

STUDY OF STAND STRUCTURE AND SPECIES COMPOSITION OF
MANGROVE FOREST AT PULAU FERI AND PULAU PARIT PINTAS IN
SUNGAI KERTIH, TERENGGANU

MUHAMMAD YAZID BIN DERAMAN

FACULTY OF MARITIME STUDIES AND MARINE SCIENCE
UNIVERSITI MALAYSIA TERENGGANU
2008

**STUDY OF STAND STRUCTURE AND SPECIES COMPOSITION OF
MANGROVE FOREST AT PULAU FERI AND PULAU PARIT PINTAS IN
SUNGAI KERTIH, TERENGGANU**

By

Muhammad Yazid Bin Deraman

**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
2008**

This project report should be cited as:

Muhammad Yazid, D. 2008. Study of Stand Structure and Species Composition of Mangrove Forest at Pulau Feri and Pulau Parit Pintas in Sungai Kertih, Terengganu. Undergraduate thesis, Bachelor of Science in Marine Biology, Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu, Terengganu. 118p.

No parts of this 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.




**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: **Study of Stand Structure and Species Composition of Mangrove Forest at Pulau Feri and Pulau Parit Pintas in Sungai Kertih, Terengganu** oleh **Muhammad Yazid Bin Deraman**, No. matrik: **UK 12529** 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 IBRAHIM
Pensyarah
Institut Oseanografi
Universiti Malaysia Terengganu (UMT)
Cop Rasmi : 21030 Kuala Terengganu, Terengganu.

Tarikh 11/5/08

.....
Penyelia Kedua (jika ada)

Nama:

Cop Rasmi

Tarikh:


.....

Ketua Jabatan Sains Marin

Nama: **DR. RAZAK ZAKARIYA**
Ketua Jabatan Sains Marin
Cop Rasmi: Fakulti Pengajian Maritim dan Sains Marin
Universiti Malaysia Terengganu
(UMT)

Tarikh: 11/5/08

ACKNOWLEDGMENT

Praise Allah SWT for His blessings, which enable me to complete this thesis. I would like to express my deepest appreciation to my supervisor, Associate Professor Sulong Bin Ibrahim for his invaluable guidance, generous advice and constructive criticisms throughout this study. Sincere thanks are also to En. Abdull Habir Bin Alias for his advice, suggestion and useful comments.

It is my pleasure to dedicate special thanks to En. Wan Asmadi Bin Wan Abd. Llah from Ecocare (MNS-OPTIMAL) for his help, invaluable guidance, patience and assistance during sampling time. Thanks to En. Hussin Bin Muda, Pn. Zaharah Binti Muda and Pn. Maziah Binti Abdullah and their family from local community at Kertih for their help and support.

Thanks to all my friends, especially my coursemate, Faiz and Sallehudin for their help during my sampling. I also wish to thanks to my beloved family especially my parents, En. Deraman Bin Ali and Pn. Zaharah Binti Embong. Thanks a lot for your encouragement, supported moral and materials and kindness to achieve what I have now.

TABLE OF CONTENTS

CONTENTS	PAGE
ACKNOWLEDGEMENT	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	vi
LIST OF FIGURES	viii
LIST OF SYMBOLS/ABBREVIATIONS	ix
LIST OF APPENDICES	x
ABSTRACT	xi
ABSTRAK	xii
1.0 INTRODUCTION	1
1.1 Justification of Study	3
1.2 Objectives	3
2.0 LITERATURE REVIEW	4
2.1 Definitions of Mangroves	4
2.2 Classifications of Mangroves Vegetation	5
2.3 Importance of Mangroves	6
2.4 Distribution of Mangroves Vegetation	7
2.4.1 Mangrove Distribution in the World	7
2.4.2 Mangrove Distribution in Malaysia	9

2.5	Species Composition	10
2.6	Forest Inventory	11
2.7	Stand Structure in Mangroves	12
3.0	METHODOLOGY	14
3.1	Study Site Description	14
3.2	Sampling Design	16
3.3	Inventory Method (Stand Structure)	20
3.4	Inventory Unit	22
3.4.1	Main Plot (8m radius)	23
3.4.2	Secondary Plot (2m radius)	23
3.4.3	Tertiary Plot (1m radius)	24
3.5	Species Composition	25
3.6	Data Analysis	25
3.7	Univariate Analysis	27
3.8	Multivariate Analysis	29
3.8.1	Cluster Analysis	29
3.8.2	MDS (Multi Dimensional Scaling)	30
4.0	RESULTS	32
4.1	Number of Individual in Mangrove Area	33
4.1.1	Pulau Feri	33
4.1.2	Pulau Parit Pintas	36

4.2	Species Analysis	39
4.3	Plot Analysis	41
4.4	Community Structure of Mangroves	43
4.4.1	Pulau Feri	43
4.4.2	Pulau Parit Pintas	46
4.5	Species Composition	48
4.6	Univariate Analysis	49
4.7	Multivariate Analysis	54
4.7.1	Cluster Analysis	54
4.7.2	MDS (Multi Dimensional Scaling)	56
5.0	DISCUSSION	58
5.1	Inventory	58
5.2	Univariate Analysis	62
5.3	Multivariate Analysis (Cluster Analysis)	64
5.4	Observation of Surrounding Area	66
6.0	CONCLUSION	68
	REFERENCES	69
	APPENDICES	73
	CURRICULUM VITAE	118

LIST OF TABLES

TABLES		PAGE
2.1	Area coverage of mangrove forests	8
2.2	Distribution (in hectares) of mangrove forest in ASEAN region	8
4.1	Number of trees in Pulau Feri	33
4.2	Number of saplings in Pulau Feri	34
4.3	Number of seedlings in Pulau Feri	35
4.4	Number of trees in Pulau Parit Pintas	36
4.5	Number of saplings in Pulau Parit Pintas	37
4.6	Number of seedlings in Pulau Parit Pintas	38
4.7	Summary of species analysis at Pulau Feri	39
4.8	Summary of species analysis at Pulau Parit Pintas	40
4.9	Summary of plot analysis at Pulau Feri	41
4.10	Summary of plot analysis at Pulau Parit Pintas	42
4.11	Structure of Pulau Feri mangrove community, Sungai Kertih	45
4.12	Structure of Pulau Parit Pintas mangrove community, Sungai Kertih	47
4.13	Exclusive mangrove species found in the study area at Pulau Feri	48
4.14	Non-exclusive mangrove species found in the study area at Pulau Feri	48
4.15	Exclusive mangrove species found in the study area at Pulau Parit Pintas	49
4.16	Non-exclusive mangrove species found in the study area at Pulau Parit Pintas	49
4.17	Summary species analysis of species richness (d), evenness (J') and diversity (H') at Pulau Feri	49

4.18	Summary species analysis of species richness (d), evenness (J') and diversity (H') at Pulau Parit Pintas	51
4.19	Summary plot analysis of species richness (d), evenness (J') and diversity (H') at Pulau Feri	52
4.20	Summary plot analysis of species richness (d), evenness (J') and diversity (H') at Pulau Parit Pintas	53

LIST OF FIGURES

FIGURES		PAGE
3.1	The location of sampling site at Sungai Kertih	15
3.2	Diagram of transect line plot	17
3.3	Location of transect line and sampling plot at Pulau Feri	18
3.4	Location of transect line and sampling plot at Pulau Parit Pintas	19
3.5	Measuring tree height using laser ace	20
3.6	Measuring DBH using diameter tape	21
3.7	Diagram of plot (main circular, 8m radius = for tree), second circular, 2m radius = for sapling) and third circular, 1m radius = for seedling)	22
3.8	<i>Rhizophora apiculacata</i> sapling in secondary plot	24
3.9	<i>Bruguiera gymnorhiza</i> seedling in tertiary plot	24
4.0	Flowchart of methodology	31
4.1	Cluster analysis at Pulau Feri	54
4.2	Cluster analysis at Pulau Parit Pintas	55
4.3	MDS configuration of mangroves species at Pulau Feri	56
4.4	MDS configuration of mangroves species at Pulau Parit Pintas	57
5.1	Species composition of mangrove forest at Pulau Feri	59
5.2	Species composition of mangrove forest at Pulau Parit Pintas	59

LIST OF SYMBOLS/ABBREVIATIONS

cm	Centimeter
DBH	Diameter Breast Height
DGPS	Digital Global Positioning System
E	East
ha	Hectare
km	Kilometer
m	meter
MDS	Multi Dimensional Scaling
N	North
No	Number
Sap	Sapling
Seed	Seedling
sq	Square
π	3.142
°	Degree
%	Percentage

LIST OF APPENDICES

APPENDIX		PAGE
1	Formula involved in calculating data	73
2	Classification of stem	79
3	Data sheet form	79
4	Inventory data	80
5	Result data analysis from PRIMER	111
6	Type of vegetation at the sampling area	116

ABSTRACT

A study was carried out to determine stand structure and species composition of mangrove vegetation at Pulau Feri and Pulau Parit Pintas in Sungai Kertih, Terengganu. Using forest inventory method, 6 transects which include 31 plots were established in these two islands. There are 9 species of exclusive mangrove species that found in Pulau Feri mangrove forest belonging to 4 Families: Rhizophoraceae, Avicenniaceae, Meliaceae and Euphorbiaceae. Meanwhile, at Pulau Parit Pintas, there are 9 species are found, of which are 6 Families: Rhizophoraceae, Avicenniaceae, Meliaceae, Euphorbiaceae, Palmae and Pteridaceae. There are one species non-exclusive was founded at both island belonging one Family Malvaceae. Community structure analysis was carried out at Pulau Feri showed that the relative density, relative frequency, relative dominance and importance value of *Rhizophora apiculata* was relatively higher than for the other species. Meanwhile, community structure analysis at Pulau Parit Pintas indicates that this island dominated by *Excoecaria agallocha* species whose relative density, relative frequency, relative dominance and importance value were 1.08%, 12.68%, 38.85% and 52.61 respectively.

Kajian Struktur Dirian Dan Komposisi Spesis Hutan Paya Bakau Di Pulau Feri Dan Pulau Parit Pintas Di Sungai Kertih, Terengganu

ABSTRAK

Kajian ini telah dijalankan untuk menentukan struktur dirian dan komposisi spesis hutan paya bakau di Pulau Feri dan Pulau Parit Pintas di Sungai Kertih, Terengganu. Kaedah inventori digunakan dengan membina 6 transek yang mengandungi 31 plot merangkumi kedua-dua pulau. Pulau Feri mengandungi 9 spesis eksklusif bakau, yang mana tergolong di dalam 4 Famili iaitu Famili Rhizophoraceae, Avicenniaceae, Meliaceae dan Euphorbiaceae. Manakala di Pulau Parit Pintas mengandungi 9 spesis eksklusif bakau, yang mana tergolong di dalam 6 Famili iaitu Famili Rhizophoraceae, Avicenniaceae, Meliaceae, Euphorbiaceae, Palmae dan Pteridaceae. Terdapat satu spesis bukan eksklusif di kedua-dua pulau iaitu dari famili Malvaceae. Analisis struktur komuniti di Pulau Feri menunjukkan taburan relatif, frekuensi relatif, dominant relatif dan 'Importance value' bagi spesis *Rhizophora apiculata* adalah yang paling tinggi jika dibandingkan dengan spesis lain. Manakala di Pulau Parit Pintas analisis struktur komuniti menunjukkan pulau ini didominasi oleh spesis *Excoecaria agallocha* yang mana nilai taburan relatif adalah 1.08%, frekuensi relatif adalah 12.68%, dominan relatif adalah 38.85% dan 'importance value' adalah 52.61.