MUDFLAT SLOPE ANGLES AND WAVE ATTENUATION INSIDE MANGROVES

MOHAMAD NAIM BIN ABD RAZAK

FACULTY OF MARITIME STUDIES AND MARINE SCIENCE
UNIVERSITI MALAYSIA TERENGGANU
2010

Mudflat slope angles and wave attenuation inside mangroves / Mohamad Naim Abd Razak.

1100088945		

Lihat Sebelah

MUDFLAT SLOPE ANGLES AND WAVE ATTENUATION INSIDE MANGROVES

By

Mohamad Naim Bin Abd Razak

**Research Report submitted in partial fulfillment of
The requirement for the degree of
Bachelor of Science (Marine Science)**

**Department of Marine Science
Faculty of Maritime Studies and Marine Science
UNIVERSITI MALAYSIA TERENGGANU**
2010

This project report should be cited as:

Naim, A.R. 2010. Mudflat Slope Angles and Wave Attenuation inside Mangroves. Undergraduate thesis, Bachelor of Science in Marine Science, Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu, Terengganu. 33p.

DEPARTMENT OF MARINE SCIENCE
FACULTY OF MARITIME STUDIES AND MARINE SCIENCE
UNIVERSITI MALAYSIA TERENGGANU

DECLARATION AND VERIFICATION REPORT
RESEARCH PROJECT I AND II

It is hereby declared and verified that this research report entitled:

Mudflat Slope Angles and Wave Attenuation inside Mangroves by **MOHAMAD NAIM BIN ABD RAZAK,** Matric No **UK 15040** has been examined and all errors identified have been corrected. This report is submitted to the Department of Marine Science as partial fulfillment towards obtaining the Degree of Bachelor of Science (Marine Science), Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu.

Verified by:

.....

Principal Supervisor

Name: Prof. Dr. Mohd Lokman bin Husain

Official stamp: Date: .....

.....

Second Supervisor (where applicable)

Name: Dr. Mohamad Fadhli bin Ahmad

Official stamp: Date: .....

.....

Head of Department of Marine Science

Name: Dr. Razak Zakariya

Official stamp: Date: .....

ACKNOWLEDGEMENT

Bismillahirahmanirahim,

Alhamdulillah, thank to All Mighty Allah s.w.t on blessing this project has been successful finished although facing a lot of hunch and challenges during conducted the project. First of all, I would like to intend my special gratitude and appreciation to my main supervisor, Prof. Dr. Mohd Lokman Husain for his supervision, assistance, comments and guidance throughout my project. Then my apparition goes to Dr. Mohamad Fadhli b. Ahmad for him idea and guide as my project coordination for two semesters. My lovely parent, my father Abdul Razak b Daud and my mother Rukiah binti Achil for their support and encouragement for me to finish the project. Also not forget to all my friends especially to Mohd Zulfadli b Jalaludin and Mohd Hafis bin Mohd Zin for all their commitment and supported. Thanks a lot to all staff from INOS, University Malaysia Terangganu for providing facilities and equipment. Finally, my appreciation goes to those who have contributed direct or indirect in this project, thank you so much.

TABLE OF CONTENTS

CONTENTS		Page
ACKNOWLEDGEMENTS		iii
LIST OF TABLES		iv
LIST OF FIGURES		v
LIST OF ABBREVIATIONS		v
LIST OF APPENDICES		vi
ABSTRACT		vii
ABSTRAK		vii
CHAPTER 1: INTRODUCTION		1
1.0	Introduction	1
1.1	Objectives	2
CHAPTER 2: LITERATURE REVIEW		3
2.1	Mangrove Environment	3
2.2	Mangrove vegetation	4
2.3	The Important of Mangrove Forest	4
2.4	Mangrove Densities	6
2.5	Wave Reduction	7
2.6	Shore Morphology	7

CHAPTER 3: METHODOLOGY 9

3.1 Study Area 9

3.2 Data Collection 10

3.2.1 Slope Angle Measurement 10

3.2.2 Vegetation Measurement 11

3.2.3 Wave Measurement 12

3.3 Data Screening and Analysis 13

3.4 Flow Chart of Methodology 14

CHAPTER 4: RESULTS 15

4.1 Slope Angle 16^{o} 16

4.1.1 Raw Data 16

4.1.2 Wave Calculation 17

4.1.3 Average Mean of Wave Height 18

4.2 Slope Angle 10^{o} 19

4.2.1 Raw Data 19

4.2.2 Wave Calculation 20

4.2.3 Average Mean of Wave Height 21

4.3 Percentage of Wave Reduction 22

4.4 Wave Reduction and Water Depth 23

CHAPTER 5: DISCUSSION 24

5.1 Wave Reduction and Slope Angle 24

5.2 Wave Reduction by Water Depth 26

CHAPTER 6: CONCLUSION 28

REFERENCES 29

APPENDICES 31

CURICULUM VITAE 33

LIST OF TABLES

Tables		Page
4.1	The total Density of *Rhizhopora* sp.	15
4.2	Calculation of wave burst for 16° at plot 1	17
4.3	Calculation of wave burst for 16° at plot 2	17
4.4	Calculation of wave burst for 10° at plot 1	20
4.5	Calculation of wave burst for 10° at plot 2	20
4.6	hydraulic condition at 16° slope angle	23
4.7	hydraulic condition at 10° slope angle	23

LIST OF FIGURES

Figures		Page
3.1	Study Area	9
3.2	The measurement of slope angle	10
3.3	Placement of Water Level Logger	12
4.1	Boart Longyear software data for 16^{o} slope angle at plot 1	16
4.2	Boart Longyear software data for 16^{o} slope angle at plot 2	16
4.3	Boart Longyear software data for 10^{o} slope angle at plot 1	19
4.4	Boart Longyear software data for 10^{o} slope angle at plot 2	19
5.1	Graph of Wave height against plot for 16^{o} and 10^{o} slope	24
5.2	Graph of wave reduction against Water depth for 16^{o} slope angle	26
5.3	Graph of wave reduction against Water depth for 10^{o} slope angle	26
5.4	Graph of wave reduction against Water depth for 16^{o} and 10^{o} slope angle.	27

LIST OFABBREVIATIONS

Symbol	Definition
H_S	wave height in front of mangrove
H_L	wave height after passing the mangrove
ρ	specific density of water
g	gravity acceleration
H	wave height

ABSTRACT

Mangrove forests cover large parts of the tropical and subtropical shorelines. These trees are tolerant to saline environments, which enable them to grow in the inter-tidal zone. Very diverse flora and fauna can be found in mangrove areas. Often, these coastlines are sheltered or are subject to a moderate wave climate. Mangrove forests act as a natural coastal protection. The most important features of this protection are the prevention of erosion by the collecting of sediment and the reduction of the wave climate. Understanding these key processes is important to the preservation of the mangrove forest themselves, but also of the often highly populated areas behind it. Nevertheless there is a lack of both quantitative and qualitative knowledge on wave processes in mangrove forests. Therefore there is a need to quantify, wave attenuation in particular, in order to relate the natural shore morphology which is slope angle and vegetation density. In this study, two different slope angle was taken which is 16o and 10o slope angle, and it is found that 16o slope angle give more reduction than 10o slope angle. The percentage of wave reduction for 16o is 4.41% and for 10o is 2.71%. Finally it is concluded that the relationship wave reduction on slope angle was successful showed. The steepness of slope at mangrove area gives the benefit to protect coastal area.

ABSTRAK

Hutan paya bakau meliputi sebahagian besar daripada garis pantai tropika dan subtropik. Pohon-pohon di hutan paya bakau ini tahan terhadap persekitaran air masin, yang membolehkan mereka tumbuh di kawasan zon pasang surut. Pelbagai flora dan fauna yang boleh ditemui di kawasan hutan paya bakau ini. Seringkali ia adalah kawasan persisiran pantai yang terlindung atau tahan kepada gelombang iklim yang sederhana. Hutan paya bakau juga bertindak sebagai perlindung kepada pantai. Perkara yang paling penting daripada perlindungan ini adalah pencegahan hakisan dengan mengumpulkan enapan dan pengurangan iklim gelombang. Dengan memahami kata kunci ini adalah sangat penting untuk pemuliharaan hutan paya bakau itu sendiri, tetapi kawasan ini sering berpendudukan. Namun demikian, terdapat kekurangan pengetahuan kuantitatif dan kualitatif tentang proses ombak di hutan paya bakau. Oleh kerana itu, adalah perlu untuk mengukur dan analisis khususnya pada pengurangan tenaga ombak, dengan menghubung kaitkan morfilogi pantai dan kepadatan tumbuhan. Dalam kajian ini, dua sudut kecerunan yang berbeza diambil dimana ia adalah 16^{o} dan 10^{o} kecerunan, dan diketahui bahawa sudut kecerunan 16^{o} memberikan pengurangan lebih banyak daripada sudut kecerunan 10^{o}. Peratus pengurangan gelombang untuk 16^{o} adalah 4,41% dan 10^{o} adalah 2,71%. Akhirnya, kita boleh menyimpulkan bahawa hubungan gelombang penurunan pada sudut kecuraman berjaya ditunjukkan. Dengan ini, sudut kecuraman adalah sangat penting dalam melindungi hutan paya bakau.