

IDENTIFICATION OF APPROPRIATE FLOOD HAZARD
MITIGATION STRATEGIES FOR KELANI RIVER BASIN:
SPECIAL REFERENCE TO CITY OF COLOMBO AND
SUBURBS

By

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Declaration by the Candidate

The work described in this thesis was carried out by me under the supervision of Prof. Krishan Deheragoda and a report on this has not been submitted in whole or in print to any university or any other institution for another Degree/Diploma.

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Certificate by the Supervisor

I certify that the above statement made by the candidate is true and that this thesis is suitable for submission to the University for the purpose of evaluation

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29.07.2017

Prof. Krishan Deheragoda

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ABBREVIATION

CFM	Consequences-Frequency Matrices
CRIP	Climate Resilience Investment Project
DEM	Digital Elevation Model
DOM	Department of Meteorology
DOI	Department of Irrigation
DMC	Disaster Management Centre
DRR	Disaster Risk Reduction
DSD	Divisional Secretariat Division
DSM	Digital Surface Model
DTM	Digital Terrain Model
GND	Grama Niladari Division
GIS	Geographic Information System
EFAS	European Flood Awareness System
EWM	Early Warning Model
HFA	Hyogo Framework for Action
HFL	Earthen platforms higher than flood level
IDW	Inverse Distance Weighted
ISDR	International Strategy for Disaster Reduction
JICA	Japan International Cooperation Agency
LiDAR	Light Detection and Ranging
NCDM	National Council for Disaster Management

PDNA	Post-Disaster Needs Assessment
MIWRM	Ministry of Irrigation and Water Resources Management
NBRO	National Building Research Organization
NNDIP	National Natural Disaster Insurance Policy
NITF	National Insurance Trust Fund
MASL	Mahaweli Authority of Sri Lanka
MCM	Million Cubic Meters
UDA	Urban Development Authority
UNDP	United Nations Development Programme
RDA	Road Development Authority
RMSE	Root Mean Square Error
RS	Remote Sensing
SFDRR	Sendai Framework for Disaster Risk Reduction
SLRDC	Sri Lanka Land Reclamation & Development Corporation
TIN	Triangular Irregular Network

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ABSTRACT

Flood risk is the result of natural processes and anthropogenic activities. Development of flood hazard mitigation strategies for risk management of the Kelani River Basin with special reference to the City of Colombo and its Suburbs has been adopted in this research.

First and second objectives of the research has focused to developed three dimensional (3D) models, flood frequency models, flood inundation models and flood early warning models respectively. Preparation of the integrated risk assessment by combining the hazard, vulnerability and consequence has the third objective of this research and finally preparation of comprehensive flood management standards and web based component were the fourth objective of this study.

Flood inundation models were generated based on different flood heights of return period and frequency analysis based on selected return periods of 2, 10, 50, and 100 years. generated different resolution DEM models using Arc Map 10.2.2 and ILWIS. The early warning model has based on flood inundation, rainfall, and watershed

delineation models and rainfall model has developed for 10 and 50 years. Flood hazard, vulnerability and consequence assessment has consisted of the calculation of the flooded area for each water depth class, land use sub group calculation for different elements at risk, damages details from 1989 to 2016 in Colombo City and Suburbs respectively. Risk assessment was a combination of the hazard, vulnerability and consequence score values. Kaduwela, Colombo and Dehiwala were identified as high, moderate and low risk DS division respectively. The results from this study were further investigated in a comprehensive analysis of flood management plan. Comprehensive flood management standards has consist three stages as a pre, during and post hazard. ArcGIS Online is a Complete, Cloud-Based Mapping Platform and very much user friendly which has used of the web based system. Web portal has designed for sharing research outcome.

It is recommended to develop high accurate topographic statistical data for Kelani River Basin, integrated hydrological and topographical information are needed, flood zone maintaining. Establishment of Early Warning and Monitoring System has recommended for cover entire Kelani River Basin, strengthening technical agencies, local authorities and local communities were more essential and finally establishment of Flood Management Department of maintaining, pre during and post flood management activities.

Key words: Consequence, DEM, Hazard, Risk, Vulnerability