



Medium and short term channel planform changes and vegetation cover dynamics on a regulated gravel bed river, Brenta River, Italy

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Many gravel bed rivers in the European Alpine area suffered different ranges and types of human pressure that modified their morphology and altered their processes. This work present the case of the middle portion of the Brenta River, historically impacted by human activities such as floodplain occupation, bank protection, gravel mining, hydropower schemes, and water diversion. Dam operation and gravel mining have produced considerable modifications in the natural sediment regime which have generated important morphological responses on the channel (narrowing and incision). Large areas of the former active channel have been colonized by riparian vegetation, both as islands and as marginal woodlands. Overall, the river changed its morphological pattern from "braided" to "wandering." The present work analyzes the timing and extent of the planform morphological changes that occurred over the last 30 years along the middle portion of the river (20 km long) through the analysis of aerial photos, repeated topographic measurements and morphological-vegetational surveys. A series of recent aerial photos (1981, 1990, 1994, 1999, 2003, 2006, 2008, and 2010) have been used to assess the medium and short-term morphological changes of the floodplains and active channel area. As to the medium-term modification, the recent prohibition of in-channel gravel mining have determined a new trend of active channel widening through erosion of vegetated areas. The analysis also allowed to assess the morphological effect of single flood events. Only floods with recurrence interval $> 10-12$ years appear to be able to determine substantial erosion of island margins. The knowledge of the medium-term trend within the long-term evolution tendency is important for the understanding of the dynamics of sediment recruitment and transfer, and to plan correctly the strategies for river management and river restoration.