



ICDSME 2019

Proceedings of the 1st International
Conference on Dam Safety Management
and Engineering

ISSN 1614-810X

Water Resources Development and Management

ISBN 978-981-15-1970-3

<https://doi.org/10.1007/978-981-15-1971-0>

ISSN 2198-316X (electronic)

ISBN 978-981-15-1971-0 (eBook)

© Springer Nature Singapore Pte Ltd. 2020

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.

The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Contents

Analysis of Climate-Net Unit Generated (NUG) Relationship for the Hydroelectric Power Station	594
Azreen Harina Azman, Nurul Nadrah Aqilah Tukimat, and M. A. Malek	
A Review of Australian Dam Safety Regulations	606
P. Southcott and B. Scott	
Comparison of Design Flood Hydrograph Using XP-SWMM in Jeluh River, Kajang for Flood Mitigation	613
Lariyah Mohd Sidek, Ahmad Zafuan Ibrahim Ahmad Zaki, Amirah Hanim Mohd Puad, and Zulkefli Mustaffa	
Investigation of Multimodel Ensemble Performance Using Machine Learning Method for Operational Dam Safety	625
Hidayah Basri, Mohammad Marufuzzaman, Lariyah Mohd Sidek, and Norlela Ismail	
International Case Studies on Using Risk-Informed Dam Safety Management	633
Adrian Morales-Torres, Ignacio Escuder-Bueno, and Jessica Castillo-Rodriguez	
Developing an Assessment Tool for Sustainable and Green Project Management	643
Yeo Wei Zhe and Gasim Hayder	
Modeling the Aquaculture Carrying Capacity of Batang Ai Reservoir, Sarawak, Malaysia	653
H. L. Lee, M. F. Kasim, S. Y. Ang, M. H. Wahap, and M. N. M. Noh	
Hydrologic Impact of Climate Change on Planned Hydro Dams in Swat River Basin	664
Hira Sattar, Saleem Sarwar, and Sangam Shrestha	
Stability Analysis and Cost Benefit Analysis of the Extension Retaining Wall for Kenyir Dam Spillway	671
Azizul Hassani, Aisyahira Melan, M. H. Zawawi, Agusril Syamsir, Syahirah Azman, M. R. M. Radzi, and Syazwi Sabri	
Author Index	681

Analysis of Climate-Net Unit Generated (NUG) Relationship for the Hydroelectric Power Station

Azreen Harina Azman¹, Nurul Nadrah Aqilah Tukimat^{1,2},
and M. A. Malek³

1 Faculty of Civil Engineering and Earth Resources, Universiti Malaysia Pahang,
Lebuhraya Tun Razak, 26300 Gambang, Pahang Darul Makmur, Malaysia
azreenharinaazman@gmail.com

2 Centre for Earth Resources Research and Management, Universiti Malaysia
Pahang, Lebuhraya Tun Razak, 26300 Gambang,
Pahang Darul Makmur, Malaysia

3 Institute of Sustainable Energy (ISE), Universiti Tenaga Nasional,
Kajang, Malaysia

Abstract:

Global climate change has influenced the sustainability of hydroelectric power generation caused by the uncertainties of the air temperature and rainfall pattern. Current reservoir water management practices may not be robust to survive impacts of climate changes particularly in sufficiency of long term water demand-supply. In addition, the electricity demand is also increasing year by year because of extreme daily weather. Higher temperature will increase the electricity demand which is good income generation however this has resulted high operation cost and reduction of water storage. Therefore, the main objective of the study was to determine the relationship between climate change with net unit generated (NUG) at Sultan Mahmud Hydro Electric Power Station. To achieve the objective, a Statistical Downscaling Model (SDSM) was applied to identify the best atmospheric variables which influenced the long term climate formation at the area. The climate-NUG relationship had been analyzed based on statistical equation. The finding shows inversed proportional relationships between rainfall and temperature. During wet seasons, the maximum rainfall achieved 60 mm/month and the temperature recorded was around 26 °C. Minimum rainfall recorded during dry seasons was <10 mm/month with maximum temperature reading up to 28.5 °C. In terms of power generated, the maximum NUG data were often recorded in wet season. The highest NUG recorded during dry seasons were 1 000 000 000–300 000 000 kWh while the value of NUG during wet seasons were 50 000 000–240 000 000 kWh.

Keyword: Climate changes; Hydroelectric power; NUG; SDSM; Statistical analysis