

IMPACT ASSESSMENT OF LAND USE
AND LAND COVER (LULC) CHANGES
ON LAND SURFACE TEMPERATURE IN
KUANTAN, PAHANG

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ROS ANIZA BINTI MOHD NOR

Thesis submitted in partial fulfilment of the requirements for award of the degree of
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TABLE OF CONTENT

	Page
TITLE PAGE	i
SUPERVISOR’S DECLARATION	ii
STUDENTS’S DECLARATION	iii
DEDICATION	iv
ACKNOWLEDGEMENTS	v
ABSTRACT	vi
ABSTRAK	vii
TABLE OF CONTENTS	viii
LIST OF TABLES	xii
LIST OF FIGURES	xii
LIST OF ABBREVIATIONS	xiii
CHAPTER 1 INTRODUCTION	
1.1 Introduction	1
1.2 Problem Statement	2
1.3 Objectives of Study	6
1.4 Scope of Study	6
1.5 Study Area	7
1.6 Significant of Study	9
1.7 Thesis Structure	9
CHAPTER 2 LITERATURE REVIEW	
2.1 Introduction	10
2.2 Land Use and Land Cover (LULC)	11

2.3	Land Surface Temperature (LST)	12
2.4	Heat and Health	12
2.5	Urban Heat Island (UHI) Phenomenon	14
2.6	Benefit Of Vegetation	18
2.7	GIS Application	20
	2.7.1 Function Of GIS	21
	2.7.2 ArcMap	21
2.8	Global Mapper Application	22
2.9	Satellite Data	23
2.10	Summary	23

CHAPTER 3 METHODOLOGY

3.1	Methodology	24
3.2	Study Area	26
3.3	Data Collecting	27
3.4	Pre-processing	31
	3.4.1 Global Mapper	31
	3.4.2 ArcMap 10.2	31
3.5	Processing	35
	3.5.1 Retrieval Of LULC and LST	35
	3.5.2 Descriptive Statistics	36
3.5	Output	36
3.6	Summary	36

CHAPTER 4 RESULT AND DISCUSSIONS

4.1	Introduction	37
4.2	The Relationship Between LST And LULC	37
4.3	Correlation Between LULC and LST	39
4.4	Summary	41

CHAPTER 5 CONCLUSION AND RECOMMENDATIONS

5.1	Introduction	42
5.2	Conclusion	43
5.3	Evaluation for Objective	44
	5.3.1 Sub-objective 1: To Retrieve The Land Surface Temperature (LST) Data In The Study Area	44
	5.3.2 Sub-objective 2: : To Analyse The Relationship Between Land Use And Land Cover (LULC) Changes	44
5.4	Recommendations for Future Research	
	5.4.1 Recommendations To the Future Research	44
	5.4.2 Recommendations To the Society	45

REFERENCES		46
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APPENDICES

A	Satellite-based LULC Changes and LST Data For Gebeng	51
B	Satellite-based LULC Changes and LST Data For Kuantan	57
C	Satellite-based LULC Changes and LST Data For Bukit Goh	63
D	Satellite-based LULC Changes and LST Data For Sungai Lembing	69

LIST OF TABLES

Table No.	Title	Page
3.1	Population and Area Of Major Cities In Pahang	26
4.1	Land Use Type	40

LIST OF FIGURES

1.1	Rise Of Temperature	4
1.2	Effect Of Global Warming	4
1.3	Extreme Heat Causing Death	5
1.4	Heatwave	5
1.5	Map Of Pahang	8
2.1	Impact Of Extreme Heat	13
2.2	Urban Heat Island (UHI) Phenomenon	14
2.3	Cause of Urban Heat Island (UHI) Phenomenon	16
2.4	Urban Heat Island (UHI) Phenomenon Causing Variety of Adverse Effect	17
2.5	Factors Contribute to The Urban Heat Island (UHI) Phenomenon	18
3.1	Flow diagram of Research Methodology	25
3.2	Image obtain from Satellite	28
3.3	Selected Area involved	28
3.4	Land Surface Temperature (LST) Obtained From Satellite	29
3.5	The data collection downloaded is in TIFF image	30

3.6	The Added LST Image In ArcMap	31
3.7	Clip Toolbox	32
3.8	Export Raster Data	32
3.9	ArcGis Satellite-based Data in Raster Image	33
3.10	ArcGis Satellite-based Data in Raster Image Merging With Image From Google Earth	34
3.11	The Temperature Value	35
4.2	LST versus LULC Graph	40

LIST OF ABBREVIATIONS

LULC	Land Use and Land Cover
LST	Land Surface Temperature
BH	Berita Harian
UM	Utusan Malaysia
USGS	The U.S. Geological Survey's

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ABSTRACT

Pahang state has experienced a rapidly developed. The land use and land cover (LULC) is changed to accommodate the demand for many purposes such as residential, industrial, institutional and commercial purposes. The changes will make the increasing land surface temperature (LST) which contributes to the urban heat island (UHI) phenomenon. The coupling relationship between LULC changes and LST had been done on the previous study. The result obtained showed that the LST of different LULC use are differ significantly. The main objective of this study was to assess the impact of land use and land cover (LULC) changes on land surface temperature (LST) in Pahang state. This study uses the data satellite from public domain database to obtain the status of LULC and LST. Remote sensing and Geographical Information System (GIS) technique were used to detect the variation of LST based on LULC changes. The statistical analysis were performed to retrieve the relationship between LULC and LST. This study demonstrates the positive relationship between LULC changes and LST. The rapid development makes the LULC changes and makes the increasing LST.

ABSTRAK

Negeri Pahang telah mengalami pembangunan yang pesat. Penggunaan tanah dan jenis penutupan tanah (LULC) diubah untuk menampung permintaan bagi pelbagai tujuan seperti tujuan kediaman, industri, institusi dan komersial. Perubahan ini akan menyebabkan suhu permukaan tanah (LST) semakin meningkat yang menyumbang kepada fenomena pulau haba (UHI). Hubungan antara perubahan LULC dan LST telah banyak dilakukan berdasarkan kajian- kajian sebelum ini. Keputusan yang diperolehi menunjukkan bahawa LST adalah berbeza bergantung kepada LULC yang juga berbeza. Objektif utama kajian ini adalah untuk mengenalpasti kesan perubahan penggunaan tanah dan jenis penutupan tanah (LULC) terhadap suhu permukaan tanah (LST). Kajian ini menggunakan data satelit daripada pangkalan data awam untuk menunjukkan status LULC dan LST. Satelit dan Sistem Informasi Geografi (GIS) digunakan untuk mengesan perubahan LST berdasarkan perubahan LULC. Analisis statistik dilakukan untuk menunjukkan hubungan antara LULC dan LST. Kajian ini menunjukkan hubungan positif antara perubahan LULC dan LST. Pembangunan yang pesat menyebabkan perubahan LULC dan serta meningkatkan LST.

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Land is definitely one of the most important natural resources where life and developmental activities depend on it. Land use refers to the type of utilization in which man has put the land in order to use it for some specific purpose. Land also refers to evaluation of the land respect to the various natural characteristics. Land cover describes the vegetal attributes of the land (Ifeka Adolphus 2014). Land use and land cover (LULC) reflects the importance as a key finite resources for mostly human activities whether agriculture, industry, recreation.

Malaysia has experienced a rapidly development led to the decreasing of green areas in the city. These developments are used to accommodate the demand of many purposes such as residential, industrial, commercial and institutional purposes. Rapid urbanization also has led to a significant increase in the number of urban citizens worldwide. Recently, research reported about 65 % of the world's population will live in urban areas by 2025 (Walailak J Sci and Tech, 2015). Currently, more green space, forest and unused land have been converted into commercial and business centre, government offices, residential areas and public amenities (Takeuchi 2010). These circumstances initiate to clear most of vegetated areas in the city.

Recently, the development of urban areas as well as the reduction of greenery areas will transform the natural landscape resulting in the changes in land use and land

cover (LULC). When the LULC is changed, consequently exposing to the increasing the land surface temperature (LST).

Previous studies have focused primarily on biophysical and meteorological factors, such as built-up area and height (Bottyan and Unger, 2003), urban and street geometry (Eliasson, 1996), LULC (Dousset and Gourmelon, 2003), and vegetation (Weng 2004). Based on the previous studies, it is clearly demonstrated that the change in LULC increase land surface temperature and thus modified the urban microclimate.

The average temperature in Malaysia is typically 27°C, but in the past few weeks, temperatures have increasing up into the 30°C. Recently, it has been even hotter up in the northern states of Peninsular Malaysia, with officials saying temperatures there could reach up to 40°C, just 0.1°C short of the highest temperature ever recorded in Malaysia (Malaysian Times, March). Pahang on the other hand is one of the top three state that has higher surface temperature over several past years and its vulnerability to these resulted from the rapid urban development of the Pahang. In other words, Pahang is one of the states consequently expose to the increasing land surface temperature. The impacts of high land surface temperature are even more damaging and interrupt economic activities and the livelihoods of people in the area.

1.2 PROBLEM STATEMENT

Pahang state is vulnerable to the increasing land surface temperature (LST). The vegetated landscape in Pahang undergoing unwanted changes because it is heading towards a rapid development. Urban growth altered the biophysical environment. Rapid urbanization has significant influenced on different aspect of the quality of life and research in determining the patterns of urbanization in quantifying their impact. The changes in biophysical attributes of the earth surface raised the land surface temperature.

The average temperature in Malaysia is typically 27°C, but in the past few weeks, temperatures have soared into the 30°C. It has been worst because in the northern states of Peninsular Malaysia, it has been even hotter up with officials saying

temperatures there could reach up to 40°C, just 0.1°C short of the highest temperature ever recorded in Malaysia. Four states in Peninsular record the highest temperature reading on 19 March 2016 which is Perlis, Kedah, Perak and Pahang. Figure 1.1, Figure 1.2, Figure 1.3 and also Figure 1.4 are some of the articles from the local newspaper about an increasing land surface temperature. The article shows that the effect of lower green areas on the environmental is contribution to the rise of global temperature. The greenhouse effect also could change the world geographical structure which might cause flood and draughts. The disaster such as floods, landslides and extreme heat might destroy many things and it can even cause death.

An increasing LST will become worst and can contribute to the UHI phenomenon in the urban centre. An UHI is a climatic phenomenon in which urban areas have higher air temperature than their rural surroundings (Shahmohamadi, 2011). In order to mitigate the effect of UHI phenomenon, therefore, this study aim to see the impact of LULC changes on LST.