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# Fluvial engineering works in the river bed of the Middle Loire

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Since 1995, the Loire riverbed has been a field of restoration and maintenance. These interventions took place within the Plan Loire Grandeur Nature and consisted of the following points: the protection of the inhabitants against flooding risks (opening of the secondary channels), the preservation of the ecological assets and the elimination of the sinking of the water line at it's lower level.
This research occurred in a specific part of the Loire riverbed, which is situated between Nevers and Orleans (on both banks). We tried by using a geomorphologic analysis to put in evidence the impact of the interventions on the evolution of the secondary channels and dikes.
The Geographical Information System (GIS) put in place for the studies sector helps the space analysis by the superposition and the comparison of the different layers of information. This information tool helps creating a database, which can be updated and extended. This way, the managers of this site can easily integrate new thematic (ecological, pedagogical, tourism activity...) and benefit from a precise mapping of the intervention's areas and the impact of the restoration works.
The main objective of the PhD is to analyse the functioning of hydrological and fluvial dynamics of the river bed of the Middle Loire, particularly in areas covered by maintenance work. These fluvial engineering works aim to improve flow and transfer of sediment in the river bed. This approach will evaluate the effectiveness of such maintenance work. It is necessary to set up a very fine scale model to quantify sediment transfer between secondary and main channels. The situation of secondary channels is contrasted, but the excessive growth of vegetation in some channels triggers their perennial functioning. The fine scale analysis is based on studies on seasonal and inter-annual evolution of secondary channels. Digital Elevation models (DEM), longitudinal profiles and topographic cross-sections integrated GIS help to quantify precisely erosion and sedimentation, according to the hydrological year. This work should be conducted according to hydrological events on the basis of topographical, bathymetric and sedimentary surveys. Therefore, a limited number of sites has been chosen in collaboration with AITL, DIREN Centre, and Conservatoire des Espaces Naturels. The result of the thesis brings tools to the Loire river management.