Old Floods Have a Bright Future: The Value of Historical Information in Flood Frequency Analysis

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Abstract

The precision of estimators of flood quantiles and of flood risk is limited by the information available. Thus hydrologist are well advised to use their understanding of flood processes; available at site records; physiographic data with models developed using regional hydrologic data; and historical, botanical and paleohydrologic information about rare floods at the site of concern. Monte Carlo and analytic studies have documented the potential value of historical and paleoflood data giving the magnitude, or just upper and lower bounds, on the sizes of floods; and the more parameters to be estimated, the more valuable such historical data. Early studies considered MLEs with the lognormal distribution. More recent work has employed Generalized MLEs with the GEV distribution with both annual maximum series (AMS) and partial duration series (PDS) (Martins & Stedinger, 2001), illustrating its value in either framework. Because MLEs do not work with well with the log-Pearson type 3 (LP3) distribution employed in the United States, Cohn et al. (1997, 2001) developed Expected Moment Analysis as an efficient alternative. Recently Monte Carlo methods have provided computationally simple way to perform a fully Bayesian analyses that can integrate measurement error distributions in flood risk analysis with at-site systematic, regional, and historical information.