A NON-LINEAR MODEL FOR STREAMFLOW PREDICTION IN THE KALU RIVER UPPER CATCHMANT IN SRI LANKA

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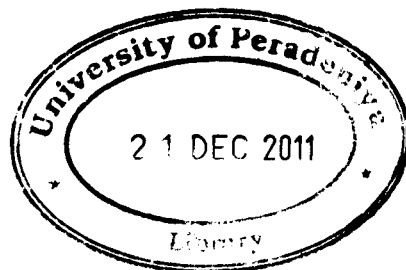*in partial fulfilment of the requirement*

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Having a long record of streamflow is very valuable in planning water resources development projects such as, hydropower projects, irrigation schemes, flood mitigation works and domestic water supply schemes. However, in many occasions, streamflow records are available for very short periods though very long rainfall records are available. Therefore, possibility to relate rainfall over a catchment to the streamflow at its outlet will enable having a long record of streamflow that will be very useful for water resources development works. Besides, prediction of streamflow using predicted rainfall will permit taking precautionary measures in water related disaster situations such as floods and droughts.

This report presents a research carried out to find a model to predict daily streamflow of *Kalu* river at Ratnapura. The model, a non-linear regression model, based on Marquardt's procedure, was developed using measured daily streamflow of the *Kalu* river at Ratnapura and daily rainfall at eight rainfall gauging-stations within the catchment above Ratnapura. Data for the period 1987-1994 were used for the calibration of the model while data for the period 1995-1997 were used for verifying it. Thiessen polygon method was applied to calculate average daily rainfall over the catchment.

Two models were developed. First model was developed by using all streamflow data. But the assumptions of the residuals were not satisfied by the developed model. Therefore, the second model was developed by removing outliers. The streamflow greater than 100 m^3/s were identified as outliers by using box plot, Leverage values and cook's distance. The models were validated using Nash-Sutcliffe efficiency and pseudo R^2. Nash-Sutcliffe efficiency and pseudo R^2 show the possibility of the fitted models in predicting daily streamflow of the *Kalu* river catchment at Ratnapura.