ABSTRACT

The estimation of flood magnitudes which are required for the design of hydraulic structures can be achieved by making use of the Peaks over Threshold (POT) series. Threshold selection is a very important topic and it is still an area of active research. The study deals with the selection of the threshold and to fit the Generalized Pareto distribution which would provide a reasonable fit to the exceedances over selected threshold. 20 gauging stations were selected for the peaks over threshold analysis and the 12 hourly floods (000s cusecs) are observed on these stations for the specified periods. The threshold selection was made by using two most usually used methods. First is exploratory method based on mean life plot which is carried out before model estimation and the other method assesses the stability of the parameter estimates for the models fitted across a range of thresholds. After selecting an appropriate threshold level, the Generalized Pareto distribution, which has large literature of being the appropriate distribution to model the POT series, was fitted to the POT flood series at 20 gauging stations in Pakistan by using maximum likelihood parameter estimation method. Probability, quantile, return level and density plots were used as the diagnostics plots to assess the quality and validity of the Generalized Pareto distribution. Probability plots were showing that the GP distribution is reasonable fit to POT flood series at 20 stations but quantile plots gave a little cause to doubt the validity of the of the fitted GP model for high return periods which return level plots indicated not too large after the allowance for their sampling errors. Also density plots were also convincing. Overall it was concluded that the Generalized Pareto distribution provides a reasonable fit to the POT flood series at 20 stations in Pakistan. Finally, the return levels have been calculated for 2, 5, 10, 20, 50, 100, 500 and 1000 return periods.