

**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**

Gautam Thapa



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Degree of Master of Engineering in
Water Resources Engineering and Management

Department of Civil Engineering

University of Moratuwa
Sri Lanka

August 2014

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Thesis Submitted in Partial Fulfilment of the Requirements for the
Degree of Master of Engineering in Water Resources Engineering and Management



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Degree of Master of Engineering in
Water Resources Engineering and Management

Supervised by

Professor N.T.S.Wijesekera

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University of Moratuwa
Sri Lanka

August 2014

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 except where the acknowledgment is made in text.

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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 km²), 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.

ACKNOWLEDGEMENTS

I take this opportunity to extend my sincere and heartfelt gratitude to Professor N.T.S. Wijesekera for his continuous guidance, support, encouragement and valuable advice throughout the study. The outcome of this report and development of my research calibre was due to his strong commitment and conviction. He has been a true guardian.

I wish to express my deep appreciation to Dr. R.L.H Lalith Rajapakse for rendering his unending support and guidance provided both in terms of academic and logistic welfare during my stay. He has been a source of inspiration.

I also wish to express my gratitude to Dr. T.M.N Wijaratna for his support. I would also like to extend my gratitude to Mr. Susantha Shameera Wanniarachchi and Mr. W.M.D.Wijesinghe for sharing their reference papers and their valuable knowledge. I would also like to add Ms. Gayani Edirisinghe for her continuous support.

I also acknowledge the University of Moratuwa Senate for providing a research grant to access the data and other support for the research work through the Senate research grant number SRC/LT/2011/15.



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I would like to add Mr. Wajira Kumarasinghe and all other support staff in my list to thank for their assistance to make my stay comfortable.

Finally I would like to thank Late. Shri Madanjeet Singh South Asia Foundation (SAF) and the University of Moratuwa for giving me this opportunity to study towards a Master Degree in water Resources Engineering and Management, at UNESO Madanjeet Singh Center for South Asia Water Management, Department of Civil Engineering, University of Moratuwa, Sri Lanka.

I am grateful to my parents for all their wisdom and guidance. I am thankful to my wife and all my family members for their support and motivations rendered to successfully complete the course.

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