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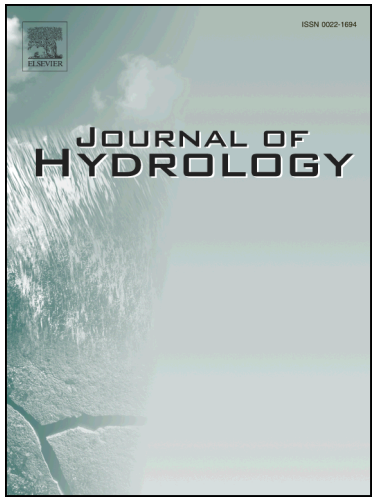

Research papers

Multivariate design of socioeconomic drought and impact of water reservoirs

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Multivariate design of socioeconomic drought and impact of water reservoirs

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Abstract

Socioeconomic drought in association with minimum instream flow against the backdrop of local water supply was investigated. An integrated procedure for design combinations of drought properties, such as duration, severity, and peak, involving the truncation of drought events, the goodness-of-fit of joint and marginal distributions of drought properties, the determination of design combinations of these properties for a given Kendall return period, and the evaluation of uncertainty of the combinations, was developed. In multivariate design of socioeconomic droughts in a case study, univariate, bivariate and trivariate design values of drought properties and their alterations due to the regulation of water reservoirs were computed. Results showed that any two properties of drought exhibited a high positive dependence. For a given bivariate return period, the pairs of cumulative frequencies of drought properties formed a symmetric curve for truncated samples and a symmetric curving-belt for large quantities of simulated samples. For a given trivariate return period, the pairs of cumulative frequencies of duration and peak showed a symmetry, but the pairs of duration and severity or severity and peak were remarkably scattered on the side of severity and comparatively concentrated on the side of duration or peak. For the

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