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Advances in Modeling of Coupled Hydrologic-Socioeconomic Systems

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River flooding is the most common natural disaster in Europe, causing deaths and huge amount of economic losses. Disastrous flood events are often related to extreme meteorological conditions; therefore, climate change is expected to have an important influence over the intensity and frequency of major floods. While approximated large-scale assessments of flood risk scenarios have been carried out, the knowledge of the effects at smaller scales is poor or incomplete, with few localized studies. Also, the methods are still coarse and uneven. The approach of this study starts from the definition of the risk paradigm and the elaboration of local climatic scenarios to track a methodology aimed at elaborating and combining the three elements concurring to the determination of risk: hydrological hazard, value exposure and vulnerability. First, hydrological hazard scenarios are provided by hydrological and hydrodynamic models, used in to a flood forecasting system capable to define "what-if" scenario in a flexible way. These results are then integrated with land-use data (exposure) and depth-damage functions (vulnerability) in a GIS environment, to assess the final risk value (potential flood damage) and visualize it in form of risk maps. In this paper results from a pilot study in the Polesine area are presented, where four simulated levee breach scenarios are compared. The outcomes of the analysis may be instrumental to authorities to increase the knowledge of possible direct losses and guide decision making and planning processes also. As future perspective, the employed methodology can also be extended at the basin scale through integration with the existent flood warning system to gain a real-time estimate of floods direct costs.