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River response to land use change and sediment control works: the case of the Reno river in Italy

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The Reno River is the eleventh largest river in Italy. It has been extensively affected by man activity for a very long span of time. The first relevant impacts date back to the Romans time and were reiterated with more or less intensity until present. During the last five centuries, the lowland portion of the river was subjected to remarkable channel modifications, diversion, levee construction, reclamation of the this portion of the Po plain. In the recent decades, mainly after World War II, , significant land use changes in the headwater, extensive bed material mining, dams construction, torrent-control works and large fluids extraction from the underground caused important channel morphology and sediment fluxes changes. Three main effects of such human impacts are evident: a remarkable streambed degradation (as much as 5 m during the last 60 years), the reduction to a hard to detect quantity of bedload flux and, consequently, a worrying beach erosion. Two main types of channel adjustment, riverbed incision and channel narrowing, were observed. Riverbed degradation is discussed by comparing 4 different longitudinal profiles surveyed in 1928, 1951, 1970 and 1998 in the 120 km long reach upstream of the outlet. The analysis of channel narrowing is carried out by comparing a number of cross-sections surveyed in different years across the same downstream reach. Moreover, in order to understand such morphological changes, their causes and, possibly, to envisage some solutions land use changes analysis and a field campaign of sediment transport measurement were carried out in the 2003 - 2006. Though the fine material release from soil erosion processes on slopes resulted in suspended sediment transport concentration and rate not very different from those of rivers with similar physiography, landscape and catchment size, bedload transport rate resulted very low also during floods larger than bankfull. The effect of climate change was anlysed as well.