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ZOOPLANKTON COMMUNITY STRUCTURE OF SUNGAI LUKUT AND ITS ESTUARY, NEGERI SEMBILAN

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of the requirements for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

The zooplankton community structure of Sungai Lukut, Negeri Sembilan was studied between February to April 2015. Sampling stations included the river mouth, middle reaches and upper reaches of the river. Sampling was conducted utilizing a tow net with a 140 µm-mesh and a ring bridlewith a 30 cm mouth diameter. The zooplankton sampling was conducted during floods and ebbs for both spring and neap tides. *In situ* salinity ranged from 9.21 to 35.59 parts per thousand; dissolved oxygen ranged from 2.99 to 8.57mg/l; temperature ranged from 28.63^{o}C to 32.67^{o}C and pH ranged from 6.61 to 9.87. Zooplankton density was significantly different ($p<0.05$) between rivermouth (47976±4025 ind/m^3), middle reaches (36647±5948ind/m^3) and the upper reaches (27652±4425ind/m^3) sampling sites. Mean zooplankton density during neap tide was 63200±14874ind/m^{3}and49042±21874ind/m^{3}during spring tide; 26826±7251ind/m^{3}during floods and 29478±11764ind/m^{3}during ebbs. Sampling site, tide and phase of tide showed significant difference for water physicochemical parameters ($p<0.05$). Shannon's H' ranged from 1.87 (upper reaches) to 2.26 (river mouth); Margalef's d ranged from 5.58 (river mouth) to 5.68 (middle reaches); and Pielou's J' ranged from 0.63 (upper reaches) to 0.74 (middle reaches). Shannon's index, Margalef's richness and Pielou's evenness was higher during spring tide (H'=2.19, d=5.27, J'=0.74); Shannon's index and Pielou's evenness was higher during ebbs (H'=2.15, J'=0.75) while Margalef's richness was higher during floods (d=5.7). PCA ordinations showed most of the zooplankton were found at all sampling site with difference abundance while CCA ordination showed distribution and abundance of zooplankton were more affected by salinity, pH and dissolved oxygen.

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CHAPTER ONE
INTRODUCTION

1.1 RESEARCH BACKGROUND

Water bodies including lakes and rivers are frequently flow through urbanized areas and usually act as the final collectors of diverse types of effluents. Urbanization impacts the hydrology, geomorphology and water quality of water bodies (Baer and Pringle, 2000) and is far stronger than the impacts caused by agriculture and deforestation (Paul and Meyer, 2001). Rivers, lakes and coasts are habitats for many aquatic organisms and impacts on these systems will be translated to the organisms that are dependent on them.

Sungai Lukut is one of the major rivers in Negeri Sembilan which is important for potable water, fishing and industry as well as for crop irrigation. Anthropogenic activities such as prawn farms, industrial estates, agriculture as well as mangrove removal along Sg. Lukut adds waste to the river. The disposal of municipal waste and industrial effluents is also channeled to the river without proper management. Further development in Sg. Lukut for instance, former Gelam (*Melaleuca cajuputi*) swamp and forested headland that was developed for housing in 1980's and old mining ponds had been converted for aquaculture which progressively altered its ecosystem (Integrated Shoreline Management Plan, Negeri Sembilan, 2007).

The zooplankton are planktonic organisms inhabiting water bodies such as lakes, rivers, coastal and marine environments. Zooplankton are important indicators of the impact of pollution in marine communities or in river estuaries (Blanc, Leveau, and Szekielda, 1969). Their distribution and abundance is linked to disturbances such as agricultural eutrophication, industrial and domestic pollutants and sewage which can alter ecosystem function. The zooplankton are useful bioindicators to characterize anthropogenic impacts of pollution, such as heavy metals (Stemberger and Chen, 1998), contamination (Yan, Keller, Somers, Pawson, and Girard, 1996), nutrient loading (Dodson, 1992) and acidification (Armorek and Korman, 1993).