A STUDY OF CHLOROPHYLL-*a* CONCENTRATION FROM SATELLITE IMAGERY AT COASTAL AREA (CASE STUDY OF MERANG AND ROMPIN)

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Lihat sebelah

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By

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

DECLARATION AND VERIFICATION FORM

FINAL YEAR RESEARCH PROJECT

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

A study of chlorophyll-*a* concentration from satellite imagery at coastal area (case study of Merang and Rompin) by **Norfadzilah binti Shafie**, Matric No. **UK 21131** has been examined and all errors identified have been corrected. This report issubmitted 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.

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LIST OF ABBREVIATIONS

DO	-	dissolved oxygen
g	-	gram
km	-	kilometer
kPa	-	kilopascal
l	-	litre
m	-	meter
mg	-	milligram
mL	-	milliliter
mg/L	-	milligram per liter
nm	-	nanometer
ppt	-	part per thousand
$MgCO^3$	-	Magnesium carbonate
^oC	-	degree celcius
%	-	percent

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ABSTRACT

Chlorophyll-*a* is the principal biomass indicator of aquatic micro algae that support food webs in the sea. Monitoring the chlorophyll-*a* contents in the ocean to its conventional state is important to ensure that their concentration is not too low or excessive. A series of Moderate Resolution Imaging Spectroradiometer (MODIS) was used in this study of Merang and Rompin coastal area. There are three objectives from this study which are to determine the chlorophyll-*a* concentration from *ground-truth* data and satellite imagery, to determine the correlation of chlorophyll-*a* concentration from *ground-truth* data and satellite imagery and to determine the monthly changes of chlorophyll-*a* concentration at coastal area of East Coast of Peninsular Malaysia. The sampling periods for Merang were done on 20 to 22 June 2011 and for Rompin were done on 30 June to 1 July 2011 and 21 October 2011. The *ground-truth* data of chlorophyll-*a* concentration for Merang ranging from 0.1372 to 1.5024 mg/L (surface) and ranges from 0.283 to 1.7369 mg/L (5 meter). While for Rompin shows the range of chlorophyll-*a* concentration from 0.1697 to 0.7391 mg/L (surface) and range between 0.1 to 0.7882 mg/L (5 meter). However for satellite imagery data, there are some missing data due to cloud cover. The range of chlorophyll-*a* concentration at Merang was 0.3424 to 0.4972 mg/L for 19 to 21 June 2011. While Rompin the chlorophyll-*a* concentration range was 0.5214 to 0.9136 mg/L for 30 to 2 July 2011 and range from 0.4708 to 0.725 mg/L for 1 to 3 July 2011. There was a weak arrangement between *ground-truth* and MODIS chlorophyll-*a* concentration with R^2= 0.0018 and RMSE= 0.1406. Besides that, the pattern of monthly changes of chlorophyll-*a* concentration of east coast of Peninsular Malaysia is due to monsoon period. In

nutshell, the monitoring the concentration of chlorophyll-*a* in in a large water body area by using remote sensing technique is more faster because the level of chlorophyll-*a* can change in the short time.

KAJIAN KEATAS KEPEKATAN KLOROFIL-*a* DARI IMEJ SATELIT DI KAWASAN PESISIR PANTAI (KAJIAN KES DI MERANG DAN ROMPIN)

ABSTRAK

Klorofil-*a* merupakan penunjuk utama kepada biojisim akuatik mikro algae tehadap rantai makanan di laut. Pemantauan secara konvensional terhadap kandungan klorofil-*a* adalah penting untuk memastikan kepekatan klorofil-*a* ini tidak terlalu rendah atau berlebihan. Satu rentetan data Moderate Resolution Imaging Spectroradiometer (MODIS) digunakan dalam penyelidikan ini iaitu di Pesisir Merang dan Rompin. Terdapat tiga tujuan penyelidikan ini dijalankan iaitu untuk menentukan kepekatan klorofil-*a* di kawasan kajian dan dari imej satelit, untuk menentukan kolerasi kepekatan klorofil-*a* di kawasan kajian dan dari imej satelit dan menentukan perubahan kepekatan klorofil-*a* antara bulan sebelum kajian di kawasan pantai timur semenanjung Malaysia. Kajian ini telah dijalankan pada 20 hingga 22 Jun 2011 untuk perairan Merang dan Rompin pula pada 30 Jun hingga 1 Julai 2011 dan pada 21 oktober 2011. Bacaan kepekatan klorofil-*a* di Merang adalah antara 0.1372 hingga 1.5024 mg/L (permukaan) dan antara 0.283 hingga 1.7369 mg/L (5 meter). Manakala untuk Rompin bacaannya antara 0.1697 hingga 0.7391 mg/L (permukaan) dan seterusnya antara 0.1 to 0.7882 mg/L (5 meter). Walaubagaimanapun, data dari satelit menunjukkan beberapa data tidak lengkap disebabkan litupan awan. Bacaan kepekatan klorofil-*a* dari satellite ialah antara 0.3424 hingga 0.4972 mg/L pada 19 hingga 21 Jun 2011 di Merang. Manakala untuk Rompin bacaannya antara 0.5214 hingga 0.9136 mg/L pada 30 Jun hingga 2 Julai 2011 dan satu

lagi bacaan antara 0.4708 hingga 0.725 mg/L pada 1 hingga 3 Julai 2011. Hubungan antara nilai klorofil-*a* bagi data dari kawasan kajian dengan data MODIS adalah lemah iaitu R^2= 0.0018 dan RMSE= 0.1406. Selain itu, corak perubahan kepekatan klorofil-*a* mengikut bulan adalah mungkin disebabkan oleh perubahan tempoh monsun. Kesimpulannya, penggunaan teknologi penderiaan jauh ini di dalam memantau kepekatan klorofil-*a* di lautan yang luas adalah lebih cepat selari dengan perubahan klorofil-*a*.