Middle Danube tributaries:
Constraints and opportunities in lowland river restoration

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With 4 figures and 2 tables in the text

Abstract: Modifications to large active rivers to aid navigation, reduce flood risk, improve land drainage or generate hydroelectric power have adversely affected river habitats and the hydrological connectivity between the river and its floodplain. Consideration of natural river processes helps to identify sustainable rehabilitation options within constraints imposed by the need to maintain required river functions and any restrictions imposed by space limitations due to floodplain development. A brief review of rehabilitation opportunities for active lowland rivers constrained by river functions is presented. This approach is used to identify suitable rehabilitation measures for two lowland meandering Slovak rivers, the Morava and Hron, which have been significantly influenced by engineering works. Both rivers differ in hydrological, morphological and ecological characteristics. Previous rehabilitation efforts based on locally targeted ecological and landscape restoration measures have actually exacerbated ecological degradation due to their failure to consider the abiotic processes which control river morphology. For rehabilitating cut-off meanders, full meander integration is recommended as the best solution for lowland rivers, such as the Morava, which actively transport bed material load. On the Hron River, an alternative method for improving the water regime and ecological quality of cut-off meanders is required due to engineering constraints. The study demonstrates the need for an integrated interdisciplinary approach to river restoration.

1. Introduction

Lowland rivers are defined by low gradients. Their substrates can be either principally sand (Rhine, DJUK et al. 1995), gravel (Meuse, KLAASSEN et al. 1998) or a combination (Mississippi, WINKLEY 1982). In western and central Europe many lowland rivers have a gravel bed because of the legacy of glacial outwash. Large