A REGRESSION MODEL FOR THE STREAM FLOW PREDICTION IN THE UPPER KOTHMALE CATCHMENT IN SRI LANKA

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Upper Kotmale Catchment (UKC), which covers an area of 301 km^2 in the central hills of Sri Lanka and having an annual rainfall of about 2270 mm, is the uppermost catchment of the Mahaweli River. Many water resource projects have been proposed utilizing the stream flow generated by the catchment. Though there are several hydrological models developed for the catchment, no regression modelling has been carried out yet.

UKC is gauged at two stations. Upper catchment of UKC consists of Dambagastala oya and Agra oya is gauged at Caledonia and again gauged at Talawakele below the confluence with Nanu oya. In the present statistical modelling approach, two Multiple Linear Regression (MLR) models are developed for the response variable, which are the stream flows generated by the UKC above Caledonia and Thalawakele stream flow measuring stations respectively. Average daily rainfall for the catchment and daily stream flow measurements at Caledonia and Thalawakele for the periods of 1987-1990 and 1991-1993 were used for the calibration and the verification of the models respectively. Average daily rainfall of the catchment for the predicted day and previous days were used as the predictor variables of the model. All the other parameters in the catchment such as slope of the catchment, vegetation cover, soil composition, land use, affecting the stream flow were considered remaining unchanged during the modelling period.

The resulting models were developed with the application of Box-Cox transformation on response variable, which are the stream flows at Caledonia and Thalawakele at λ=-0.08 and λ=0.2 respectively to stabilize the error variance. The outliers caused by extreme events were removed from the data set using standardized residuals with limits ± 2. By introducing Dummy variables to represent time variations among rainfall data models were improved up to R-squared values before and after removing serial correlation are 82%, 94% for Caledonia and 84%, 95% for Thalawakele respectively. The MLR models developed predict the stream flows at Caledonia and Thalawakele to sufficient accuracy.