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Regional flood frequency analysis in Australia using generalized extreme value distribution

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ABSTRACT

Flood is one of the most catastrophic natural disasters that bring disruptions to services and damages to infrastructure, agricultural production, and properties. To reduce flood damage, at-site flood frequency analysis is being widely adopted. However, it requires a long period of recorded streamflow data. At many locations, there no recorded streamflow data, and for these ungauged catchments, regional flood frequency analysis (RFFA) is adopted in engineering practice. Previous researchers have examined many distributions and found that the Generalised Extreme Value (GEV) distribution fits Australian flood data quite well. Therefore, the GEV distribution is selected in this research to develop a RFFA technique. In Australian Rainfall and Runoff, LP3 distribution was adopted to develop RFFE model.Collation and preparation of a quality-controlled annual maximum flood (AMF) dataset across Australia, and identification of an appropriate statistical distribution are major tasks in RFFA as the quality and the size of the database can affect the accuracy of the quantile estimates. Parameter regression technique (PRT) relates the parameters of a probability distribution (i.e. location, scale, and shape) to catchment characteristics. The main objective of this research is to investigate the accuracy of RFFA by PRT using GEV distribution, and to compare the two most used statistical distributions - GEV and LP3 - to propose additional recommendations to improve RFFA for ungauged catchments in Australia. For this research, 201 gauged catchments have been selected from south-east Australia. The streamflow data have been prepared and flood quantiles have been estimated using GEV and LP3 distributions. Three journal articles will be published from this research. This doctoral research will be completed by Nov 2023.