

THE UNIVERSITY OF MICHIGAN LIBRARY OF THE EASTERN MICHIGAN DIVISION OF

FACULTY OF THE UNIVERSITY OF MICHIGAN LIBRARY OF THE EASTERN MICHIGAN DIVISION OF

LP
23
FMSM
1
2007

1100054054

Perpustakaan Sultanah Nur Zahirah (UMT)
Universiti Malaysia Terengganu



LP 23 FMSM 1 2007



1100054054

Mapping of mangrove forest in eastern part of Kelantan delta
using quickbird image / Mohammad Nazri Nahar.

PERPUSTAKAAN SULTANAH NUR ZAHIRAH
UNIVERSITI MALAYSIA TERENGGANU (UMT)
21030 KUALA TERENGGANU

1100054054

1100054054		

Lihat sebelah

HAK MILIK
PERPUSTAKAAN SULTANAH NUR ZAHIRAH UMT

**MAPPING OF MANGROVE FOREST IN EASTERN
PART OF KELANTAN DELTA USING QUICKBIRD
IMAGE**

By

MOHAMMAD NAZRI BIN NAHAR

Research Report submitted in partial fulfillment of the requirements for
the degree of Bachelor of Science (Marine Biology)

Department of Marine Science
Faculty of Maritime Studies and Marine Science
UNIVERSITI MALAYSIA TERENGGANU
2007

1100054051

This project should be cited as:

Mohd Nazri N. 2007. Mapping of Mangrove Forest in Eastern Part of Kelantan Delta Using Quickbird Image. Undergraduate thesis, Bachelor of Science in Marine Biology, Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu. 70 p

No part of this project may be reproduced by any mechanical, photographic, or electronic process, or in the form photographic, recording, nor may it be stored in a retrieval system, transmitted, or otherwise copied for public or private use, without written permission from the author and the supervisor of the project.



**JABATAN SAINS MARIN
FAKULTI PENGAJIAN MARITIM DAN SAINS MARIN
UNIVERSITI MALAYSIA TERENGGANU**

**PENGAKUAN DAN PENGESAHAN
LAPORAN PROJEK PENYELIDIKAN I DAN II**

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk:

Mapping of Mangrove Forest in Eastern Part of Kelantan Delta Using Quickbird Image oleh **Mohammad Nazri B.Nahar** , No. Matrik **UK 10783** telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Marin sebagai memenuhi sebahagian daripada keperluan memperoleh **Ijazah Sarjana Muda Sains (Biologi Marin)**, Fakulti Pengajian Maritim dan Sains Marin, Universiti Malaysia Terengganu.

Disahkan oleh:

Penyelia Utama.

Nama : Prof.Madya Sulong B.Ibrahim

Cop Rasmi : **PROF. MADYA SULONG IBRAHIM**
Pensyarah
Institut Oseanografi
Universiti Malaysia Terengganu (UMT)
21030 Kuala Terengganu, Terengganu.

Tarikh:

Penyelia kedua.

Nama : En.Kasawani B.Ibrahim

Cop Rasmi : **KASAWANI IBRAHIM**
Pensyarah
Jabatan Sains Biologi
Fakulti Sains dan Teknologi
Universiti Malaysia Terengganu
21030 Kuala Terengganu.

Tarikh:

ACKNOWLEDGEMENT

Alhamdulillah, thanks to Allah the almighty God for giving me the strength and patience to complete this thesis. Without his permission, I think I would be able to finish this project in time. I would like to express my thanks and gratitude to those whose names are involved in this study.

Firstly, I would like to extend my deep appreciation to my supervisor Associate Professor Sulong Ibrahim for accepting me as their student. Without his guidance, advice and attention or sometimes critics, this project might not have been completed. I am also indebted to my co-supervisor, En. Kasawani Ibrahim for his support and valuable critics about my final year project.

My big thanks also dedicated to several staff in Oceanography institute (INOS), En. Suffian, En. Habir, En. Azri, En. Nasir, and En. Khartik for his time that give the extra guide and help in this study. Also for staff from Jabatan Perhutanan Negeri Kelantan whose help me a lot during my sampling period in Tumpat.

Lastly, I would like to express my deepest gratitude and sincere thanks to my parent and family for all of their moral support. Thanks also for what you have done throughout my 3 years study. I love you all.

TABLE OF CONTENTS

CONTENT	PAGE
TITLE PAGE	i
APPROVAL FORM	ii
ACKNOWLEDGEMENT	iii
CONTENTS	iv
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF APPENDICES	xi
LIST OF ABBREVIATIONS	xii
ABSTRACT	xiii
ABSTRAK	xiv
CHAPTER 1 INTRODUCTION	1
1.1 Background of the study	1
1.2 Objectives of study	3
CHAPTER 2 LITERATURE REVIEW	4
2.1 Definitions of Mangroves	4
2.2 Classifications of mangrove vegetation	6
2.3 Mangrove forest distributions	9
2.4 Delta formation	11

2.5	Mangrove forest in Kelantan Delta	12
2.6	Importance's of Mangrove Forest	13
2.6.1	Ecological	13
2.6.2	Economic	14
2.6.3	Geomorphological and physical functions	15
2.7	Threats on mangrove	16
2.8	Remote sensing	17
2.8.1	Remote sensed data to make a map	19
2.8.2	Quickbird	21
CHAPTER 3 METHODOLOGY		23
3.1	Description of the study area	23
3.2	Materials	24
3.3	Research Method	24
3.3.1	Data Acquisition	25
3.3.2	Geometric correction	26
3.3.3	Unsupervised classifications	26
3.3.4	Ground truthing	27
3.3.5	Supervised classifications	27
3.3.6	Accuracy Assessment	27
3.3.7	Produce maps	28

CHAPTER 4 RESULT	35
4.1 Unsupervised classification	35
4.2 Ground truthing	37
4.3 Characteristics of mangrove species	38
4.3.1 <i>Sonneratia caseolaris</i>	38
4.3.2 <i>Avicennia alba</i>	38
4.3.3 <i>Hibiscus tiliaceus</i>	38
4.3.4 <i>Nypa fruticans</i>	39
4.3.5 <i>Acanthus ebracteatus</i>	39
4.3.6 <i>Acrostichum aureum</i>	39
4.4 Supervised classification	40
4.5 Accuracy assessment	45
CHAPTER 5 DISCUSSION	50
5.1 Mangrove forest distribution in eastern part of Kelantan Delta	50
5.2 Remote sensing as the tools for mapping of mangrove forest	54
5.3 Digital image analysis	56

CHAPTER 6 CONCLUSION AND RECOMMENDATION	59
6.1 Conclusion	59
6.2 Recommendation	60
REFERENCES	61
APPENDICES	64
CURRICULUM VITAE	70

LIST OF TABLES

Table		Page
2.1	Characteristic of Quickbird satellite's	8
4.1	Accuracy assessment for Pulau Kuda	46
4.2	Accuracy assessment for Pulau Renjuna	46
4.3	Accuracy assessment for Pulau Gagak	46
4.4	Accuracy assessment for Pulau Hj. Nik Mat, Pulau Seratus, Pulau Beluru	47
4.5	Accuracy assessment for Pulau Suri	47
4.6	Accuracy assessment for Pulau Dollah	47
4.7	Area of mangrove's coverage (ha) in the study area	49

LIST OF FIGURES

Figure	Page
2.1 Mangroves community forest types	8
2.2 Mangroves forest distributions	10
2.3 Mangrove land Form (Delta)	12
2.4 Principles of remote Sensing	20
3.1 Study area at eastern part of Kelantan Delta	23
3.2 Digital Globe's Quickbird Satellite	25
3.3 The Raw Data of Quickbird Imagery for the Study Area	28
3.4 Subset of study area for Pulau Renjuna	29
3.5 Subset of study area for Pulau Kuda	30
3.6 Subset of study area for Pulau Gagak	31
3.7 Subset of study area for Pulau Hj. Nik Mat, Pulau Seratus, and Pulau Beluru	32
3.8 Subset of study area for Pulau Suri	33
3.9 Subset of study area for Pulau Dollah	34
4.1 Unsupervised image classification for eastern part of Kelantan Delta	36
4.2 Supervised classification map of Pulau Dollah	41
4.3 Supervised classification map of Pulau Gagak	41
4.4 Supervised classification map of Pulau Renjuna	42
4.5 Supervised classification map of Pulau Hj. Nik Mat, Pulau Beluru, Pulau Seratus	42

4.6	Supervised classification map of Pulau Suri	43
4.7	Supervised classification map of Pulau Kuda	43
4.8	Mangrove forest types in eastern part of Kelantan Delta	48

LIST OF APPENDICES

Appendix		Page
1	Ground truth GPS point	64
2	Types of Vegetation at the sampling area	67
3	Error matrix	68

LIST OF ABBREVIATIONS

%	-	Percentage
°	-	Degree
ERDAS	-	Earth Resources Data Analysis System
GPS	-	Global Positioning System
Ha	-	Hectar
Km	-	Kilometer
m	-	Meter
Pan	-	Panchromatic
SPOT	-	Systeme Pour l'Observation de le Terre
TM	-	Thematic Mapper

ABSTRACT

The world's coastal ecosystem has faced a serious problem with a global decline of mangrove forest. In correlated with this issue, this study was conducted in eastern part of Kelantan Delta using the high resolution QuickBird satellite images with the application of remote sensing for mapping the mangrove vegetation and produce an updated land cover map of this area. Eight islands were involved in this study : Pulau Suri, Pulau Hj. Nik Mat, Pulau Seratus, Pulau Beluru, Pulau Renjuna, Pulau Dollah, and Pulau Kuda. The current total area of the mangrove vegetation on this study area is 175.48 hectares (18.72 %). *Sonneratia* forest stand covers 112.08 ha (63.8%) from the total mangrove forest cover in this study area. Other types of mangrove forest are Mixed mangrove (33.02 ha; 18.8%), Mixed *Acanthus* (18.94 ha; 10.8%), *Hibiscus* forest (8.98 ha; 5.1%) and *Hibiscus-Acrostichum* (0.46 ha :1.5%) were also recorded.