The title (العنوان):

Design Flood and Flood-Prone Areas under Rating Curve Uncertainty: Area of Vieux-Ténès, Algeria

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Abstract:

The accuracy of flood control models depends on the set of annual maximum discharge used to estimate design flood via statistical flood frequency analysis (FFA). The uncertainties associated with the discharge time series from stage records are often ignored. Indeed, the uncertainty associated with discharge estimation is not addressed in many of the previous hydraulic risk analyses. In this study, we provide a quantitative approach to rigorously explore the effect that the rating curve uncertainty has on the design flood estimation and the flood hazard mapping. The town of Vieux-Ténès, Algeria, located near the mouth of the Allala River, was used as a case study. Despite the presence of concrete flood protection walls, several floods caused severe damage over the last decades in the town. Multisegment Bayesian rating curve, based on the Bayesian rating curve (BaRatin) method, was used to compute the rating curve uncertainty of the Allala hydrometric station, allowing for the creation of a new time series of annual maximum discharge for the 1973–2017 time period and the estimation of the design flood for different return periods by FFA. The Hydrologic Engineering Center's river analysis system (HEC-RAS) was used to model the water levels for different locations based on steady flow analysis, using them to define flood-prone areas and an effective protection system. We found that estimations of the flooded area varied between −18%–18% and 15% when assessing rating curve uncertainties. Results highlighted that the existing flood control system is not sufficient to protect the inner city against flood risks, especially in the lower-lying areas of the flooded area.

Key words: Flood and Flood-Prone ; Areas underArea ; Vieux-Ténès, Algeria

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