

COMPARISON OF VEGETATION INDICES, ATMOSPHERIC
CORRECTION BASED REMOTE SENSING AND AIRBORNE VEGETATION
MAPPING AT DELTA OF SELANGOR

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COMPARISON OF VEGETATION INDICES (ATMOSPHERIC CORRECTED
BASED INDEX) FOR MANGROVE VEGETATION MAPPING
AT KELANTAN DELTA

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AT KELANTAN DELTA

By

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Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk: COMPARISON OF VEGETATION INDICES (ATMOSPHERIC CORRECTED BASED INDEX) FOR MANGROVE VEGETATION MAPPING AT KELANTAN DELTA oleh Roziatul Zaila binti Bukari @ Bukhari, no. matrik: UK 10458 telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Biologi sebagai memenuhi sebahagian daripada keperluan memperoleh Ijazah Sarjana Muda Sains Gunaan (Pemuliharaan & Pengurusan Biodiversiti), Fakulti Sains dan Teknologi, Universiti Malaysia Terengganu.

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TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENT	ii
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	viii
LIST OF APPENDICES	ix
ABSTRACT	x
ABSTRAK	xi
CHAPTER 1 INTRODUCTION	
1.1 Introduction	1
1.2 Objective of Study	2
CHAPTER 2 LITTERATURE REVIEW	
2.1 Mangrove Forest	3
2.1.1 Naming Mangrove	4
2.1.2 Mangrove Importance	5
2.2 Remote Sensing of Vegetation	7
2.3 Landsat TM	8
2.4 Vegetation Index	9
2.5 Indices to reduce Atmospheric Effects	12
2.5.1 Global Environmental Monitoring Index (GEMI)	12
2.5.2 Atmospherically Resistant Vegetation Index (ARVI)	13
2.5.3 Atmospheric Free Index (AFRI _{MIR} and AFRI _{SWIR})	13
2.6 Atmospheric aerosol effects on Vegetation Index	15

2.7	Application of Vegetation Indices in Mangrove Forest	16
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CHAPTER 3 METHODOLOGY

3.1	Study Area	18
3.2	The Resources	19
3.2.1	Satellite Imagery	19
3.2.2	The computer systems	19
3.3	Image Processing Techniques	19
3.3.1	Geometric Correction	19
3.3.2	Unsupervised Classification	19
3.3.3	Field Investigation	20
3.3.4	Vegetation Index Calculation	20
3.3.5	Computational Approach for Vegetation Index Analysis	21
3.3.6	Vegetation Index Map	22
3.3.7	Accuracy Assessment	22

CHAPTER 4 RESULT

4.1	Mangrove Species Distribution at Kelantan delta	23
4.1.1	Area Coverage and Percentage of Mangrove Distribution	28
4.2	Unsupervised Classification	29
4.3	Vegetation Index Approach	30
4.3.1	GEMI	35
4.3.2	ARVI	36
4.3.3	Modified AFRI _{MIR}	37
4.3.4	Modified AFRI _{SWIR}	38
4.4	Accuracy Assessment	39

4.4.1	The Classification Accuracy of Unsupervised	39
4.4.2	The Classification Accuracy Among Indices	39
CHAPTER 5 DISCUSSION		
5.1	Mangrove Distribution	40
5.2	Differences among Atmospheric Reflectance Indices	42
5.2.1	GEMI	43
5.2.2	ARVI	45
5.2.3	Modified AFRI _{MIR}	47
5.2.4	Modified AFRI _{SWIR}	49
5.3	The classification and Accuracy of Vegetation Indices	51
CHAPTER 6 CONCLUSION		53
REFERENCES		54
APPENDICES		61
CURRICULUM VITAE		68

LIST OF TABLES

Table		Page
2.1	Band Characteristics of Landsat TM 5	8
4.1	Mangrove distribution in the Study Area	28
4.2	The ranges and mean of vegetation indices for mangrove vegetation classes of Kelantan Delta	34
4.3	The overall accuracy and Kappa statistic values for unsupervised	39
4.4	The overall accuracy and Kappa statistic values of indices	39

LIST OF FIGURES

Figure		Page
3.1	Topographic map of Kelantan Delta, Kelantan (1:50 000)	18
3.2	Schematic diagram using model maker module in Erdas Environment	22
4.1	<i>Avicennia</i> in Kelantan Delta	23
4.2	<i>Avicennia-Sonneratia</i> in Kelantan Delta	24
4.3	Mixed <i>Sonneratia</i> in Kelantan Delta	25
4.4	Mixed <i>Acrostichum</i> in Kelantan Delta	26
4.5	<i>Acanthus-Sonneratia</i> in Kelantan Delta	27
4.6	Main Forest Type at the study area	28
4.7	Unsupervised image of Kelantan Delta	29
4.8	Grey-scale image of GEMI of Kelantan Delta	30
4.9	Grey-scale image of ARVI of Kelantan Delta	31
4.10	Grey-scale image of Modified AFRI _{MIR} of Kelantan Delta	32
4.11	Grey-scale image of Modified AFRI _{SWIR} of Kelantan Delta	33
4.12	GEMI after recode process	35
4.13	ARVI after recode process	36
4.14	Modified AFRI _{MIR} after recode	37
4.15	Modified AFRI _{SWIR} after recode	38
5.1	Spectral reflectance signatures of band 3 (red) and band 4 (NIR)	44
5.2	Comparison the mean value and standard deviation of GEMI in Kelantan Delta	44
5.3	Spectral reflectance signatures of band 1 (blue), band 3 (red) and band 4 (NIR)	46
5.4	Comparison the mean value and standard deviation of ARVI in Kelantan Delta	46
5.5	Spectral reflectance signatures of band 4 (NIR) and band 5 (MIR)	48
5.6	Comparison the mean value and standard deviation of Modified AFRI _{MIR} in Kelantan Delta	48
5.7	Spectral reflectance signatures of band 4 (NIR) and band 7 (SWIR)	50
5.8	Comparison the mean value and standard deviation of Modified AFRI _{SWIR} in Kelantan Delta.	50

LIST OF ABBEVIATION

AFRI	- Aerosol Free Vegetation Index
ARVI	- Atmospheric Resistant Vegetation Index
ASVI	- Atmosphere-Soil Vegetation Index
AVIRIS	- Airborne Visible-Infrared Imaging Spectrometer
DN	- Digital Number
APAR	- Absorbed Photosynthetically Active Radiation
GCP	- Ground Control Point
GEMI	- Global Environment Vegetation Index
GIS	- Global Information System
MACRES	- Malaysia Centre for Remote Sensing
MIR	- Middle Infrared
MSAVI	- Modified Soil Adjusted Vegetation Index
MSS	- Multi-Spectral Scanner
NDVI	- Normalized Different Vegetation Index
NIR	- Near Infrared
PVI	- Perpendicular Vegetation Index
SWIR	- Shortwave Infrared
SARVI	- Soil Adjusted Atmospherically Vegetation Index
SAVI	- Soil-adjusted Vegetation Index
RMSE	- Root Mean Square Error
TM	- Thematic Mapper
TSAVI	- Transformed Soil-adjusted Vegetation Index
VI	- Vegetation Index
VI's	- Vegetation Indices
WDVI	- Weighted Difference Vegetation Index

LIST OF APPENDICES

Appendix		Page
1	Raw image of Kelantan Delta, year 2000	61
2	The thematic images of vegetation indices of Kelantan Delta	62
3	An error matrix table generated from unsupervised classification of Kelantan Delta	66

ABSTRACT

A study was conducted at Kelantan Delta to identify mangrove forest types based on Vegetation Index (VI) approach. The aim of this study were to evaluate and compare the performance of different VI (Atmospheric based corrected VI), derives from the Landsat Thematic Mapper (TM) 2000 satellite. In this study four indices were used, namely the Global Environmental Monitoring Index (GEMI), Atmospherically Resistant Vegetation Index (ARVI), Modified Aerosol Free Vegetation Index Mid-Infrared (Modified AFRI_{MIR}) and Modified Aerosol Free Vegetation Index Shortwave-Infrared (Modified AFRI_{SWIR}). Total of five main mangrove forest types which were *Avicennia*, *Avicennia-Sonneratia*, Mixed *Acrostichium*, *Achantus-Sonneratia*, and Mixed *Sonneratia* have been recorded during field investigation and the performances of different VI were analyzed using Spatial-Modeler module in Erdas Imagine environment. The results demonstrated that the indices range for Modified AFRI_{SWIR} at Kelantan Delta was found to be well separated and therefore five classes have been generated. It was found that the shortwave-infrared band is very sensitive to liquid water content and therefore has the potential as the best index to recognize the mangrove classes. With accuracy of 79.33%, higher than using unsupervised classification (72.67%), this index was suggested in order to reduce atmospheric noise and can well recognize the classes. The better used of Shortwave Infrared (SWIR) in this study area was due to high moisture content, influenced by many meteorological events and condition.

**PERBANDINGAN KE ATAS INDEKS TUMBUHAN (INDEKS
PEMBETULAN ATMOSFERA) KE ATAS HUTAN PAYA
BAKAU DI DELTA KELANTAN**

ABSTRAK

Satu kajian telah dijalankan di Delta Kelantan untuk mengelaskan hutan paya bakau menggunakan Indeks Tumbuhan. Matlamat utama kajian ini ialah menilai dan membandingkan antara Indeks Tumbuhan yang berbeza (berdasarkan pembetulan atmosfera Indeks Tumbuhan), daripada imej satelit Landsat TM 2000. Empat jenis indeks yang telah digunakan di dalam kajian ini termasuklah Global Environmental Monitoring Index (GEMI), Atmospherically Resistant Vegetation Index (ARVI), Modified Aerosol Free Vegetation Index Mid-Infrared (Modified AFRI_{MIR}) dan Modified Aerosol Free Vegetation Index Shortwave-Infrared (Modified AFRI_{SWIR}). Lima jenis kelas hutan paya bakau telah direkodkan semasa kerja lapangan iaitu *Avicennia*, *Avicennia-Sonneratia*, “Mixed” *Acrostichium*, *Achantus-Sonneratia*, dan “Mixed” *Sonneratia* telah dianalisa oleh Indeks Tumbuhan dengan menggunakan “Spatial-Modeler module” di dalam perisian Erdas. Keputusan menunjukkan bahawa julat bagi “Modified AFRI_{SWIR}” adalah membahagi secara baik dan menghasilkan lima kelas tumbuhan. Ini membuktikan bahawa jalur gelombang pendek infra merah amat sensitif pada kandungan cecair dan mempunyai potensi sebagai indeks terbaik untuk mengenalpasti kelas hutan paya bakau. Dengan ketepatan sebanyak 79.33%, lebih tinggi daripada pengelasan tanpa berpenyelia (72.67%), indeks ini adalah dicadangkan untuk mengurangkan gangguan atmosfera juga mampu mengelaskan dengan baik. Penggunaan gelombang pendek infra merah di kawasan kajian adalah yang terbaik disebabkan oleh kandungan kelembapan yang tinggi, yang dipengaruhi oleh banyak keadaan dan persekitaran berkaitan cuaca.