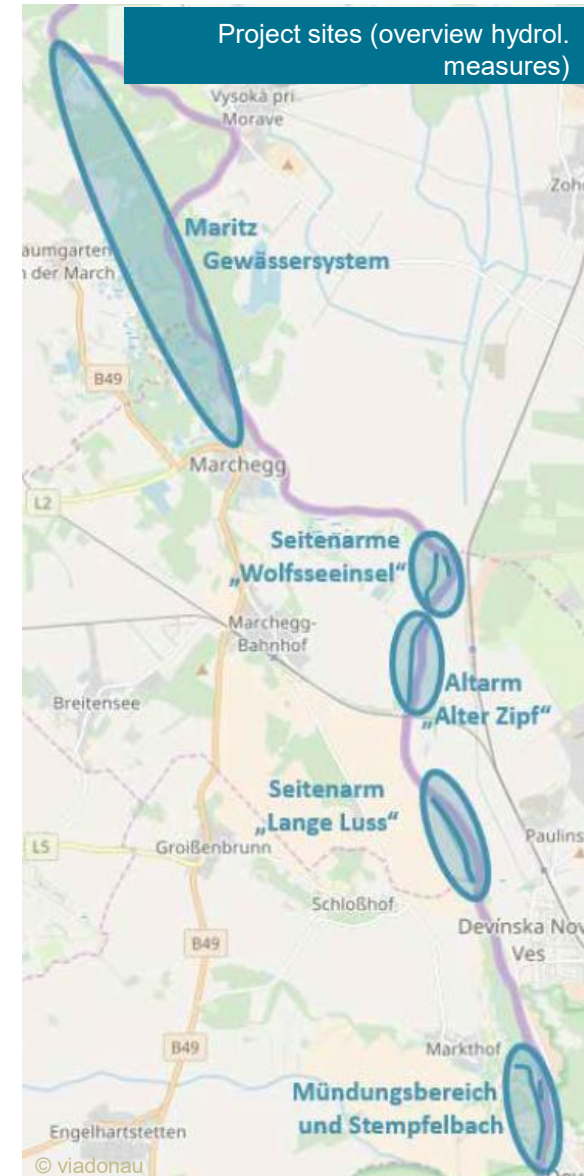
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© Christoph Roland



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The Morava River – LIFE „Untere March-Auen“

Hydraulic engineering measures

Difficulties / Obstacles

- Middle line of the river is flexible border line between Austria and Slovakia
- No commitment AT-SK for restoring the river (possible change of the border)
- Lessons learned from former projects (groynes, short or just partly riprap removals, meander re-connection)

→ Main focus on first 15 km (braided stretch)

Side-arms easier to re-connect than meanders

no border issues



LIFE „Untere March-Auen“ – restoration old side arms



Confluence stretch

Measures

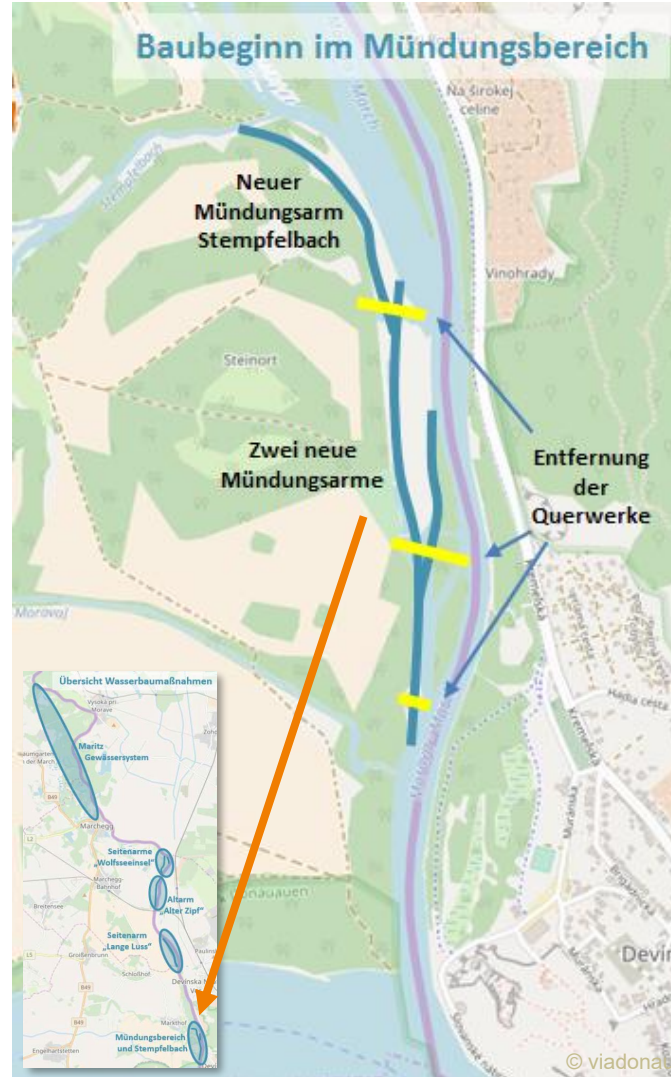
Removing 3 transversal barriers

Selective opening of bank stabilization

→ 5 new river islands

→ 1,8 km of reconnected new side arms

→ 900 m of typical tributary creek mouth



LIFE „Untere March-Auen“ – restoration old side arms



Confluence stretch



LIFE „Untere March-Auen“ – restoration old side arms



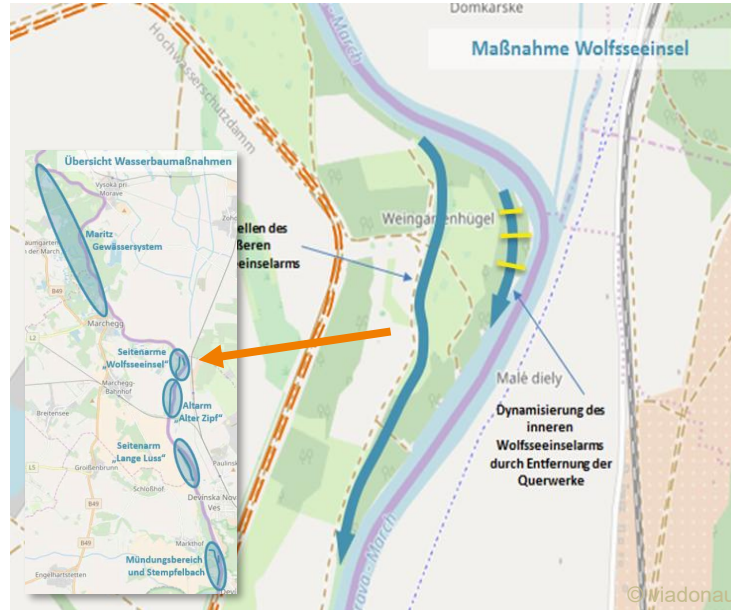
“Wolfsseeinsel” side arms

Measures

Re-digging of two completely silted-up former side arms (6 m width; initial ditches)

Removing 3 transversal barriers

→ 1,2 km of reconnected side arms



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LIFE „Untere March-Auen“ – restoration old side-arms



“Wolfsseeinsel” side arms



© viadonau

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LIFE „Untere March-Auen“ – results



So much effort - what for?

First post-monitoring (2019, only one year after finishing construction work): fish, mollusca, birds, amphibies, vegetation, invasive species, morphology

e.g. fish population

→ There were 3 times as much juvenile fish biomass in the side arms than before the reconnection.

→ In areas with deadwood in the water, the density of individuals was 7 times higher than on the regulated river bank.

The 2022 monitoring showed similar results, but a not really constant positive upward trend.

→ lessons learned

Side arm reconnections can help biodiversity, BUT for a long term improvement we have to work with / on the whole river system!.



only 5-10% of former biomass, but all typical species
→ high potential for restoring the river and floodplains and we have a high responsibility for it!

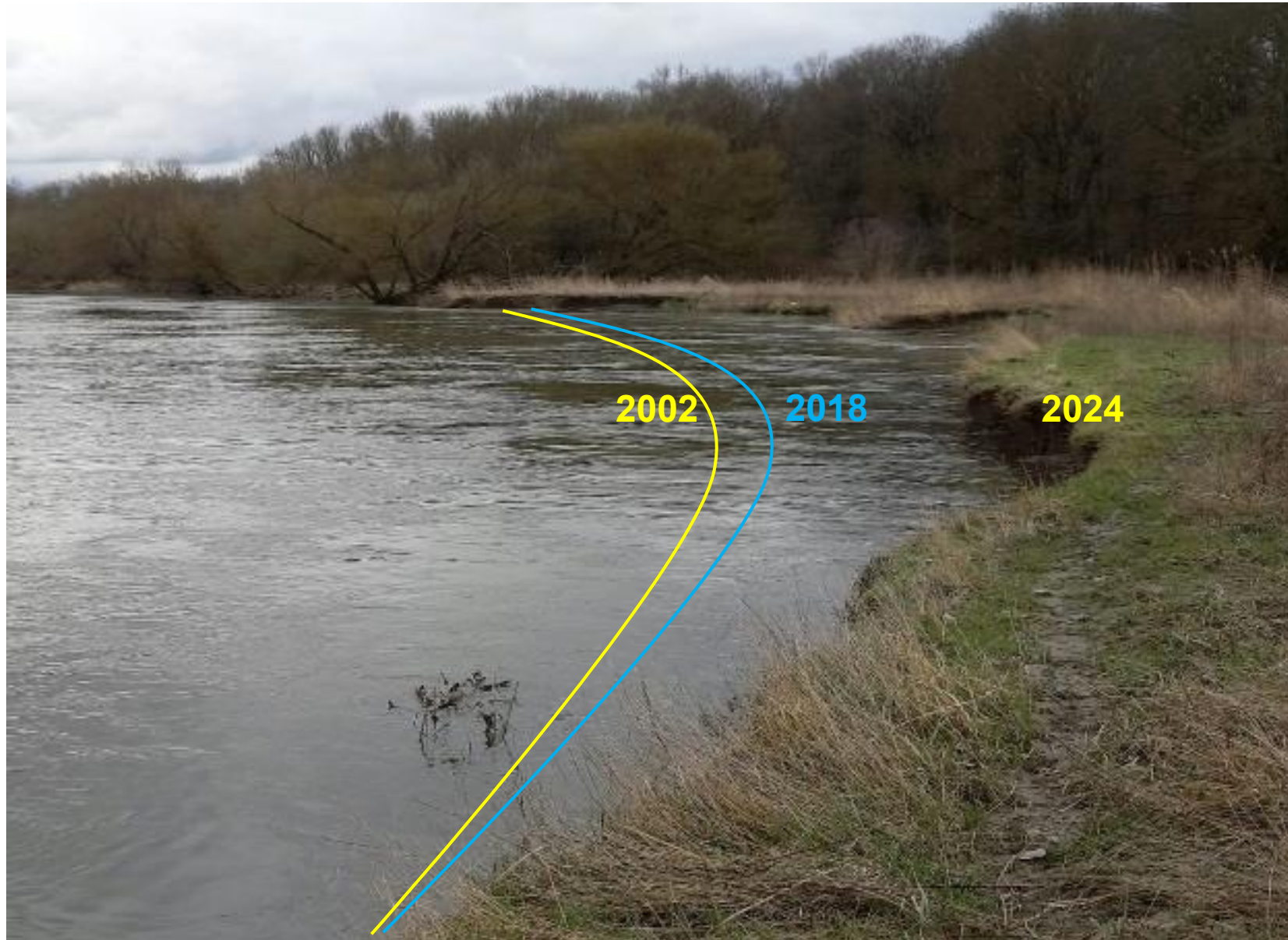


The sandbanks in the side arms are colonized by **little ringed plovers** and **sandpipers**.

Next project (viadonau, 2022): 700 m natural bank restoration.
Removal of stones (riprap), appr. 5-10 m³ per m bank length



Important lesson: bank erosion and restoration of natural dynamic situation go very slowly! All stones must be removed, especially at the river bottom. Otherwise hardly any dynamics.



4. Current situation and future plans

The Morava River – developments and future plans



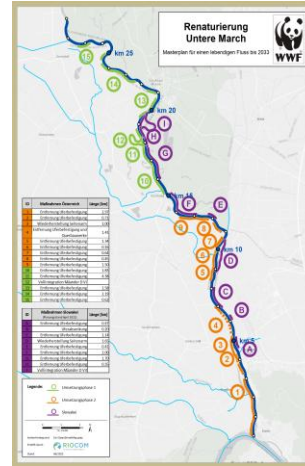
Future restoration plans

Motto: Keep water in the landscape for as long as possible!

...for the coming years and decades(?)

to make the **best possible use of the water storage capacities of the landscape**, by

- restoring the main river and tributaries
- re-connecting Morava with its floodplains
- re-wetting wet meadows, alluvial forests, swamps and bogs



Plan for the Lower Morava:

Removal of bank stabilization where ever possible

Pilot site WWF floodplain reserve in Marchegg

- 12 km riprap removal
- Initiating new meandering (instead of re-connecting old meanders)



[Masterplan for restoring the Lower Morava River](#) © WWF Austria, riocom.at

May 2022: **political milestone**
first agreement ever SK-AT for restoring the river and not to follow navigation plans (Danube-Oder-Elbe Channel)



...keep fingers crossed!





**Thanks a lot for
your attention!**

***The only constant is change.
For living river landscapes!***

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Mulde River, near Dessau, Germany © Michael Stelzhammer