DISTRIBUTION OF WATER PHYSICO-CHEMICAL PARAMETERS AND BIOGENIC ELEMENTS IN SETIU LAGOON DURING MONSOON EVENTS AS INDICATOR FOR PRIMARY PRODUCTIVITY

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MASTER OF SCIENCE
UNIVERSITI MALAYSIA TERENGGANU

2015

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Thesis Submitted in Fulfillment of the Requirement for the Degree of Master of Science in the School of Marine and Environmental Sciences
Universiti Malaysia Terengganu

June 2015

This thesis was affectionately dedicated to
my family members…

Especially to my mum and dad,
who always encouraged me
to go on every difficulties…
their endless love always clinging along
my pathway of success…

I love you all…

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

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The study was conducted in the Setiu Lagoon, Terengganu involving three sampling periods, namely in May 2007 (post-monsoon), September 2007 (pre-monsoon) and January 2008 (monsoon). Samples of nutrients (NO_3^--N, NO_2^--N, NH_4^+-N, PO_4^{-3}-P), primary productivity, chlorophyll-a and physico-chemical parameters of water were collected during low and high tides from 6 stations in the lagoon area and 6 stations in the riverine area except for primary productivity where samples were taken during the pre-monsoon and monsoon seasons only during high tide. Data obtained were analyzed to assess the variations of water quality within Setiu lagoon spatially and temporally subjected to monsoonal events and tidal changes. From the results, the N:P ratio indicated that the study area was mostly N limited especially in the lagoon area. Correlation analysis indicated that phytoplankton consumed more NO_3^--N during low tide in the post-monsoon ($p<0.01$) and pre-monsoon season ($p<0.05$) but during high tide,

PO_4^{-3}-P more favorable to phytoplankton in the post-monsoon ($p<0.01$) and pre-monsoon season ($p<0.01$). Factor analysis showed that monsoonal event affects the phytoplankton productivity in the study area compared to tidal event. Temperature was the primary factor while nutrients concentration and salinity were the secondary factors. These indicated that monsoonal events coupled with tidal events contribute to the nutrient supply into the study area. Non-point sources and natural sources were the contributer for the nutrient enhancement in the study area. The study area was still not polluted with nutrients loading and did not exhibit any sign of eutrophication. The nutrient level did not exceed the standard of MWQCS (2010). The physico-chemical parameters and nutrients can be a good indicator for primary productivity in the Setiu lagoon.

Abstrak tesis yang dikemukakan kepada Senat Universiti Malaysia Terengganu sebagai memenuhi keperluan untuk Ijazah Master Sains

TABURAN PARAMETER FISIKO-KIMIA AIR DAN UNSUR BIOGENIK DI LAGUN SETIU SEMASA MONSOON SEBAGAI PENUNJUK PRODUKTIVITI PRIMER

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Kajian ini telah dijalankan di Lagun Setiu, Terengganu melibatkan tiga kali persampelan iaitu pada Mei 2007 (post-monsun), September 2007 (pra-monsun) dan Januari 2008 (monsoon). Sampel nutrien (NO_3^--N, NO_2^--N, NH_4^+-N, PO_4^{-3}-P), produktiviti primer, klorofil-a, dan parameter fisiko-kimia air diambil ketika air surut dan air pasang dari 6 stesen di kawasan lagun and 6 stesen di kawasan sungai kecuali untuk sampel produktiviti primer yang diambil hanya ketika musim pra-monsun dan monsun ketika air pasang. Data yang diperolehi dianalisa untuk melihat variasi kualiti air di lagun Setiu mengikut kawasan dan masa berdasarkan acara monsun dan perubahan pasang-surut. Dari keputusan yang diperolehi, nisbah N:P menunjukkan kawasan kajian adalah dihadkan oleh N terutamanya di kawasan lagun. Analisis korelasi menunjukkan fitoplankton menggunakan NO_3^--N semasa air surut pada musim post-monsun ($p<0.01$) dan pra-monsun ($p<0.05$) tetapi semasa air pasang, PO_4^{-3}-P lebih digemari oleh fitoplankton pada musim post-monsun ($p<0.01$) and pra-monsun ($p<0.01$).

Analisis factor menunjukkan bahawa acara monsun lebih memberi kesan terhadap produktiviti fitoplankton di kawasan kajian berbanding dengan acara pasang-surut. Suhu merupakan faktor primer manakala kepekatan nutrien dan kemasinan merupakan factor sekunder. Ini menunjukkan bahawa acara monsun bersama dengan acara pasang-surut berperanan di dalam membawa bekalan nutrien ke dalam kawasan kajian. Sumber bukan titik dan sumber semulajadi adalah penyumbang kepada peningkatan nutrien di kawasan kajian. Kawasan kajian masih lagi tidak tercemar dengan kemasukan nutrien dan tidak menunjukkan sebarang tanda eutrofikasi. Tahap nutrien masih di bawah atau tidak melebihi piawaian yang telah ditetapkan oleh MWQCS (2010). Parameter fisiko-kimia dan nutrien boleh dijadikan sebagai penunjuk yang baik kepada produktiviti primer di lagun Setiu.