

A STUDY SPECTRAL REFLECTANCE OF HEALTHY AND NON-HEALTHY
CORAL (*Acropora formosa*) IN BIDONG ISLAND WATER
BY USING REMOTE SENSING TECHNOLOGY

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**A STUDY SPECTRAL REFLECTANCE OF HEALTHY AND NON-HEALTHY
CORAL (*Acropora formosa*) IN BIDONG ISLAND WATER BY USING REMOTE
SENSING TECHNOLOGY**

By

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

**Department of Marine Science
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UNIVERSITI MALAYSIA TERENGGANU
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DEPARTMENT OF MARINE SCIENCE
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**DECLARATION AND VERIFICATION REPORT
FINAL YEAR RESEARCH PROJECT**

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

A Study Spectral Reflectance of Healthy and Non-Healthy Coral (*Acropora Formosa*) in Bidong Island Water by Using Remote Sensing Technology by Mohamad Ezhar Bin Nordin, Matric No. UK 18083 have 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 **Bachelor of Science (Marine Science)**, Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu.

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ABBREVIATIONS/SYMBOLS

°C	degree Celcius
m	meter
mg/l	milligram per liter
nm	nanometer
psu	practical salinity units
DO	dissolved oxygen

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ABSTRACT

Coral reefs in Malaysia are important as attractive tourist place because they are variety type of coral. The importance of and worldwide threats to coral reef ecosystems have created an urgency to develop methods to study reefs on a global scale. In 1998, global coral bleaching event was the largest recorded historical disturbance of coral reefs and resulted in extensive habitat loss. The expulsion of pigmented zooxanthellae from corals during bleaching events results in a strong optical signal. In this study, a field program was designed to explore the differences in the spectral reflectance characteristics of various coral reef features especially between healthy and non-healthy coral. This study was conducted at Bidong Island, Karah Island and Tengkorah Island by using remote sensing application. In-situ upwelling and downwelling radiances were collected for 33 of measurements in range of wavelength 350 to 800 nm by using Satlantic underwater sensor just above the target substrate. This study is aimed to determine the optical wavelength in healthy and and non-healthy *Acropora formosa*. In order to discriminate between the target substrate further analyses were done such as hyperspectral reflectance, derivative and cluster analysis were applied. Stepwise wavelength selection revealed that reef species more accurate distinguished by using derivative analysis compared to hyperspectral reflectance or cluster analysis. The results from this study indicate that remote sensing technology may be feasible means of accurate identification and subsequent monitoring of change in coral health and overall well-being.

ABSTRAK

Terumbu karang di Malaysia adalah penting sebagai tarikan pelancongan kerana terdapat pelbagai jenis batu karang. Pentingnya dan ancaman di seluruh dunia terhadap terumbu karang telah mencipta suatu kepentingan untuk membangunkan kaedah bagi mengkaji terumbu karang pada skala global. Pada tahun 1998, peristiwa pemutihan karang secara global adalah yang terbesar dalam sejarah dan hilangnya habitat karang yang luas. Pengusiran pigmen zooxanthellae dari karang semasa berlakunya pemutihan memberikan isyarat optik yang kuat. Dalam kajian ini, sebuah program lapangan direka untuk mengenalpasti perbezaan ciri-ciri spektrum reflektansi diantara terumbu karang khususnya antara karang yang sihat dan bukan sihat. Kajian dijalankan di Pulau Bidong, Karah Pulau dan Pulau Tengkorah dengan menggunakan aplikasi penderiaan jauh. Upwelling dan radiances downwelling 33 jenis substrat dalam julat gelombang 350-800 nm dengan menggunakan Satlantic underwater sensor tepat di atas substrat target. Penyelidikan ini bertujuan untuk menentukan panjang gelombang optik dalam *Acropora formosa* sihat dan dan tidak sihat. Untuk mendapatkan perbezaan jelas antara target substrat, analisis lebih lanjut telah dijalankan seperti analisis spectra reflectance, derivative dan cluster yang diterapkan. Perbezaan gelombang mendedahkan bahawa terumbu karang dapat dibezakan dengan lebih tepat menggunakan analisis derivative berbanding dengan analisis reflektance atau analisis cluster. Kajian ini menunjukkan bahawa teknologi penderiaan jauh boleh diguna untuk kenalpasti dan pemantauan berterusan perubahan dalam kesihatan karang dan kesejahteraan secara keseluruhan.