

**ESTABLISHMENT OF DRY WEATHER FLOW IN
KALU GANGA UNDER CLIMATE CHANGE
SCENARIOS**

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Degree of Master of Science

Department of Civil Engineering

University of Moratuwa

Sri Lanka

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Thesis submitted in partial fulfillment of the requirements for the degree Master of
Science in Environmental Engineering and Management

Department of Civil Engineering

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Sri Lanka

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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 except where the acknowledgement is made in the text.

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

Signature of the supervisor:

Date:

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ABSTRACT

Establishment of Dry Weather Flow in Kalu Ganga under Climate Change Scenarios

Kalu Ganga basin is one of the most important river basins in Sri Lanka which covers a major portion of the wet zone and carries the highest discharge volume into the sea annually. Therefore it has been identified that, Kalu Ganga is the main source of water for potable water supply schemes especially for the Greater Colombo area.

It is the dry weather flow which determines its potential as a source of water for potable water supply schemes with no major 'at the source storage'. This study is focused on the analysis of low flow due to climate change. The objective of the study is to establish low flow conditions in the Kalu Ganga basin under different climate change scenarios.

Effect of the predicted climate change scenarios on the low flows can be taken into account by using Statistical downscaling with emission scenario consideration.

Statistical Downscaling Model (SDSM) is used for the downscaling of GCM data. Downscaling of GCM data using SDSM Global Circulation Model data of Hadley Center Coupled Model 3 (HadCM3) is used under both A2 and B2 emission scenario as the raw data. A variation of future rainfall is analyzed with observed data. Catchment runoff is predicted using a MIKE11CNAM based hydrological model for 50 years. Frequency analysis is conducted for measured and predicted flow data to establish low flow values due to climate change impacts.

Reduction of low flow in Ellagawa station about 6% and Millakanda Station about 4% in 50 year return periods. It is about 1% for other return periods in both stations. Impact of climatic change is high for the events with high recurrence interval. Hence it is not recommended to extract water during dry period. Therefore, having an appropriate storage system to cater the required demand during dry season is needed.



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TABLE OF CONTENTS

Declaration	i
Acknowledgements	ii
Abstract	iii
Table of content	iv
List of Figures	vi
List of Tables	vii
List of Abbreviations	viii
1. INTRODUCTION	1
1.1 Background	1
1.2 Statement of the Problem	4
1.3 Objective	6
1.4 Scope of the Study	6
1.5 Limitation of the Study	7
2. LITERATURE REVIEW	8
2.1 General	8
2.1.1 Need of study	8
2.1.2 Climate change terminology	9
2.2 Downscaling of Climate Data from GCMS	9
2.2.1 Climate change studies in Sri Lanka	12
2.2.2 Statistical downscaling model (SDSM) for climate change data downscaling	14
2.3 Hydrological Modelling	16
2.4 Low Flow	17
2.4.1 Estimation of low flow	18
3. METHODOLOGY	20
3.1 Data Collection	20
3.2 Hydrological Modelling	21
3.3 Downscaling and analysing the future climate with GCM data	22
3.4 Low flow analysis	24
4. STUDY AREA AND DATA COLLECTION	26
4.1 Study area	26
4.2 Data Collection	28
4.2.1 Hydrological and meteorological data	28
4.2.2 Maps and Other Information	29

4.2.3 Seasonal Distribution of Rainfall in Sri Lanka.....	30
4.2.4 Data preparation for the hydrological model set up	30
5. RESULT AND DISCUSSION	34
5.1 Analysis Of Past Metrological Data	34
5.2 Hydrological Modeling	37
5.3 Downscaling and analyzing of GCM data	41
5.3.1 Selection of the Emission scenario for GCM data.....	42
5.3.2 Selection of the GCM data for the area	43
5.3.3 Downscaling of climate change data using SDSM.....	46
5.3.4 Low flow analysis	48
6. CONCLUSIONS AND RECOMMENDATIONS	53
7. REFERENCE.....	55



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LIST OF FIGURES

Figure 1-Schematic diagram of downscaling technique	10
Figure 2: Schematic View of the SDSM Process.	15
Figure 3: Methodology framework	20
Figure 4: Structure of the NAM model	22
Figure 5: Study Area	26
Figure 6: Meteorological gauging stations.....	28
Figure 7: Catchment Delineation of Kalu Ganga	33
Figure 8: Annual Variations of River Flow Data in Kalu Catchment	35
Figure 9: Recorded Absolute Minimum Flow at Ellagawa (1969 -1999)	36
Figure 10: Recorded Absolute Minimum Flow at Millakanda (1994 – 2010)	37
Figure 11: Ellagawa Calibration - Simulated vs. Observed Flow Comparison	38
Figure 12: Ellagawa Calibration- Simulated vs. Observed Flow Duration Curves ...	38
Figure 13: Millakanda Calibration - Simulated vs. Observed Flow Comparison.....	39
Figure 14: Millakanda Calibration - Simulated vs. Observed Flow Duration Curves	39
Figure 15: Ellagawa Validation - Simulated vs. Observed Flow Comparison	40
Figure 16: Ellagawa Validation- Simulated vs. Observed Flow Duration Curves	40
Figure 17: Millakanda Validation - Simulated vs. Observed Flow Comparison.....	41
Figure 18: Millakanda Validation - Simulated vs. Observed Flow Duration Curves	41
Figure 19: Schematic illustration of the four SRES storylines	42
Figure 20 Validation of SDSM for Ellagawa a) Daily Mean Rainfall b) Maximum Dry Spell Length c) Daily Maximum Rainfall d) Mean dry Spell Length	47
Figure 21 Validation of SDSM for Millakanda a) Daily Mean Rainfall b) Maximum Dry Spell Length c) Daily Maximum Rainfall d) Mean dry Spell Length	48



LIST OF TABLES

Table 1: Annual Rainfall Variation.....	5
Table 2: Main Strengths and weakness of statistical and dynamic downscaling.....	14
Table 3: Kalu Ganga raw water sources	27
Table 4: Hydrological and Meteorological data collected	29
Table 5: Data from internet sources	29
Table 6: Contribution of the seasonal rainfall to the annual rainfall.....	30
Table 7: Neighboring Rainfall Stations used for Normal Ratio Method	32
Table 8: Catchment area details	33
Table 9: Daily mean rainfall (For period 1961 to 1990).....	34
Table 10: Recorded Absolute Minimum Flow at Ellagawa (1969 -1999).....	35
Table 11: Recorded Absolute Minimum Flow at Millakanda (1994 – 2010).....	36
Table 12: The GCM data sources for SRES A2 and B2	44
Table 13: Monthly averaged daily mean rainfall (1961-1990) at Ellagawa	45
Table 14: Monthly averaged daily mean rainfall (1961-1990) at Millakanda.....	45
Table 15: Selected predictor variables and correlations with local predictands	46
Table 16: Low flow values at Ellagawa without climate change impact.....	49
Table 17: Low flow values at Millakanda without climate change impact	49
Table 18: Low flow values at Ellagawa with climate change impact.....	50
Table 19: Low flow values at Millakanda with climate change impact	50
Table 20: Safe abstraction rate for Ellagawa & Millakanda (m ³ /d).....	51
Table 21: Safe abstraction rate for Horana & Naboda (m ³ /d).....	51
Table 22: Percentage of success.....	53
Table 22: Summary of Low Flow Rates (m ³ /s).....	53
Table 23: Summary of Safe Abstraction rates (m ³ /d).....	53



LIST OF ABBREVIATIONS

CCCma	Canadian Centre for Climate Modeling and Analysis
CSIRO	Commonwealth Scientific and Industrial Research Organization
DHI	Danish Hydraulic Institute
GC	Greater Colombo
GCM	General Circulation Model
GHG	Green House Gas
HadCM3	Hadley Center Coupled Model 3
IPCC	Intergovernmental Panel on Climate Change
MCM	Million Cubic Meters
NAM	Nedbør-Afstrømnings-Model
NCEP	National Center for Environmental Physics
NEM	North East Monsoon
NWSDB	National Water Supply and Drainage Board
RCM	Regional Climate Model
SDSM	Statistical Downscaling Model
SRES	Special Report on Emission Scenarios
SWM	South West Monsoon
WMO	World Meteorological Organization



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