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Investigation of channel morphology in a restored river/floodplain interconnection at the embanked Danube between Neuburg and Ingolstadt (Germany)

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The Upper part of the Danube was straightened and embanked since the mid of the 19th century and flows between dikes without any contact to its floodplain. Additionally, since the 1970ies hydropower stations are influencing the river continuity and the ground water level of the floodplain negatively.
The presented investigations are part of a floodplain restoration project that aims to bring back new dynamics to the floodplain, like water, groundwater and morphological features, as the key processes for floodplain habitats and species.They give a drive to enliven the natural processes in the riparian areas. This project ("Remediation of riparian areas on the Danube floodplain between Neuburg and Ingolstadt", Germany) takes place in a project area of 2.100 hectares of riparian forests. The project consists of two major parts
- A permanent flow of water (up to 5 m3/s) bypassing the dam of the power station. The new river will develop on the floodplain partly following old oxbows, but partly eroding its way naturally in the new modelled channel.
- Controlled flooding (up to 30 m3/s) of parts of the floodplain during peak discharge of the Danube (600-1.100 m3/s; statistically one to three times a year)
The project, conducted by the Bavarian Water Authority, will start at the beginning of February 2010. The Floodplain Institute Neuburg and the Department of Physical Geography of the Catholic University of Eichstaett together with some other Institutes established a comprehensive monitoring program including vegetation, fauna, hydrological and morphological data. This monitoring program is founded by the BfN (Federal Agency for Nature Conservation).
From the beginning of the flooding a new morphological activity will start which might be self sustaining or self cumulative. For example the new river banks are prone to lateral erosion and new undercut slopes will develop. The transport, erosion and deposit of sediment will depend on the outflow which is man-controlled and adjusted to the Danube water level. To understand the developement of this new river channel the status quo was recorded by several surveys. The goals of these preliminary investigations are to get as much knowledge of the starting conditions in the channel as possible (channel topography and sediment distribution). Therefore methods are ranging from standard grain size analyses over cross profile measurements and high resolution aerial photos (taken from a helicopter), up to highly sophisticated Terrestrial Laser Scanning (TLS) measurements using a Riegl LMS Z 420i. Laser scanning is a very powerful tool for high-resolution data acquisition of geomorphic surfaces. This application investigation may also contribute to the understanding and monitoring of sedimentation processes and quantification of erosion and sedimentation in a semi-natural modelled channel.Further analyses in the next 5 years will show the development of the channel after its flooding.
Due to the fact that the phase of construction will be finished at the End of January 2010, research is still at its beginning. So the suggested poster presentation will show the concept of the investigations, but also first results.