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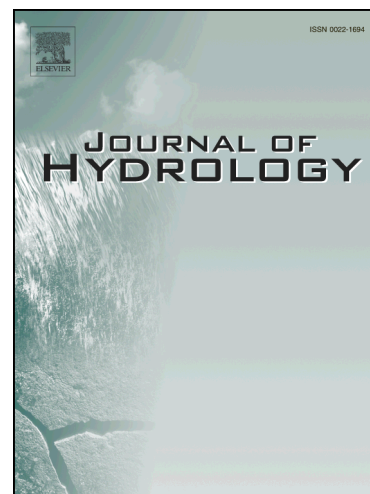
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Flood risk analysis for flood control and sediment transportation in sandy regions: a case study in the Loess Plateau, China

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ABSTRACT

Traditional flood risk analysis focuses on the probability of flood events exceeding the design flood of downstream hydraulic structures while neglecting the influence of sedimentation in river channels on regional flood control systems. This work advances traditional flood risk analysis by proposing a univariate and copula-based bivariate hydrological risk framework which incorporates both flood control and sediment transport. In developing the framework, the conditional probabilities of different flood events under various extreme precipitation scenarios are estimated by exploiting the copula-based model. Moreover, a Monte Carlo-based algorithm is designed to quantify the sampling uncertainty associated with univariate and bivariate hydrological risk analyses. Two catchments located on the Loess plateau are selected as study regions: the upper catchments of the Xianyang and Huaxian stations (denoted as UCX and UCH, respectively). The univariate and bivariate return periods, risk and reliability in the context of uncertainty for the purposes of flood control and sediment transport are assessed for the study regions. The results indicate that sedimentation

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