UNIVERSITI TEKNOLOGI MARA

REGIONALIZATION FREQUENCY ANALYSIS OF SHORT DURATION RAINFALL FOR PENINSULAR MALAYSIA

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ABSTRACT

Rainfall frequency of various intensities and durations are used extensively in the design floods and management of many water resources projects involving natural hazards due to extreme rainfall events.

In Malaysia, it has been the practice to estimate design rainfall based on at-site data. Through this study, *regional estimation* has been recommended as an alternative technique to estimate design rainfall. The choice of this proposed technique will definitely improve the accuracy of design rainfall, which will reduce the uncertainties of at-site data and to overcome unavailability of long data records for estimation of flood quantiles at ungauged sites.

In this study, regional frequency analysis was used based on the L-moments methodology, which involves four main stages namely screening of the data, identification of homogeneous region, and choice of the frequency distribution and the estimation of the frequency distribution. The analysis was conducted according to the index flood method but expressed in terms of rainfall. The main objectives were to identify the homogeneous region and to develop the regional frequency curves or growth curves.

In this study, Peninsular Malaysia was divided into 3 regions. From the twelve rainfall durations investigated, the results showed that, R1 region belongs to 'acceptably homogeneous' region for 30-minutes to 24-hours durations except of 15-

minutes, 48-hours and 72-hours durations. For R2 region, it was classified as 'possibly heterogeneous' region for 15-minutes, 12-hours and 24-hours durations while other durations were homogeneous. Then for R3 region, it was classified as 'acceptably homogeneous' for 15-minutes to 4-hours durations. Most of the regions were represented by GLO and GEV distributions. Based on the assessment through the estimated regional growth curves by Monte-Carlo simulation, RMSE for each region gives an acceptable value, ranging from a minimum of 0.8% that appeared in R1 for 45-minutes and 1-hour durations, to a maximum of 13.8%, which appeared in R3 for 72-hours duration. The RMSEs values were satisfactorily low to enable good quantile estimation with confidence.