

Central European Lowland Rivers – from their ecological situation to a restoration perspective

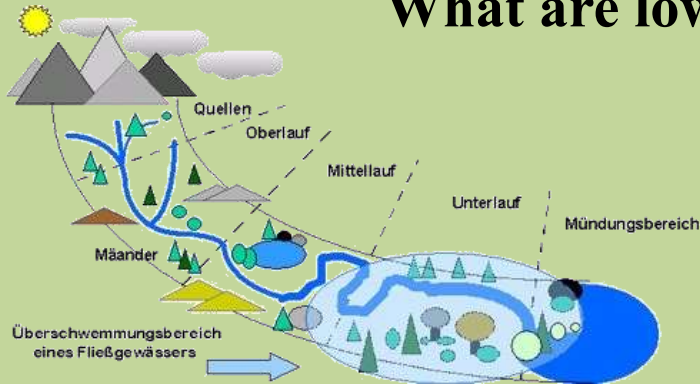
Dr. Werner Lazowski



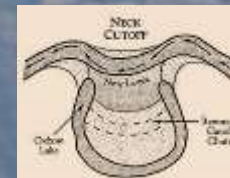
Dir. Miklós Pannonhalmi



What are lowland rivers?



They are situated in low lands, not higher than approximately 300 m above sea level
 Their stream slope is usually less than 1 ‰, so they show low flow velocities
 They reach relatively high water temperatures (Summer $\pm 20^{\circ}\text{C}$)
 Their sediments are mostly fine (fine-grained sand and silt)
 They are meandering
 In this sense lowland rivers are very different to alpine rivers!
 But – exceptions don't break the rules



Sinuosity index (Flussentwicklung)

$$SI = \frac{\text{channel length}}{\text{downvalley length}}$$

Main habitats

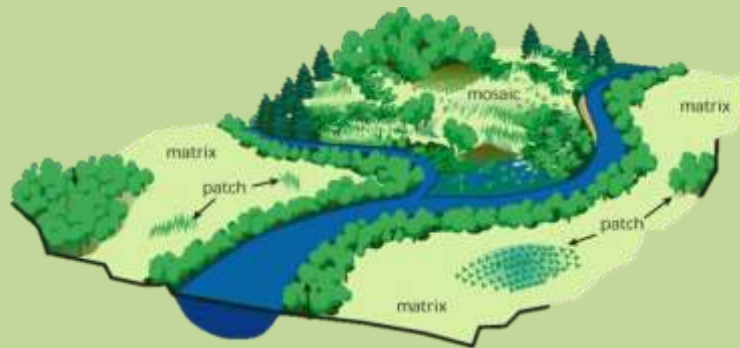


At the water's edge

- Erosion and accumulation zones (meanders, also with successional stages of annual plants, grasses and softwood)
- River[-cut] cliff or cut bank (bluff), point-bars and scroll-bars
- Backwaters with vegetation belts of helophytes, amphiphytes and hydrophytes

Floodplain

- Regularly (annually) inundated sites and aggraded parts with mature soils, the latter sometimes remnants of elder terraces
- Hardwood forest communities
- Typical cultural landscapes of floodplains are pastures and grasslands, which dramatically declined during the last decades







Geographical scope

Pannonian regions of Austria, western Hungary and Slovakia, Southern Moravia (Basin of Vienna, Kisalföld).
In a wider sense some catchment areas of the Carpathian Basin (e. g. Tisza, Drava, Sava, Mureş).

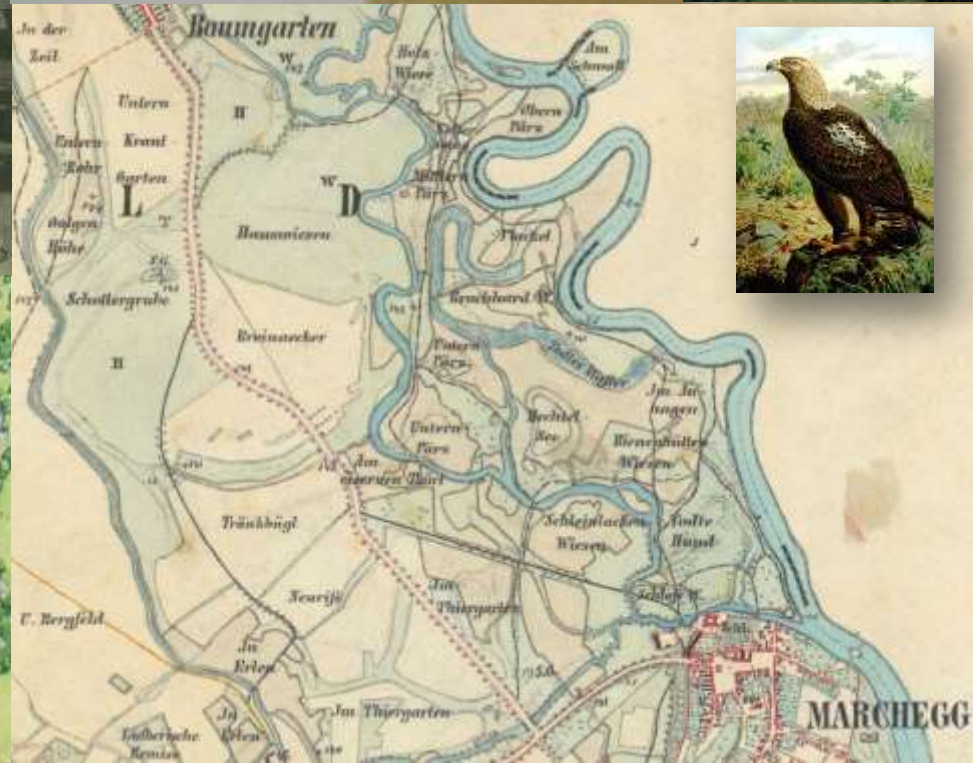
Examples: March/Morava, Thaya/Dyje, Raab/Rába, Lafnitz/Lapins, Leitha/Lajta

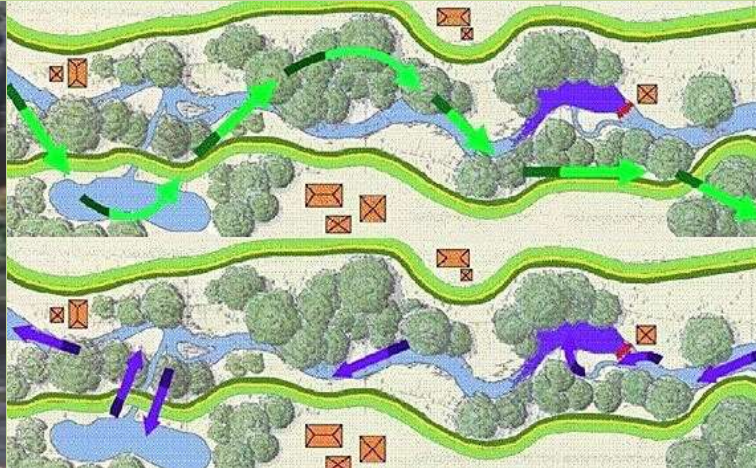


But: natural reference sites became very rare in Europe

For the following biological quality elements data are available for specific areas of the river-floodplain-system:

- Vegetation and flora (incl. algae and amphiphytes)
- Fish
- Birds
- Phyllopoda
- Arthropods, esp. "Soil arthropods, deadwood fauna"
- Amphibians
- Reptiles
- Mammals, esp. game animals
- Insects, e.g. Orthoptera, Odonata, Culicidae
- Molluscs
- Macro invertebrates
- Bryozoa
- Aspects of microbial ecology e.g. "Biofilms"





Anthropogenic change

Human made changes are coming from regulation measures and the incision of the river bed, also from lateral levees and the building up of dams for irrigation and energy production.

River course shortening, discharge acceleration, groundwater deepening and retention curbing are fatal consequences for the whole ecosystem.

Other ecological problems derived from land use changes (forestry, agriculture) and regional socioeconomic developments.



Many problems with floods and sediments along lowland rivers could be mitigated by the restoration of floodplains and river meanders. There is a need for retention and accumulation zones within the whole river space.

Perspectives

Restoration of floodplains by widening the retention zones and by connectivity enhancement.

Restoration of meanders by the reconnection of oxbow lakes with the river (as part of a riverbed restoration plan).

Or through initiating the process of meandering!

Challenges

Successful examples are very rare, especially of restored meandering rivers.

But: ecological experiences are necessary to go further!

There are also political obstacles, especially at border forming rivers.



*Willamette River,
Oregon*

*Oregon Department of Geology
and Mineral Industries*

