



Floodplain restoration on the upper Danube by re-establishing back water dynamics: first results of the hydro-geomorphological monitoring

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Within the framework of a restoration project at the upper Danube, eight working groups of different scientific disciplines have been operating since 2009. They investigate the changes evoked through the accomplished restoration measures, which seek to bring back new dynamics to the floodplain and to reconnect it with the river in order to optimize flood plain ecological functioning. Main object is the identification and analysis of hydro-geomorphological processes and their impact on vegetation and fauna.

Hydrology is one of the key factors determining the type and function of flood plains and thus alternating water levels are the motor of riparian ecosystems. Diverse water and groundwater levels and particularly flood events affect and support floodplain typical vegetation and animal species. All floodplain waterbodies (oxbows, floodplain ponds, backwaters and sidearms) are more or less connected by surface or subsurface waterways. Hydrological conditions are mainly influenced by the following measures:

- a, permanent nature orientated bypass river with a discharge of up to 5 m³/s;
- b, man controlled ecological flooding (discharge of up to 30 m³/s);
- c, groundwater drawdown in the eastern project area.

These measures shall bring back "former" natural hydrological dynamics to the floodplain. They establish geomorphological processes and forms as well and create a mosaic of typical habitats. River morphology is monitored by terrestrial laser scanning analysing the so attained data sets, erosion and aggregation rates at selected undercut slopes and point bars can be detected with a high resolution. Large scale mapping by a drone and dGPS mapping are very helpful tools for identifying widespread flooding areas. Further methods such as, cross section and bed load measurements complete the research work.

The aim is to link the interaction of these abiotic processes with the biotic nature and determine the importance of geomorphological disturbance for floodplain ecosystems. These complex interrelations take place at different spatial and time scales, from short term response during individual floods to long term response of the seasonal flow conditions.

The investigation show that a better understanding of the interplay of hydrological and geomorphological components within the floodplain is needed for further restoration projects. At the end recommendations shall be given in order to control discharge and floodings which will be important for a sustainable development of sensitive riparian ecosystems.