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Monitoring of soil moisture and groundwater level in a restored river/floodplain interconnection at the embanked Danube between Neuburg and Ingolstadt (Germany)

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In the past the most European rivers, especially the Upper Danube, have been embanked and straightened. Also hydropower plants have been constructed since the 19th century. So the rivers and the corresponding floodplains became disconnected, hydrology and hydromorphology changed dramatically and the typical floodplain habitats as softwood and hardwood riparian forests have been suffering. The presented investigation is integrated in the floodplain restoration project, called "Remediation of riparian areas on the Danube floodplain (2100 hectares) between Neuburg and Ingolstadt, Germany", which is conducted by the Bavarian Water Authority. The main goal is the restoration of the former floodplain habitats by bringing back water, groundwater and sediment dynamics to the area. To accomplish this goal three measures were implemented notwithstanding the still existing dams:
a)a new permanent floodplain river (discharge: up to 5 m^3/s, length: 9 km),
b)man controlled ecological flooding (discharge: up to 30 m^3/s), during peak discharge of the Danube (600-1.100 m3/s; statistically one to three times a year),
c)frequently draining of the permanent high groundwater level in the eastern project area.
A comprehensive monitoring program, which is managed by the Floodplain Institute Neuburg and the Department of Physical Geography of the Catholic University of Eichstaett, was designed and installed to improve the management of these measurements. Analysed parameters are on the topic of hydrology, hydromorphology, vegetation and fauna. This monitoring program is founded by the BfN (Federal Agency for Nature Conservation).
Alternating water levels are the "motor of riparian forests". Diverse groundwater levels and flooding affect indirectly and directly plant and animal species. The three measures bring back these former natural hydrological dynamics to the floodplain. For analysing the impact of these dynamics on riparian habitats a high resolution soil moisture monitoring network were designed. By modelling these sampled data with additional pedological (e.g. substrate), hydrological (e.g. groundwater, discharge Danube river), geomorphologic and vegetation data it will be possible to identify the vertical and horizontal range of these measures to generate the expected alternating water levels.
In total 90 soil moisture-probes installed in 30 gauging stations monitor the vadose zone, in different distances to the new floodplain river. At each site, three sensors were installed in a depth about 50 cm to register the development of ground and soil water. The frequency domain reflectometry (FDR) method being used is based on the measurement of dielectric constant to determine soil water content. In additional 13 groundwater logging stations are collecting data every hour.
The submitted poster will present preliminary results of the soil moisture and groundwater analysis.