

DISTRIBUTION AND CYCLING OF PHOSPHORUS-  
AND SILICON- BASED NUTRIENTS IN SETIU  
WETLAND, TERENGGANU

AN NUURU AR RASYIDAH BINTI HUSSEIN

MASTER OF SCIENCE  
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**AN NUURU AR RASYIIDAH HUSSEIN**

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**Institute** : **Institute of Oceanography & Environment**

A study was conducted at Setiu Wetland, Terengganu over one year (October 2009-September 2010) in order to know the spatial and temporal variations of phosphorus and silicon based-nutrients. Sampling was carried out monthly at 10 sampling stations. Chlorophyll-a (chl-a) and physical parameters such as salinity, temperature, dissolved oxygen (DO), pH, biological oxygen demand (BOD) and total suspended solids (TSS) were also measured at each station. In addition, the organic nutrient fractionation analysis was performed at selected sampling stations. Monsoon effects on measured parameters were also evaluated. Levels of salinity, temperature, DO, pH, BOD, TSS, chl-a, dissolved inorganic phosphorus (DIP), dissolved organic phosphorus (DOP), total particulate phosphorus (TPP), dissolved inorganic silicon (DISi), dissolved organic silicon (DOSi) and total particulate silicon (TPSi) were in the range of 0-37 ppt, 27-35 °C, 3.1-7.6 mg/L, 5.2-8.7, 0.57-2.88 mg/L, 2-244 mg/L, 0.004-2.95 mg/L, 0.01-0.22 µM, 0.01-0.33 µM, 0.03-0.76 µM, 2-64 µM, 0.1-25 µM, 0.1-18 µM, respectively. The results showed the deterioration of water quality especially near the aquaculture and agriculture area. During the monsoon season, the levels of temperature, DO, pH, TSS, DOP and TPSi were lower compared to post monsoon season and *vice versa* for BOD, TPP and DISi concentrations. There was no obvious trend of high and low concentrations recorded for DIP, DOSi and chl-a throughout the year. During the monsoon season, the heavy rainfall will wash out the nutrients from land and discharged into the wetland. Higher organic content in the wetland will lead to low DO, low pH and high BOD levels due to the decomposition process. Although it is expected that high runoff will also led to high nutrient content

in the wetland, but this phenomenon was not observed. Only TPP and DISi concentrations were high. In contrast, the concentration of TSS, DOP and TPSi were low probably due to the dilution process. The percentage of low molecular weight DOP (LMW DOP) was high during monsoon season corresponded with high chl-a concentrations suggesting the influence of phytoplankton in controlling the distribution of LMW DOP through the direct release process. In contrast, the percentage of high molecular weight DOP (HMW DOP) was high during the post monsoon season suggesting contribution from the resuspension of bottom sediments. The low correlation between low molecular weight DOSi (LMW DOSi) and chl-a throughout the year suggests that the phytoplankton did not play important role in controlling the distribution of LWM DOSi.

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

## **TABURAN DAN KITARAN NUTRIEN BERASASKAN FOSFORUS DAN SILIKON DI TANAH BENCAH SETIU, TERENGGANU**

**AN NUURU AR RASYIIDAH HUSSEIN**

**2012**

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Satu kajian telah dijalankan di Tanah Bencah Setiu, Terengganu selama satu tahun (Oktober 2009-September 2010) untuk mengetahui variasi tempat dan masa nutrien berasaskan fosforus dan silikon. Pensampelan telah dijalankan setiap bulan di 10 stesen pensampelan. Klorofil-a (Klo-a) dan parameter fizikal seperti saliniti, suhu, oksigen terlarut (DO), pH, kehendak oksigen biologikal (BOD) dan jumlah pepejal terampai (TSS) juga telah diukur di setiap stesen. Di samping itu, analisis fraksinasi nutrien organik juga dilakukan di stesen pensampelan terpilih. Kesan monsun terhadap parameter yang diukur juga dinilai. Paras saliniti, suhu, DO, pH, BOD, TSS, klo-a, fosforus tak organik terlarut (DIP), fosforus organik terlarut (DOP), jumlah fosforus partikulat (TPP), silikon tak organik terlarut (DISi), silikon organik terlarut (DOSi) dan jumlah silikon partikulat (TPSi) adalah masing-masing dalam julat 0-37 ppt, 27-35 °C, 3.1-7.6 mg/L, 5.2-8.7, 0.57-2.88 mg/L, 2-244 mg/L, 0.004-2.95 mg/L, 0.01-0.22 µM, 0.01-0.33 µM, 0.03-0.76 µM, 2-64 µM, 0.1-25 µM dan 0.1-18 µM. Keputusan menunjukkan kemerosotan kualiti air terutama yang berhampiran dengan kawasan perikanan dan pertanian. Ketika musim monsun, paras suhu, DO, pH, TSS, DOP dan TPSi adalah lebih rendah berbanding dengan selepas musim monsun dan keadaan sebaliknya untuk kepekatan BOD, TPP dan DISi. Tiada perubahan yang ketara untuk kepekatan tinggi atau rendah yang direkodkan untuk DIP, DOSi dan klo-a sepanjang tahun. Semasa musim monsun, hujan lebat akan membawa masuk nutrien daripada tanah ke kawasan tanah bencah. Ini akan menyebabkan kandungan organik yang banyak di tanah bencah yang seterusnya

menyebabkan paras DO dan pH menjadi rendah dan BOD menjadi tinggi melalui proses penguraian. Walaupun dijangkakan larutlesap yang tinggi akan menyebabkan kepekatan kandungan nutrien di tanah bencah juga bertambah, tetapi fenomena itu tidak berlaku. Hanya kepekatan TPP dan DISi sahaja yang tinggi. Sebaliknya, kepekatan TSS, DOP dan TPSi adalah rendah yang besar kemungkinan disebabkan proses pencairan. Peratus berat molekul rendah DOP (LMW DOP) adalah tinggi semasa musim monsun yang selari dengan kepekatan tinggi klo-a mencadangkan pengaruh fitoplankton dalam mengawal taburan LMW DOP melalui proses pembebasan terus. Sebaliknya, peratus berat molekul tinggi DOP (HMW DOP) adalah tinggi selepas musim monsun yang mencadangkan sumbangan daripada resuspensi sedimen dasar. Korelasi yang rendah antara berat molekul rendah DOSi (LMW DOSi) dan klo-a di sepanjang tahun mencadangkan fitoplankton tidak memainkan peranan yang penting dalam mengawal taburan LMW DOSi.