APPLICATION OF FUSED QUICKBIRD DATA TO IDENTIFY BENTHIC HABITAT

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By

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DECLARATION AND VERIFICATION REPORT

FINAL YEAR RESEARCH PROJECT

It is hereby declared and verified that this research report entitled: Application of Fused QuickBird Data to Identify Benthic Habitat by Liow Yan Ling, matric number UK 15279 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 in Marine Science, Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

CST	-	Color Space Transformation
PCT	-	Principal Component Transformasion
LRT	-	Local Regression Transformation
UN	-	Unpansharp
PAN	-	Panchromatic
MUL	-	Multispectral
BRDF	-	Bidirectional reflectance distribution function

LIST OF APPENDICES

ABSTRACT

Image fusion is a very important tool in remote sensing, as many Earth observation satellites provide both high-resolution panchromatic and low-resolution multispectral images (Yun Zhang *et al.*, 2005). In this study, one of the image fusion technique is being used, which named pan-sharpening. Generally, pan-sharpening is the process of fusing a low resolution multispectral image with a high resolution panchromatic image to obtain a high resolution multispectral image (Moeller *et al.*, 2008). Nowadays, many image fusion techniques have been developed to improve the spatial resolution, improve the geometric precision, enhanced the capabilities of features display, improve classification accuracy, enhance the capability of the change detection and replace or repair the defect of image data (Zhao, 2003). However, the available algorithms can hardly produce a satisfactory fusion result for QuickBird images. This study introduces the basic concepts and theory of image fusion method for benthic habitat mapping purpose. Indeed, this study discussed 3 types of pan-sharpening method (local regression transformation, colour space transformation and principal component transformation) by applying images into Idrisi Andes software. Doing mapping and geospatial analysis of benthic environments are particularly important because the subtidal seafloor environment is not readily viewed directly by eye. In other words, the complex relationships that exist among physical, biological, and chemical seafloor components require advanced, integrated analysis techniques to enable others to visualize patterns about benthic processes. In short, research in benthic environments relies heavily on remote sensing to collect effective data meanwhile fusion technique act as a very vital step to enhance the visual quality of data in remote sensing field. According to the study result, all the methods are found

to improve resolution and the features present in the multispectral image. Local regression transformation is very efficient in presenting the dead coral compound while the color space transformation are expert in showing the mixture area of sand and dead coral in the water. As for principal component transformation, it is better in performing coral compound and the mixture area of sand and coral in the water.

KENALPASTIKAN HABITAN DASAR LAUT DENGAN MENGAPLIKASIKAN GABUNGAN DATA QUICKBIRD

ABSTRAK

Penyatuan imej merupakan satu teknik yang sangat penting dalam penderiaan jauh, sebagai bukti banyak satelit pemantauan bumi telah menyediakan kedua-dua jenis imej iaitu imej panchromatic beresolusi tinggi dan imej multispectral beresolusi rendah (Yun Zhang *et al.,* 2005). Dalam pengajian ini, salah satu teknik gabungan imej telah digunakan, teknik ini dinamakan pan- sharpening. Secara umum, pan-sharpening adalah suatu gabungan untuk imej multispectral resolusi rendah dengan imej panchromatic resolusi tinggi untuk menghasilkan imej multispectral yang lebih berqualiti (Moeller *et al.,* 2008). Baru-baru ini, banyak teknik gabungan imej telah diperkenalkan untuk meningkatkan spasial resolusi, meningkatkan ketepatan geometri, meningkatkan ciri-ciri skrin, meningkatkan kejituan klasifikasi, meningkatkan daya deteksi perubahan dan menukar atau membaiki kekurangan dalam data-data gambar (Zhao, 2003). Namun, algoritma yang sedia ada masih tidak dapat menghasilkan keputusan yang memuaskan untuk gabungan data Quickbird. Pengajian ini memperkenalkan konsep-konsep asas dan teori mengenai kaedah gabungan imej untuk tujuan pemetaan habitat dasar laut. Dalam pengajian ini 3 jenis pan- sharpening (transformasi regresi tempatan, transformasi ruangan warna dan transformasi komponen utama) juga telah dibincangkan dengan mengaplikasikan imej-imej ke dalam software Idrisi Andes. Pemetaan dan analisis geospatial persekitaran dasar laut adalah sangat penting kerana persekitaran dasar laut subtidal tidak mudah dilihat oleh mata kasar. Dengan kata lain, hubungan kompleks yang ada

di antara fizikal, biologi, dan kimia dasar laut memerlukan komponen canggih, teknik analisis bersepadu untuk membolehkan orang lain untuk memvisualisasikan pola mengenai proses dasar laut. Pendek kata, kajian di persekitaran benthic sangat bergantung pada penderiaan jarak jauh untuk memperolehi data yang berkesan manakala teknik gabungan bertindak sebagai satu langkah yang amat penting untuk meningkatkan data visual kualiti dalam bidang penderiaan jauh. Menurut hasil kajian, semua kaedah yang diaplikasikan dapat meningkatkan resolusi dan ciri-ciri gambar multispectral. Transformasi regresi tempatan sangat efisien dalam menyajikan kawasan karang yang mati sedangkan transformasi ruangan warna sesuai untuk menunjukkan kawasan bercampuran antara pasir dan karang mati di dalam air. Bagi transformasi komponen utama, lebih sensitif dalam menunjukkan kawasan karang dan kawasan campuran antara pasir serta karang di dalam air.