

**AN ASSESSMENT OF NUTRIENTS
DISTRIBUTION IN SURFACE WATER OF SETIU
RIVER BASIN, TERENGGANU**

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**MASTER OF SCIENCE
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HEE YET YIN

Thesis Submitted in Fulfillment of the Requirement for
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**AN ASSESSMENT OF NUTRIENTS DISTRIBUTION IN SURFACE WATER
OF SETIU RIVER BASIN, TERENGGANU**

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Phosphorus-based nutrients (dissolved inorganic phosphorus (DIP), dissolved organic phosphorus (DOP) and total particulate phosphorus (TPP)), nitrogen-based nutrients (nitrite, nitrate, ammonia, urea, dissolved organic nitrogen (DON) and particulate organic nitrogen (PON)) and carbon-based nutrients (dissolved organic carbon (DOC) and particulate organic carbon (POC)) were measured monthly at 10 sampling stations along the Setiu River basin, Terengganu from July 2010-June 2011. In addition, the low and high molecular weight (LMW and HMW, respectively) of dissolved organic nutrients analysis were performed at selected sampling stations. During the present study, the concentration of DIP, DOP, TPP, nitrite, nitrate, ammonia, urea, DON, PON, DOC and POC were in the range of below detection limit (BDL)-17.14 ppb P, 2.18-18.97 ppb P, 3.46-503.06 ppb P, 0.01- 6.48 ppb N, 49.17-215.97 ppb N, 0.97-105.11 ppb N, 3.61-65.61 ppb N, 6.43-498.99 ppb N, 111.50-837.12 ppb N, 917-12321 ppb C and 298-10333 ppb C, respectively. Most of the nutrients concentrations measured were relatively higher than those recorded by previous studies in the same study area. In general, higher concentrations of nutrients recorded at downstream areas and town center reflecting the inputs of nutrients from anthropogenic activities such as agriculture, aquaculture

and urban domestic wastes. The DIP, DOP, TPP, ammonia, DON, PON and POC concentrations showed a similar pattern with monsoon season i.e. higher during monsoon season and lower during dry season. However, no obvious trends were observed for other nutrients. The fractionation study of dissolved organic nutrients revealed that HMW fractions were abundant which consists of 24-61%, 44-91% and 45-97% of total DOP, DON and DOC, respectively. The LMW dissolved organic nutrients were not significantly associated with chlorophyll-a, suggesting that the phytoplankton might not be the predominant contributor for LMW fraction in Setiu River basin. High percentage of HMW dissolved organic nutrients were recorded at agriculture, aquaculture and town centre stations which may reflect that the contribution from anthropogenic activities. Re-suspension of bottom sediments during monsoon season also played an important role in controlling the HMW dissolved organic nutrients distribution in study area.

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**SATU PENILAIAN TABURAN NUTRIEN DI PERMUKAAN AIR
LEMBANGAN SUNGAI SETIU, TERENGGANU**

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Nutrien berasaskan fosforus (fosforus terlarut tak organik (DIP), fosforus terlarut organik (DOP) dan jumlah fosforus partikulat (TPP)), nutrien berasaskan nitrogen (ammonia, nitrit, nitrat, urea, nitrogen terlarut organik (DON) dan partikulat organik nitrogen (PON)), nutrien berasaskan karbon (karbon terlarut organik (DOC) dan partikulat organik karbon (POC)) telah diukur secara bulanan di 10 stesen pensampelan sepanjang lembangan Sungai Setiu dari Julai 2010-Jun 2011. Di samping itu, analisis berat molekul rendah dan tinggi (masing-masing LMW dan HMW) nutrien organik terlarut telah dilakukan pada stesen pensampelan yang terpilih. Semasa kajian, kepekatan DIP, DOP, TPP, nitrit, nitrat, ammonia, urea, DON, PON, DOC dan POC adalah masing-masing dalam julat di bawah had pengesanan (BDL)-17.14 ppb P, 2.18-18.97 ppb P, 3.46-503.06 ppb P, 0.01-6.48 ppb N, 49.17-215.97 ppb N, 0.97-105.11 ppb N, 3.61-65.61 ppb N, 6.43-498.99 ppb N, 111.50-837.12 ppb N, 917-12321 ppb C dan 298-10333 ppb C. Kebanyakan kepekatan nutrien yang dikaji adalah secara relatifnya lebih tinggi daripada yang direkodkan oleh kajian terdahulu dalam kawasan kajian yang sama. Umumnya, kepekatan nutrien yang direkodkan di kawasan hulu sungai dan kawasan pusat

bandar adalah tinggi yang membayangkan bahawa kemasukkan nutrien adalah daripada aktiviti antropogenik seperti pertanian, akuakultur dan kumbahan domestik perbandaran. Kepekatan DIP, DOP, TPP, ammonia, DON, PON dan POC mempamerkan corak yang serupa dengan musim monsun iaitu tinggi semasa musim monsun dan rendah semasa musim kering. Walau bagaimanapun, tiada perubahan yang ketara untuk nutrien yang lain. Kajian fraksinasi nutrien organik terlarut mendedahkan bahawa fraksi HMW mempunyai kelimpahan yang tinggi yang masing-masing merangkumi 24-61%, 44-91% dan 45-97% daripada jumlah DOP, DON and DOC. Nutrien organik terlarut LMW tidak menunjukkan hubungan yang signifikan dengan klorofil-a yang mencadangkan bahawa fitoplankton mungkin bukan penyumbang utama kepada fraksi nutrien organik terlarut LMW di lembangan Sungai Setiu. Nutrien organik terlarut HMW menunjukkan peratusan yang tinggi di stesen yang terletak di kawasan pertanian, akuakultur dan perbandaran yang membayangkan sumbangan adalah daripada aktiviti antropogenik. Resuspensi sedimen dasar semasa musim monsun turut memainkan peranan yang penting dalam mengawal taburan nutrien organik terlarut HMW di kawasan kajian.