Intensity Duration Frequency Curve Generation using Historical and Future Downscaled Rainfall Data

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Abstract: Intensity–duration–frequency curves are used extensively in engineering to assess the return periods of rainfall events. The estimation and use of IDF curves rely on the hypothesis of rainfall series stationarity, namely that intensities and frequencies of extreme hydrological events remain unchanged over time. However, changes in the hydrologic cycle due to the increase in greenhouse gases are projected to cause variations in intensity, duration, and frequency of precipitation events. Quantifying the potential effects of climate change and adapting to them is one way to reduce vulnerability. Since rainfall characteristics are often used to design water management structures, reviewing and updating rainfall characteristics for future climate scenarios is necessary. In this study, IDF curves relationship is determined to utilize statistical analysis of rainfall data for a record of 38 years. The methods used are Log-Normal, Normal, and Gumbel (EV-I). The distributions were carried out with return periods of 2, 5, 10,25, 50, and 100 years with durations of 1, 2, 3, 6, 12, and 24 hours. Highest intensity values were observed for the Gumbel method and the values obtained from other methods were close to each other.

Keywords: IDF, Hydrologic, Statistical, Empirical, Hypothesis, Vulnerability