

1100054382

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LP 54 FMSM 2 2007



1100054382

Total organic carbon (TOC) and biological oxygen demand (BOD) in water and sediment of Setiu Lagoon, Terengganu, South China Sea / Tan Hong Hock.

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**TOTAL ORGANIC CARBON(TOC) AND BIOLOGICAL OXYGEN
DEMAND(BOD) IN WATER AND SEDIMENT OF SETIU LAGOON,
TERRENGGANU, SOUTH CHINA SEA**

By

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

**Department of Marine Science
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UNIVERSITY MALAYSIA TERENGGANU
2007**

1100054332



**JABATAN SAINS SAMUDERA
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**PENGAKUAN DAN PENGESAHAN LAPORAN PROJEK PENYELIDIKAN I DAN
II**

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk:

Total Organic Carbon And Biological Oxygen Demand(BOD) In Water And Sediment Of Setiu Lagoon, Terengganu, South China Sea oleh *Tan Hong Hock*, No. Matrik *UK9321* telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Samudera sebagai memenuhi sebahagian daripada keperluan memperoleh *Ijazah Sarjana Muda Sains Sains Samudera*, Fakulti Maritime dan Sains Marine, Universiti Malaysia Terengganu.

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ACKNOWLEDGEMENTS

Firstly, I would like to express my sincere gratification and appreciation to my supervisor Professor Dr. Law Ah Theem for his guidance and advices during the completion of this thesis.

Secondly, I really appreciate and grateful to Mr Chuah Lai Fatt, Yong Jaw Chuen and all Professor Law's postgraduate students who had provided me advices and opinion on my thesis, especially lab analysis.

I would like to thank all my project team especially Mr Teoh Boon Sim, Ms Tan Lit Yan, Ms Lim Xing Jie for providing supportive help and advices. I'm very grateful and proud on our team work. Our team had worked hand in hand towards the goal of our project.

I also would like to thank all lab assistants of Jabatan Sains Samudera for their helps and guidance in the lab. Besides that, I would like to thank the Faculty of Science and Technology (UMT) for their technical and equipment support in this study.

Last but not least, I would like to thank my parents and sibling for their moral support. They were my strength and I could not finish this project without their support. My parents Michael Tan and Dolly Teoh and my sibling Annie Tan, Josey Tan, Rina Tan and Willy Tan.

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LIST OF ABBREVIATIONS

μm	-	Micrometer
‰	-	Part per thousand
ALPHA	-	American Publish Health Association
BOD	-	Biological Oxygen Demand
$\text{C}_6\text{H}_{12}\text{O}_6$	-	Carbohydrate
CH_4	-	Methane
Cl	-	Chlorine
CO_2	-	Carbon Dioxide
COD	-	Chemical Oxygen Demand
DO	-	Dissolved Oxygen
DOC	-	Dissolved organic carbon
DOE	-	Department of Environment
FW	-	Formula Weight
GFC	-	Glass Microfibre Filters
HCl	-	hydrochloride acid
M	-	Molar
Max	-	Maximum
mg C/g	-	Milligram carbon per gram
mg/L	-	Milligram per liter
Min	-	Minimum
ml	-	Milliliter
MW	-	Molecular weight
N	-	Normality
NO_2^-	-	Nitrite
NO_3^-	-	Nitrate
NPOC	-	Non-purgeable organic carbon
O_2	-	Oxygen
$^\circ\text{C}$	-	Degree Celsius
OM	-	Organic matter
p	-	Probability
POC	-	Purgeable organic carbon
ppm	-	part per million
S	-	Sulphur
SS	-	Suspended Solid
St	-	Station
Std. Dev.	-	Standard Deviation
TC	-	Total carbon
TIC	-	Total inorganic carbon
TOC	-	Total Organic Carbon
WQS	-	Water Quality Standard
μM	-	Micromole

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ABSTRAK

Taburan jumlah Organik Carbon(TOC) and Biological Oxygen Demand(BOD) dalam air dan sediment di Setiu Lagoon telah dikaji. Tiga lawatan dilakukan ke atas empat belas stesen telah ditentukan. Sampling pertama, kedua dan ketiga dilakukan pada 13 September 2006, 12 October 2006 dan 14 December 2006. Purata nilai and sisihan piawai bagi taburan TOC dalam sample air semasa sampling pertama, kedua dan ketiga ialah 48.869 ± 19.483 mg C/L, 82.711 ± 25.370 mg C/L dan 87.178 ± 13.653 mg C/L masing-masing. Purata nilai and sisihan piawai bagi taburan TOC dalam sample sediment semasa sampling pertama, kedua dan ketiga ialah 7.367 ± 5.864 mg C/g, 9.445 ± 6.311 mg C/g dan 6.946 ± 4.880 mg C/g masing-masing. Purata nilai and sisihan piawai bagi taburan BOD₅ dalam sample air semasa sampling pertama, kedua dan ketiga ialah 0.990 ± 0.345 mg/L, 1.495 ± 0.352 mg/L dan 0.668 ± 0.191 mg/L masing-masing. Purata nilai and sisihan piawai bagi taburan biodegradasi organik carbon dalam sample sediment semasa sampling pertama, kedua dan ketiga ialah 0.396 ± 0.138 mg C/L, 0.598 ± 0.141 mg/L dan 0.267 ± 0.076 mg/L masing-masing. Purata nilai and sisihan piawai bagi taburan tak-biodegradasi organik carbon dalam sample air semasa sampling pertama, kedua dan ketiga ialah 0.056 ± 0.044 mgC/g, 0.140 ± 0.048 mgC/g dan 0.060 ± 0.023 mgC/g masing-masing. Purata nilai and sisihan piawai bagi taburan tak-biodegradasi organik carbon dalam sample sediment semasa sampling pertama, kedua dan ketiga ialah 47.858 ± 21.637 mgC/L, 82.327 ± 23.712 mgC/L dan 89.133 ± 12.415 mgC/L masing-masing. Purata nilai and sisihan piawai bagi taburan tak-biodegradasi organik carbon dalam sample sediment semasa sampling pertama, kedua dan ketiga ialah 7.526 ± 6.265 mgC/g, 9.304 ± 6.284 mgC/g dan 6.885 ± 4.869 mgC/g. Musim monsoon telah mengakibatkan peningkatan bacaan TOC dan BOD₅. Akan tetapi pasir bar buatan manusia telah mengakibatkan peningkatan bacaan TOC dan BOD₅ yang lebih tinggi berbanding kesan monsoon. Akhirnya, Setiu Lagoon masih berada dalam keadaan yang tidak tercemar.

ABSTRACT

The distribution of Total Organic Carbon (TOC) and Biological Oxygen Demand (BOD) in water and sediment of Setiu Lagoon were studied. Three sampling field trips were conducted on the established fourteen stations. The first, second and third sampling was carried out on 13 September 2006, 12 October 2006 and 14 December 2006 respectively. The mean and standard deviation values of TOC in water sample during the first, second and third sampling periods for Setiu lagoon stations were 48.869 ± 19.483 mg C/L, 82.711 ± 25.370 mg C/L and 87.178 ± 13.653 mg C/L respectively. The mean and standard deviation values of TOC in sediment during the first, second and third sampling periods for the lagoon stations were 7.367 ± 5.864 mg C/g, 9.445 ± 6.311 mg C/g and 6.946 ± 4.880 mg C/g respectively. During first, second and third sampling periods, the mean and standard deviation values BOD₅ values for water sample were 0.990 ± 0.345 mg/L, 1.495 ± 0.352 mg/L and 0.668 ± 0.191 mg/L respectively. First, second and third sampling periods for biodegradable organic carbon for water sample were 0.396 ± 0.138 mg C/L, 0.598 ± 0.141 mg/L, 0.267 ± 0.076 mg/L respectively. The mean and standard deviation values of biodegradable organic carbon for sediment samples during first, second and third sampling periods were 0.056 ± 0.044 mg C/g, 0.140 ± 0.048 mg C/g, 0.060 ± 0.023 mg C/g respectively. In addition, The mean and standard deviation values for non-biodegradable organic carbon for water sample during the first, second and third sampling periods for Setiu lagoon stations were 47.858 ± 21.637 mg C/L, 82.327 ± 23.712 mg C/L, 89.133 ± 12.415 mg C/L. While the mean and standard deviation values for non-biodegradable organic carbon in sediment samples during the First, second and third sampling periods for Setiu lagoon stations were 7.526 ± 6.265 mg C/g, 9.304 ± 6.284 mg C/g, 6.885 ± 4.869 mg C/g. During northeast monsoon has greatly increase the TOC and BOD₅ reading. However the man made sand bar had influences TOC and BOD₅ reading compare to monsoon effect. Lastly, Setiu Lagoon is still consider as an unpolluted aquatic system.