Natural and artificial refugia in dynamic river widenings

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Rivers are heavily impacted by anthropogenic activities, channelization, and reduced morphological variability. Additionally, the sediment continuum is interrupted by structures such as weirs or sediment retention basins. One approach to mitigate these negative effects are dynamic river widenings. Thereby, the natural morphodynamic processes of a river reach should be revived. However, the development of dynamic river widenings may be determined by numerous factors, for example, hydrological conditions, floodplain erodibility, vegetation, slope, or sediment availability. Further investigations are necessary to predict the benefits of dynamic river widenings in different fluvial systems. Large-scale mobile-bed laboratory experiments with a longitudinal slope of approximately 0.2 percent will be conducted, including the influence of varying sediment supply rates. To initiate bank erosion, local flow deceleration measures (e.g., engineered log jams, initial widening, …) and flow acceleration measures (e.g., flow deflector, …) will be tested. In addition, numerical simulations are used to predict the availability of flood and drought refugia in dynamic river widenings. Based on previous studies, it is expected that a high sediment supply rate (close to channel transport capacity) is needed to cause active morphodynamic processes and sustain them over longer time periods. In addition, erosion initiation measures will be tested to increase heterogeneity rapidly. However, the observed channel response highly depends on the specific river system and its degrees of freedom. This study is part of the transdisciplinary research project *Resilient River: Refugia – Connectivity – Stepping stones* and is co-financed by the Swiss Federal Office for the Environment (FOEN).