Erosion and Sediment Yields in the Changing Environment (Proceedings of a symposium held at the Institute of Mountain Hazards and Environment, CAS-Chengdu, China, 11–15 October 2012) (IAHS Publ. 356, 2012)., 146-154.

Driving forces in a floodplain restoration project: interaction between surface water, groundwater and morphodynamic processes during an ecological flooding

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Abstract Erosion, transport and deposition of sediment play a major role in restoration projects and sustainable river management. The main driving variables, water and sediment dynamics resurrect the natural processes in "riverscapes" and floodplains. After the first flooding of a new river course in the flood- plain along the River Danube between Neuburg and Ingolstadt (Germany) in 2010 (up to 5 m^3/sec), new morphological activity started instantly. However, intensive erosion rates were measured during the first two controlled ecological flood events with water discharges of 10 $m^3 s^{-1}$ and 20 $m^3 s^{-1}$. The relatively new river banks are prone to lateral erosion and during bankfull stages new undercut slopes have developed. To understand the processes in this new river channel, its development is being recorded by a package of methods such as terrestrial laser scanning (TLS) measurements.

Key words river restoration; floodplain; ground-based LiDAR; hydromorphology; monitoring