

An exploratory historical analysis of biogeomorphological changes in a channelized regulated river

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Many recent studies have analysed historical information sources to explore the impact of human activities on river morphology and vegetation, but investigations of channelized rivers have been relatively rare. We address this research gap by investigating the historical evolution of morphology and vegetation within a 33 km straightened and embanked reach of the River Isère, a tributary of the Rhône in southeast France.

The goal of this study is to establish the trajectory of biogeomorphological development of the 33 km reach since the beginning of the 20th century in response to changing human pressures and interventions. Achieving this goal should lead to an improved understanding of how mainly woody vegetation and fluvial processes interact in a heavily human-impacted setting, which in turn should lead to the development of better informed management strategies.

The study reach was braided prior to channelisation in 1858, when the river was confined to a single straight channel between embankments. Since the mid 20th century, the river's flow and sediment transport regimes have become increasingly influenced by hydropower development as well as by sediment mining within the studied reach between 1948 and 1973.

By extracting information from the historical sources across a range of space and time scales, we identify temporal trajectories of morphological and vegetation development in response to these human interventions. In particular, we identify a progressive development of alternate bars that become vegetated and also enlarge and coalesce through the study period. These processes are evident throughout the study reach but they follow different temporal trajectories within different parts of the reach. We propose tentative links between these biogeomorphic trajectories and human causal factors while at the same time emphasising some limiting aspects of the analysis of such historical data sets.