UNIVERSITI TEKNOLOGI MARA

THE INFLUENCE OF GROUND FEATURES ON FLOW PATTERN USING IFSAR AND UAV DATASETS

FARAH HANANI BINTI AMRAN

Thesis submitted in fulfillment
of the requirements for the degree of
Bachelor of Surveying Science and Geomatics
(Hons.)

Faculty of Architecture, Planning and Surveying

August 2020

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with Academic Rules and Regulations for Undergraduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student	:	Farah Hanani binti Amran
Student I.D. No.	:	2017800028
Programme	:	Bachelor of Surveying Science and Geomatics (Hons.) – AP220
Faculty	:	Faculty of Architecture Planning and Surveying
Choose an item.	:	The Influence of Ground Features on Flow Pattern using IFSAR and UAV Datasets
Signature of Student	:	……..
Date	:	August 2020

ABSTRACT

Flood is the most common natural hazards and the rank as the deadliest and most frequent hazards that occur worldwide. Nevertheless, features influence like building, roads, and trees to the flow pattern on flood plain due to the urbanisation on that particular area along the river. The present study aims to determine the influence of water velocity and inundated area with or without features on the Interferometric Synthetic Aperture Radar (IFSAR) and Unmanned Aerial Vehicle (UAV) Digital Elevation Model (DEM) and Digital Surface Model (DSM) datasets. The objectives of this study to (i) determine the impact of water velocity occurred with or without features on DEM and DSM datasets, and (ii) validate the flood extent and water depth based on previous flood marks and inundated area. The study area of Padang Terap River is selected because it is considered as a large prone area following by Sungai Kuala Muda. The datasets of DEM and DSM is being used in this research to determine the impact of water velocity. The integration of hydraulic modelling and Geographic Information Syatem (GIS) to identify the flow pattern of water velocity. Due to the existing features, the impact of water velocity occurred with or without features on DEM and DSM dataset might be different. Validating flood extent and water depth shall be done using predicted inundated areas and previous flood marks by applying a hydraulic model to the flood area and water discharge. The result is to predict the impact of flow direction with different orientation of ground features during flood events. Hence, this research is carried out to identify the influence of ground features orientation that affect to the environment and landscape due to human intervention.

TABLE OF CONTENT

		Page
CONFIRMATION BY PANEL OF EXAMINERS		**ii**
AUTHOR'S DECLARATION		**iii**
SUPERVISOR'S DECLARATION		**ii**
ABSTRACT		**iii**
ACKNOWLEDGEMENT		**iv**
TABLE OF CONTENT		**v**
LIST OF TABLES		**ix**
LIST OF FIGURES		**x**
LIST OF ABBREVIATIONS		**xiii**
LIST OF NOMENCLATURE		**xv**
CHAPTER ONE	**INTRODUCTION**	**1**
1.1	Introduction	1
1.2	Research Background	1
1.3	Problem Statement	2
1.4	Aim and Objectives	3
1.5	Research Question	3
1.6	Scope of Work	1
1.7	Significance of the Study	1
1.8	Chapter Outline	1
CHAPTER TWO	**LITERATURE REVIEW**	**3**
2.1	Introduction	3
2.2	Definition of Flood	3
2.3	Flood Inundation Mapping	3
2.4	The Influence of Features to the Flood	4
2.5	Flood Mapping using Unmanned Aerial Vehicle (UAV)	6
2.6	Hydraulic in Flood Modelling	7
2.7	Cross Sectional Geometry	8

CHAPTER FOUR RESULTS AND CONCLUSION 40

4.1 Introduction 40

4.2 The Impact of Water Velocity Occurred with/without Features on DEM and DSM Datasets 40

4.2.1 Comparison between Water Velocity and Flood Depth on Orientation of Building for IFSAR DEM and UAV DEM 40

4.2.2 Comparison between Water Velocity and Flood Depth on Orientation of Building for IFSAR DSM and UAV DSM 49

4.2.3 Comparison between Water Velocity and Flood Depth on Orientation of Building using Different Boundary Condition for IFSAR DEM and UAV DEM 57

4.2.4 Comparison between Water Velocity and Flood Depth on Orientation of Building and Boundary Condition for IFSAR DSM and UAV DSM 64

4.3 Validating Flood Extent on Different Datasets with Previous Flood Extent 71

4.3.1 Comparison of Flood Extent between IFSAR DEM and IFSAR DSM 71

4.3.2 Comparison of Flood Extent between UAV DEM and UAV DSM 74

4.3.3 Comparison of Flood Extent between IFSAR DEM and IFSAR DSM for Different Boundary Condition 77

4.3.4 Comparison of Flood Extent between UAV DEM and UAV DSM for Different Boundary Condition 80

4.4 Comparison between IFSAR DEM and IFSAR DSM on Flood Depth using Previous Flood Marks 83

4.5 Comparison between UAV DEM and UAV DSM on Flood Depth using Previous Flood Marks 86

4.6 Summary 90

CHAPTER FIVE CONCLUSION AND RECOMMENDATION 91

5.1 Introduction 91

5.2 Conclusion 91

5.3 Recommendation 94

5.4 Summary 94

BIBLIOGRAPHY 95