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Estimation of Probable Maximum Precipitation in the Context of Climate Change

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Abstract

Probable Maximum Precipitation (PMP) estimates are essential when designing hydraulic structures, especially since the risk of the failure of such structures are high. The impact on climate change with PMP has been crucial at present although the concept does not incorporate climate change. Although there are two widely used methods to estimate PMP, this research focused on the statistical method, covering 16 stations of the Kelani River catchment. The daily precipitation records for 57 years were collected and annual maximum daily rainfall series were prepared for all the 16 stations. The study was conducted using five scenarios (S1-S5). The results from Hershfield PMP (S1) emphasizes that the Hershfield enveloping curve has a very high value of frequency factor (K) in low annual average maximum daily precipitation. Thus, the need to modify the curve has arisen as a major objective of this research. Therefore, Modified Hershfield PMP (S2) and Modified PMP in the context of Sri Lanka (S3) are considered. Outlier detection (S4) manifests that, there may be one or more or devoid of outliers deviating from the original concepts of Hershfield. Split sampling (S5) concludes, Standard Deviation is the most influential factor for PMP, which shows the effect of climate change. PMP maps are developed to observe the spatial-temporal variation of PMP, which is the first version in the context of Sri Lanka.

Keywords: *PMP, Statistical method, Modified enveloping curve, Split sampling, Climate change*