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An integrated simulation method for flash-flood risk assessment: 2. Effects of changes in land-use under a historical perspective

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Abstract. The influence of land use changes on flood occurrence and severity in the Bisagno River (Thyrrenian Liguria, N.W. Italy) is investigated using a Monte Carlo simulation approach (Rulli and Rosso, 2002). High resolution land-use maps for the area were reconstructed and scenario simulations were made for a pre-industrial (1878), an intermediate (1930) and a current (1980) year. Land-use effects were explored to assess the consequences of distributed changes in land use due to agricultural practice and urbanisation. Hydraulic conveyance effects were considered, to assess the consequences of channel modifications associated with engineering works in the lower Bisagno River network. Flood frequency analyses of the annual flood series, retrieved from the simulations, were used to examine the effect of land-use change and river conveyance on flood regime. The impact of these effects proved to be negligible in the upper Bisagno River, moderate in the downstream river and severe in the small tributaries in the lower Bisagno valley that drain densely populated urban areas. The simulation approach is shown to be capable of incorporating historical data on landscape and river patterns into quantitative methods for risk assessment.

Keywords: flood, simulation, distributed model, land-use changes, channel modifications, historical data

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