EVENT BASED MODELLING OF STREAMFLOW FOR RELIABLE FLOOD MITIGATION AND DRAINAGE INFRASTRUCTURE DESIGNS USING SNYDER'S SYNTHETIC UNIT HYDROGRAPH METHOD - A CASE STUDY OF KARASNAGALA WATERSHED IN THE ATTANAGALU OYA OF SRI LANKA

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Degree of Master of Engineering in

Water Resources Engineering and Management

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Supervised by

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DECLARATION

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person expect where the acknowledgment is made in text.

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Gautam Thapa Date

The above candidate has carried out research for the Masters thesis under my supervision.

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Professor N.T.S.Wijesekera Date

ABSTRACT

The main purpose of water resources development is to enhance the water availability and equitable distribution among the stakeholders. Most of the infrastructure development structures are seen in the ungauged watersheds and as a country looking forward for development activities requires accurate estimations.

Although the regional parameters provide a simple and clear indication, only limited work could be found on event based or watershed characteristics based or watershed characteristic based runoff coefficient estimates. In this study, daily rainfall data is applied to Karasnagala river basin (52.58 km^2), Sri Lanka to simulate discharge. The study used event based modelling and Concave method baseflow separation technique to derive the Snyder's Unit Hydrograph parameters. A minimum Inter-event Time criterion was applied to determine the independent events for modelling. The model calibration was done with 30 events and 30 events were used for model verification. An average value of Ct and Cp from 30 optimised events during calibration was 3.75 and 0.38 respectively. Model performance showed that Mean Ratio of Absolute Error (MRAE) and Ratio of Absolute Error to Mean (RAEM) were 0.20 and 0.21 respectively.

This model developed for Karasnagala provides Low values of MRAE and RAEM reflected the very good matching the peakflow magnitude and the shape the opportunity to make better estimates of water recourse . The Synthetic Unit Hydrograph parameters Ct and Cp obtained with systematic calibration and verification process demonstrates the applicability of the method to any ungauged watershed of the region with a short duration of gauged data.

The model computations with Concave baseflow separation method revealed an average loss rate of 1.20mm/hr for Karasnagala watershed.

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