

**AN ANALYSIS ON FLOOD MAPPING AND MITIGATION
FOR AKKARAIPATTU MUNICIPAL COUNCIL AREA**

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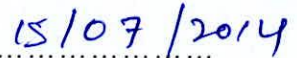
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DECLARATION

The work described in this thesis was carried out by me under the supervision of Dr. Ranjith Premasiri, Senior Lecturer, Department of Earth Resources Engineering, University of Moratuwa, Mrs. H. M. B. S. Herath, Senior Lecturer,, Department of Geography, University of Sri Jayewardenepura, and a report on this has not been submitted in whole or in part to any university of any other institution for another Degree/Diploma



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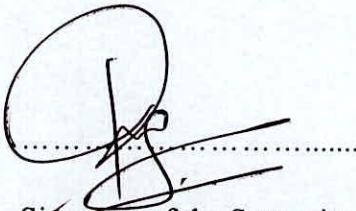


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ABSTRACT

This Study was conducted in Akkaraipattu Municipal Council Area in Ampara District of Sri Lanka. Where Flooding has been found as an annual disaster, there also lack proper drainage system, or an early warning system for quantifying effects of the flood in advance. This study uses GIS as a platform with available data from the area to map the flooding and measure the effects to find out ways to mitigate the damage in early.

The primary objective of this project is to develop Hydrologic and Hydraulic models using GIS tools and techniques for the flood plan analysis of Akkaraipattu Municipal area. The model simulation output will be use to analyze mitigation alternatives within a Geographic Information System.

Hydrological and Hydraulic modeling is to be performed using HEC-HMS and HEC-RAS Software. After delineating catchment basin model using HEC-GeoHMS in ArcGIS environment. The Geometry of a natural drainage model will be created using HEC-GeoRAS in ArcGIS. And will be exported to HEC-RAS with Flow data from HEC-HMS to map the inundation area with depths.

Using GIS people and properties effected will be measure for such a flood with the help of population and statistical data. There will be an analysis to find out access routes to safer places identified by local authorities to evacuate or reach the effected peoples in the flooded area without crossing the major flow path of the flood water.

CHAPTER 1

INTRODUCTION

1.1 Problem Statement

The need to study the cause and effect of flooding has begun since flooding has become a problem to society when people and their valuables become affected. Historically many solutions have been proposed to mitigate the effects of flooding but knowledge on the actual cause effect relation is lacking. With the advent of digital computers, much emphasis has been on simulating and modeling of flood events and related characteristics has become a vital part in a modern society.

Flood is amongst the most devastating natural disaster effecting human life than any other disaster. In 1998 and 2010 there were 178 Million people affected by floods and causing financial losses exceeding \$40 billion globally. It is also reported that one sixth of the global population most of them from low income earners live in a potential path of 1 in 100 year flood according to Department For International Development – UK (DFID).

Based on the Hyogo Framework for Disaster Risk Reduction's (HFDRR, 2010) flood statistical data from 1980 to 2008 have been registered almost 3000 flood events which caused nearly 200,000 deaths, while the economic loss during this period was 397 billion US\$ (annual economic loss 13.5 billion US\$). Global climate change is likely to increase temperature, change precipitation patterns and raise the frequency of extreme flood events (IPCC, 2001)

Akkaraipattu Municipal Council Area is such a place heavily experiencing flood every year. According to disaster management plan created by the DMC and Target Action (NGO) for the Akkaraipattu DS Division, out of twenty-eight (28) there are twenty-seven (27) GN divisions are vulnerable for flooding every year. The topography of Akkaraipattu Municipal Council area is almost flat and mild slope around 1feet per kilometer variation in elevation, with clay and sand soils mostly covers residential houses and small home gardens. There are 42,325 people

living in six square kilometers, the dense population with no proper flood warning system causing the damage to people and properties annually. The main objective of this study is to analyze the effect of such flood event and drive methods to reduce the damage risk.

Causes of flooding may be either natural or human induced. Natural causes may be high and long lasting precipitation or extreme events such as earth quacks and tsunamis. Man induced causes include failure of dam or levee. Mitigating in flood effects requires information on the flooding characteristics and how such characteristics propagate. Such information can be obtained through hydraulic models that are able to simulate flood events, depths, levels, velocity and timing. Hydraulics models have the ability to solve such problems. HEC-RAS/HEC-GeoRAS is one of such powerful tool to model flooding characteristics when given sufficient input data of good quality.