



Impacts of dams on the geomorphodynamics of fluvial systems - Complex system response?

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In Europe, for more than 5.000 years humans impact fluvial systems in various ways, e.g. also through building dams. These constructions change the interdependencies between the components of the fluvial system. 'Natural (fluvial) systems' are scarce and humans play an active and major role in changing river systems. In return the geomorphic response of fluvial systems like channel bed degradation downstream or sedimentation upstream of dams also affects the human system which again leads to 'human responses' such as building (or abandoning) river engineering structures. Geomorphic response or geomorphic system behavior can change and feature linear or nonlinear/complex behavior depending on the internal systemic structure and system history.

The study area, the 'Kaja' River watershed is located in the Eastern part of the Bohemian Massif in Austria (Europe) and drains into the 'Thaya' River which builds the northern border to the Czech Republic in Lower Austria. Furthermore it is eponymous for the local National Park 'Nationalpark Thayatal'.

In the study area 14 dams are located in total, 13 along the Kaja River, and one along a tributary river. The study area influenced by dams amounts 1.615 ha. All dams are embankment dams whose cross-sections show hill-shaped forms. They are made of various compositions of soil, sand, clay, and rock. Four dams are currently active, ten are abandoned.

The main objectives of this study are to identify if nonlinear/complex geomorphic system behavior occurs in this small and highly dam-affected watershed and to investigate geomorphic effects on fluvial systems due to dams. In order to find nonlinear/complex system behavior those sites are probed in which geomorphic effects due to dams are highly expected: reservoirs, channels, and floodplains. Sedimentary records, numerical modeling and mapping techniques will be used to reveal geomorphic changes and perturbations within the fluvial system. Spatial and temporal reconstructions and interpretation of geomorphic effects due to dams will be used to reconstruct system behavior.

River bed surface mapping, observations of river engineering structures, and land use changes already reveal that geomorphic effects due to dams do exist within our study area. Sediment cores show that reservoir sediments of abandoned dams are preserved. These will be especially useful for further quantitative and qualitative investigations. First results of the study will be presented on European Geosciences Union General Assembly, 2010.