



A simplified quasi-2d model of the Po River for the identification of large-scale flood-risk mitigation measures

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The Flood Directive 2007/60/EC (European Commission, 2007) promotes a paradigm shift from engineering defences to flood-risk mitigation and management strategies. The actual implementation of the Directive necessarily implies the development of reliable procedures for assessing the flood-risk associated with flood prone areas. These procedures can then be adopted by Institutions and public bodies in charge of formulating robust flood risk management strategies for large European rivers for identifying optimal policies for a given area. Optimal policies need to be identified at catchment scale through a holistic approach, and this applies also to large European rivers. Our study focuses on the middle-lower reach of the River Po (~ 350 km), the longest Italian river and the largest in terms of streamflow. We show a large-scale application of a quasi two-dimensional (quasi-2D) model to support the identification of the optimal management strategy of an extreme flood event (recurrence interval ~ 500 years) by means of controlled flooding (flooding of portions of the flood-prone area located outside the main embankments through ad-hoc lateral structures) for a flood-prone area of $\sim 6,1 \times 10^3$ square kilometres. Different flooding scenarios associated with several possible geometric configurations of the system of lateral structures are compared in terms of flood losses, characterized through the analysis of CORINE land cover data relative to the period 1990-2006. The results of the study show how a simplified quasi-2D model may be effectively used to: (1) provide useful indications on the flood-risk associated with a large flood prone area; (2) support the identification of optimal flood-risk mitigation strategies and (3) assess the impact of recent land-use dynamics (i.e. population-growth, changes agricultural practices, etc.) on flood-risk.