

**CALIBRATION AND VERFICATION OF A-TWO  
PARAMETER MONTHLY WATER BALANCE MODEL  
AND ITS APPLICATION POTENTIAL FOR  
EVALUATION OF WATER RESOURCES -A CASE  
STUDY OF KALU AND MAHAWELI RIVERS OF  
SRI LANKA**

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Degree of Master of Science in Water Resources Engineering and  
Management

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University of Moratuwa

Sri Lanka

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

Supervised by

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Sri Lanka

October 2015

## **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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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**

Water balance is a method by which we can account for the hydrological cycle of a specific area, with the emphasis on plants and soil moisture. One of the main purposes of a water balance study is to evaluate the net available water resources, both on the surface and in the subsurface. Understanding the behavior of a catchment from a hydrological point of view is necessary when planning and activities needed to be done in the watershed.

A-two parameter monthly water balance model for two basins was calibrated and verified using 30 years monthly rainfall, observed flow and pan evaporation data. Kalu Ganga at Ellagawa and Mahaweli Ganga at Morape were selected to estimate the streamflow. The model was calibrated and verified and a good performance was shown for both catchments. The C coefficient for Kalu Ganga at Ellagawa and Mahaweli Ganga at Morape were found as 1 and 1.1 respectively while the SC parameter was found as 800 and 1200 respectively.

The MRAE value for calibration period for Kalu Ganga at Ellagawa and Mahaweli Ganga at Morape showed a very good fitting with value of 0.145 and 0.152 respectively. The same for verification period was also very good with value of 0.153 and 0.157 respectively. During the calibration and verification periods value of the Nash–Sutcliffe efficiency for Kalu Ganga at Ellagawa was found as a 93.6% and 92.4% respectively. 93.6% and 94.1% were the Nash–Sutcliffe values for Mahaweli Ganga at Morape respectively. The two parameter monthly water balance model produced a better fitting of MRAE in annual and seasonal values when compared with monthly time series.

The two-parameter monthly water balance model with the simple structure and two parameters proved as a very efficient model when simulating the monthly, seasonal and annual runoff. Due to its simplicity and high efficiency in performance, this two-parameter monthly water balance model can be easily and efficiently used for the water resources planning and management.

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