



## **Hydrodynamic analysis of riparian areas in flood protection design: the River Taro case study (Italy)**

**M. Ferraresi** (1), R. Telò (2)

1. Dept. of Civil Engineering and Architecture, University of Parma, Italy
2. Studio di Ingegneria Idraulica e Ambientale, Parma, Italy

An interdisciplinary study is presented dealing with the morphological and environmental riqualification of River Taro (Northern Italy) in its reach belonging to the Regional Natural Park, coupled with the design of flood protection structures. The study aims at: a) decreasing the local and downstream risks of flooding, b) providing guide-lines for the anthropic activities along the river channel, c) protecting and increasing the remarkable value of the natural sites, d) testing experimental solutions on fluvial reach rehabilitation to its full ecological vocation. The solution stems from environmental, social and hydrodynamic analyses.

The river length is 133 km and the catchment area is 2050 km<sup>2</sup>: the final 42 kms are considered in the analysis. The heavy mining activities during the '60 and '70 years caused the river bed to shift from a multiple branch to a single deeply eroded branch pattern, but nowadays, after three decades of mining prohibition and natural vegetation preservation, the river is regaining its structural equilibrium: meandering is anew taking place. The proposed technical solutions tend to enhance this behaviour, coupling the conservation practices with the hydraulic regulation.

Recovering a local technique used in the XIX century for improving the fertile silt deposition during high floods, the protection strategy is based on the transformation of the flood plains into dynamic reservoirs able to significantly reduce the discharge peaks. The flood reduction takes advantage of the bed depressions due to former mining and is enhanced by a system of deformable structures directing the flood flow to the riparian areas. During low flow periods, these zones are designed to act as humid areas, particularly suited for local fauna development, as filtering ecosystems and as water reservoirs for summer agricultural needs.

The available data, the numerical modeling tools and the main results of the study are described in the paper.