

MANGROVE DISTRIBUTION IN NORTH OF  
TERENGGANU

FURUZZA DINI HARIH

FAKULTI SAINS DAN TEKNOLOGI  
UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA  
2006

# MANGROVE DISTRIBUTION IN NORTH OF TERENGGANU

By

Nur Hafiza binti Harith

Research report submitted in partial fulfillment of  
the requirements for the degree of  
Bachelor of Applied Science (Biodiversity Conservation and Management)

Department of Biological Sciences  
Faculty of Science and Technology  
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA  
2006

This project should be cited as:

Nur Hafiza, H. 2006. Mangrove Distribution in North of Terengganu. Undergraduate thesis, Bachelor of Applied Science in Biodiversity Conservation and Management, Faculty of Science and Technology, Kolej Universiti Sains dan Teknologi Malaysia, Terengganu. 76 p.

No part of his project report may be produced by any mechanical, photographic, or electronic process, or in the form of phonographic 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 (s) of the project.

1100046115



**JABATAN SAINS BIOLOGI  
FAKULTI SAINS DAN TEKNOLOGI  
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA**

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

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk: MANGROVE DISTRIBUTION IN NORTH OF TERENGGANU oleh Nur Hafiza binti Harith, no. matrik: UK8085 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 (Pemuliharaan dan Pengurusan Biodiversiti), Fakulti Sains dan Teknologi, Kolej Universiti Sains dan Teknologi Malaysia.

Disahkan oleh:



Penyelia Utama

Nama: **Kasawani Ibrahim**  
*Pensyarah*  
Cop Rasmi: **Jabatan Sains Biologi**  
**Fakulti Sains dan Teknologi**  
**Kolej Universiti Sains dan Teknologi Malaysia**  
21030 Kuala Terengganu.

Tarikh: 10.5.06



Penyelia Kedua (jika ada)

Nama: **PROF. MADYA SULONG BIN IBRAHIM**  
*Fellow*  
Cop Rasmi: **Institut Oseanografi**  
**Kolej Universiti Sains dan Teknologi Malaysia**  
**Mengabang Telipot**  
21030 Kuala Terengganu.

Tarikh: 4.5.06



Ketua Jabatan Sains Biologi

Nama: **PROF. MADYA DR. NAKISAH BT. MAT AMIN**  
*Ketua*  
Cop Rasmi: **Jabatan Sains Biologi**  
**Fakulti Sains dan Teknologi**  
**Kolej Universiti Sains dan Teknologi Malaysia**  
**(KUSTEM)**  
21030 Kuala Terengganu.

Tarikh: 10.5.06

## ACKNOWLEDGEMENTS

Alhamdulillah, a great thank to ALLAH S.W.T that had gave an opportunity for me to accomplish this research. A lot of thanks go to Mr. Kasawani Ibrahim for graciously agreeing to be my supervisor and also giving a supportive morale and technical during this research. Some notable thank to Assoc. Prof. Sulong Ibrahim as my co-supervisor.

I would like to express my sincere thanks to Mr. Mohd Suffian Hj. Idris, Mr. Nasir, and Mr. Asri, Mr. Abdul Habir Alias and Mr. Razali bin Salam for their cooperation and providing the additional information in this project. Much gratitude also goes to the many individuals who contributed to this research especially Karthigayen, Mohd Yunus Ibrahim, Ruzalizam and Kak Izah who helped me smooth through this project.

Special thanks are goes to my partner project, Chunna, my housemates, Siti Munira, Siti Mariam, Roslina and Nurul Faresha. Many thanks to Dawood, Rozek, and Erni who help me during sampling and also to all friends for never ending supported and remain as my inspiration.

Deeply indebted to my beloved parents Mr. Harith Shaari and Madam. Nafisah Othman and also my brothers Hizmy Shahril and Mohd Hafiz. They always become my aspiration all the way in this project.

## TABLE OF CONTENTS

<b>CONTENTS</b>	<b>Page</b>
<b>ACKNOWLEDGEMENTS</b>	<b>ii</b>
<b>TABLE OF CONTENTS</b>	<b>iii</b>
<b>LIST OF TABLES</b>	<b>vi</b>
<b>LIST OF FIGURES</b>	<b>vii</b>
<b>LIST OF ABBREVIATIONS</b>	<b>viii</b>
<b>LIST OF APPENDICES</b>	<b>ix</b>
<b>ABSTRACT</b>	<b>x</b>
<b>ABSTRAK</b>	<b>xi</b>
<b>CHAPTER 1 INTRODUCTION</b>	
1.1 Introduction	1
1.2 Objectives	3
<b>CHAPTER 2 LITERATURE REVIEW</b>	
2.1 Mangrove	4
2.2 Types of Mangrove Forest	4
2.2.1 Estuarine soft-bottom	5
2.2.2 Hard or sandy bottom	5
2.3 Distribution	6
2.4 Importance of Mangrove	7
2.5 Mapping of Mangrove Forest Distribution	7

2.6	Geographic Information system (GIS)	8
2.7	Forest Inventory	9
2.8	Random Sampling	10
2.9	Species Composition	10
2.10	Stand Structure in Mangroves	11

### **CHAPTER 3 METHODOLOGY**

3.1	Study Area	13
3.1.1	Sub Area of Kuala Terengganu	13
3.1.2	Sub Area of Merang	15
3.1.3	Sub Area of Setiu	15
3.1.4	Sub Area of Besut	16
3.2	General Approach of the Study	16
3.3	Data Acquisition	18
3.3.1	Topographic Map	18
3.3.2	Digital Map	18
3.4	Preliminary Survey and Ground Sampling	19
3.4.1	Plot Design	20
3.5	Data Processing	22
3.6	Final Map	22

### **CHAPTER 4 RESULTS**

4.1	Distribution of Mangrove at Study Area	23
4.1.1	Sub Area of Kuala Terengganu	23
4.1.2	Sub Area of Merang	24

4.1.3	Sub Area of Setiu	27
4.1.4	Sub Area of Besut	33
4.2	Community Structure of Mangrove	38
4.2.1	Community Structure in Sungai Ibai	38
4.2.2	Community Structure in Sungai Merang	40
4.2.3	Community Structure in Sungai Keluang Kecil	42
4.2.4	Community Structure in Sungai Keluang Besar	42
4.2.5	Community Structure in Sungai Besut	45
4.3	Common species found in the study area	47
4.3.1	Sub Area of Kuala Terengganu	47
4.3.2	Sub Area of Merang	47
4.3.3	Sub Area of Setiu	52
4.3.4	Sub Area of Besut	53
<b>CHAPTER 5 DISCUSSION</b>		<b>55</b>
<b>CHAPTER 6 CONCLUSION AND RECOMENDATIONS</b>		<b>62</b>
<b>REFERENCES</b>		<b>63</b>
<b>APPENDICES</b>		<b>66</b>
<b>CURICULUM VITAE</b>		<b>76</b>



## LIST OF TABLES

<b>Tables</b>		<b>Page</b>
Table 3.1	Topographic maps according to study area	18
Table 3.2	Digital maps according to study area	19
Table 4.1	The extend of Mangrove Distribution in North Setiu	28
Table 4.2:	Structure of Sungai Ibai Mangrove Community, Kuala Terengganu	39
Table 4.3	Structure of Sungai Merang Mangrove Community, Merang	41
Table 4.4	Structure of Sungai Keluang Kecil Mangrove Community, Besut	43
Table 4.5	Structure of Sungai Keluang Besar Mangrove Community, Besut	44
Table 4.6	Structure of Sungai Besut Mangrove Community, Besut	46
Table 4.7	Exclusive mangrove species found in study area	48
Table 4.8	Non-exclusive mangrove species found in study area	50

## LIST OF FIGURES

<b>Figure</b>		<b>Page</b>
Figure 3.1	Study area location	14
Figure 3.2	General methodology flow diagrams	17
Figure 3.3	Inventory sampling plot	20
Figure 4.1	The distribution of mangrove at Sungai Kuala Ibai	24
Figure 4.2	The estuary of Mengabang Panjang which is closed by sand	25
Figure 4.3	The distribution of mangrove at Sungai Merang, Merang	26
Figure 4.4	Mangroves along Sungai Merang	26
Figure 4.5	The map showing the vegetation types in North of Setiu (Kg. Gong Batu to Pulau Sutung)	30
Figure 4.6	The map showing the vegetation types in North of Setiu (Pulau Sutung to Kg. Mangkuk)	31
Figure 4.7	The Map showing the vegetation types in North of Setiu (Kg. Mangkuk to Kg. Penarik)	32
Figure 4.8	Map of the mangrove forest along Sungai Keluang	34
Figure 4.9	The mangrove area there has been converted into aquaculture ponds	35
Figure 4.10	Cage culture in Sungai Keluang Kecil	35
Figure 4.11	Mangrove forest in Sungai Besut	36
Figure 4.12	Map of the mangrove forest along Sungai Besut	37
Figure 4.13	The broadening process at Sungai Cawat	38

## LIST OF ABBREVIATIONS

%	- Part per hundred
'	- Minutes
“	- Second
°	- Degree
°C	- Degree Celsius
DBH	- Diameter Breast Height
E	- East
EIA	- Environmental Impact Assessment
GIS	- Geographical Information System
ha	- Hectare
Kg.	- Kampung
m	- meter
N	- North
PLKN	- Program Latihan Khidmat Negara
Sg.	- Sungai

## LIST OF APPENDICES

<b>Appendices</b>	<b>Page</b>
A. Form for data observation	67
B. Inventory data sheet	68
C. Inventory data for data measurement	69
D. Formula involved in calculating of data	73
E. Calculation for area coverage each radius in plot	74

## ABSTRACT

This study was conducted to complete the distribution data of mangrove forest at North of Terengganu. This study covers an area from the district of Kuala Terengganu to Besut. The data was collected from previous study, topographic map, observation and some data collection to know the density of tree per hectare compiled together and the areas that have a distribution of mangrove forest were identified. From the result, there are five rivers that have an exclusive mangrove forest distribution which are Sungai Ibai, Sungai Merang, Sungai Keluang Besar, Sungai Keluang Kecil and Sungai Besut. There are there are 25 exclusive and 39 non- exclusive species of mangrove from 38 families were recorded. The mangrove area covers approximately 576.57 ha of total study area where the district of Setiu is the largest distribution of the mangrove with approximately 418.35 ha.

# TABURAN HUTAN PAYA LAUT DI UTARA TERENGGANU

## ABSTRAK

Kajian ini dijalankan untuk melengkapkan data mengenai taburan hutan paya laut di bahagian Utara Terengganu. Kajian ini meliputi dari daerah Kuala Terengganu hingga ke Besut.. Data dari kajian terdahulu, peta topografi dan juga pemerhatian serta pengumpulan data untuk mengetahui kepadatan pokok per hektar dikumpulkan dan dikenal pasti kawasan yang terdapat taburan hutan paya laut. Daripada keputusan yang diperolehi, terdapat lima sungai yang mempunyai taburan hutan eksklusif iaitu Sungai Ibai, Sungai Merang, Sungai Keluang Besar, Sungai Keluang Kecil dan Sungai Besut. Terdapat sebanyak 25 spesis eksklusif dan 39 spesis bukan eksklusif yang terdiri dari 38 famili dicatatkan. Luas taburan hutan paya laut bagi keseluruhan kawasan kajian ialah dianggarkan 576.57 hektar di mana daerah Setiu mencatatkan taburan hutan paya laut yang tertinggi dengan keluasan 418.35 hektar.