

ASSESSMENT OF WAVE ATTENUATION  
ABILITY OF SELECTED MANGROVE  
VEGETATIONS OF PENINSULAR MALAYSIA

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MASTER OF SCIENCE  
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DEDICATION

THIS THESIS IS DEDICATED TO MY MOTHER, FATHER, SISTERS AND  
FRIENDS, WITH THANKS FOR ALL THEIR HELPS, SUPPORT AND

By

**ISFARITA BINTI ISMAIL**

**Thesis Submitted in Fulfillment of the Requirements for the  
Degree of Master of Science in the Institute of Oceanography  
University Malaysia Terengganu**

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Approval of the thesis presented to the Faculty of University Malaysia Terengganu  
in fulfillment of the requirements for the degree of Master of Science

## ASSESSMENT OF WAVE ATTENUATION ABILITY OF SELECTED MANGROVE VEGETATIONS OF PENINSULAR MALAYSIA

ISPARITA BINTI ISMAIL

June 2016

Chairpersons: Prof. Dr. Mohd. Yusoff Yusoff, Ph.D.

### DEDICATION

Members: Prof. Madya Saiful Baharudin, M.Sc.

**THIS THESIS IS DEDICATED TO MY MOTHER, FATHER, SISTERS AND  
FRIENDS, WITH THANKS FOR ALL THEIR HELP, SUPPORT AND  
UNDERSTANDING**

Mangrove forests cover the lower intertidal zones of the tropical and subtropical  
world. They play an important part in ecological, environmental, physical, and  
geomorphological aspects and also as a food and fibre source for humans.  
Mangroves grow in the river delta. This study focuses on three sites, Tenggol, Paka  
(Kangas) and Kuala Terengganu, Kelantan (Kuala Terengganu) and Kuala Terengganu,  
(Kuala Terengganu).

This study was done with an objective to assess the ability of mangrove of wave  
attenuation by vegetation and vegetation density. The model's model was used to find  
the percentage of wave reduction. The study of wave reduction and wave period  
for various height and horizontal height were also discussed. The goal of this study  
is to identify the wave attenuation capabilities of different mangrove vegetation and  
identify the most suitable mangrove vegetation that can be used for coastal erosion.

Abstract of the thesis presented to the Senate of Universiti Malaysia Terengganu  
in fulfillment of the requirements for the degree of Master of Science

**ASSESSMENT OF WAVE ATTENUATION ABILITY OF SELECTED  
MANGROVE VEGETATIONS OF PENINSULAR MALAYSIA**

**ISFARITA BINTI ISMAIL**

**June 2010**

**Chairperson : Prof. Dr. Mohd Lokman Husain, Ph.D.**  
**Members : Prof. Madya Sulong Ibrahim, M.Sc.**  
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Mangrove forests cover the upper intertidal zones of the tropical and subtropical shorelines. They play an important part in ecological, economical, physical, and geomorphological aspects and also as a flora and fauna habitat. In Malaysia, mangroves grow in the river deltas. This study focuses on three sites; Taiping, Perak (*Bruguira* species). Tumpat, Kelantan (*Nypa fruticans*) and Kemaman, Terengganu (*Rhizophora* species).

This study also deals with the physical processes involved in the dissipation of wave reduction by vegetation and vegetation density. The Mazda's model was used to find the percentage of wave reduction. The analysis of wave reduction and root density, the vertical height and horizontal height were also discussed. The goal of this study is to quantify the wave attenuation capabilities of different mangrove vegetations and identify the most suitable mangrove vegetation that can be used for erosion control.

The study also aims to determine the percentage of wave reduction for certain water levels. Besides that the relationship between wave attenuation and vegetation densities were also determined. It was found that out of the three species, the best species to reduce the wave is *Nypa fruticans* (48%) followed by *Rhizophora* species (11%) and *Bruguiera* species (no reduction). It was also observed that in all the three species, the root density decrease with the increasing distance from the shore line. It was also found that for the vertical distance (level), the root density for each species were highest at level 0 – 20 cm. Further, it was found that the wave attenuation increased with the increasing distance inside the mangrove for *Nypa fruticans* and *Rhizophora* species, while the *Bruguiera* species result was contrary.

Abstrak tesis yang dikemukakan kepada Senat Universiti Malaysia Terengganu  
sebagai memenuhi keperluan untuk ijazah master sains

**PENILAIAN KADAR PENYERAPAN OMBAK PADA SPESIS TUMBUHAN  
PAYA BAKAU YANG TERPILIH DI SEMENANJUNG MALAYSIA**

**ISFARITA BINTI ISMAIL**

**Jun 2010**

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**Fakulti : Institut Oseanografi**

Hutan paya bakau meliputi lingkungan pasang surut pada persisir tropikal dan subtropikal. Paya bakau penting dari segi ekologi, ekonomi, fizikal, dan geomorfologi dan juga sebagai habitat tumbuhan dan haiwan. Di Malaysia, paya bakau tumbuh di kawasan muara sungai. Tesis ini menumpukan kepada tiga kawasan paya bakau yang diutamakan seperti Taiping, Perak (spesis *Bruguiera*), Tumpat, Kelantan (*Nypa fruticans*) and Kemaman, Terengganu (spesis *Rhizophora*).

Kajian ini berkenaan dengan proses fizikal yang melibatkan penghamburan penyerapan ombak oleh tumbuhan dan kepadatan tumbuhan. Model Mazda digunakan untuk mencari peratusan penyerapan ombak. Untuk analisis penyerapan ombak dan kepadatan tumbuhan, ukuran lurus dan ukuran mendatar telah dibincangkan. Matlamat kajian ini adalah untuk mengukur kecekapan kadar penyerapan ombak pada tumbuhan paya bakau yang berbeza dan mengenal pasti tumbuhan paya bakau yang paling sesuai yang boleh digunakan untuk mengawal hakisan.

Kajian ini juga menentukan peratusan kadar penyerapan ombak pada aras air yang tertentu. Selain itu hubungan antara peratusan penyerapan ombak dengan ketumpatan tumbuhan juga telah dikaji. Daripada tiga spesies ini, spesies terbaik dalam penyerapan ombak ialah *Nypa fruticans* (48%) diikuti oleh spesies *Rhizophora* (11%) dan *Bruguiera* (tiada pengurangan ombak). Bagi ketiga – tiga spesies tumbuhan, kepadatan tumbuhan menurun dengan pertambahan jarak dari garisan pantai. Bagi ukuran lurus, ketumpatan pokok untuk setiap spesies paling tinggi pada aras 0 – 20 cm. Selain itu kadar penyerapan ombak meningkat dengan kenaikan jarak dalam hutan paya bakau untuk spesies *Nypa fruticans* dan *Rhizophora* tetapi adalah sebaliknya untuk spesies *Bruguiera*.