Identification of Outliers in Flood Frequency Analysis: Comparison of Original and Multiple Grubbs-Beck Test

Authors : Ayesha S. Rahman, Khaled Haddad, Ataur Rahman

Abstract : At-site flood frequency analysis is used to estimate flood quantiles when at-site record length is reasonably long. In Australia, FLIKE software has been introduced for at-site flood frequency analysis. The advantage of FLIKE is that, for a given application, the user can compare a number of most commonly adopted probability distributions and parameter estimation methods relatively quickly using a windows interface. The new version of FLIKE has been incorporated with the multiple Grubbs and Beck test which can identify multiple numbers of potentially influential low flows. This paper presents a case study considering six catchments in eastern Australia which compares two outlier identification tests (original Grubbs and Beck test and multiple Grubbs and Beck test) and two commonly applied probability distributions (Generalized Extreme Value (GEV) and Log Pearson type 3 (LP3)) using FLIKE software. It has been found that the multiple Grubbs and Beck test when used with LP3 distribution provides more accurate flood quantile estimates than when LP3 distribution is used with the original Grubbs and Beck test. Between these two methods, the differences in flood quantile estimates have been found to be up to 61% for the six study catchments. It has also been found that GEV distribution (with L moments) and LP3 distribution with the multiple Grubbs and Beck test provide quite similar results in most of the cases; however, a difference up to 38% has been noted for flood quantiles for annual exceedance probability (AEP) of 1 in 100 for one catchment. These findings need to be confirmed with a greater number of stations across other Australian states.