CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME I

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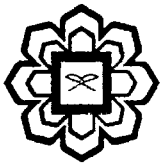

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CHAPTER 2

WATER QUALITY MODELING TO ASSESS THE IMPACTS OF PALM OIL MILL EFFLUENT (POME) IN SG. KALUMPANG BASIN

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ABSTRACT

Palm Oil Mill Effluent (POME) contribution in the Sg. Kalumpang Basin results in serious water quality degradation due to the high organic (BOD) load that enters the water column which depletes the instream oxygen levels. The objective of this study was to assess the organic load contribution via a water quality modeling approach. The exercise showed that the primary POME contributor was Sg. Pang Burong, a tributary of Sg. Kalumpang, which dislodges about 31,500 kg/day of BOD to the main-stem. To achieve a Class III denotation on the main-stem, a reduction of about 3,872 kg/day (9%) had to be obtained whereas a Class II denotation warranted a 23,000 kg/day (55%) reduction.

Keywords: Sg. Kalumpang, POME, TMDL, land application

INTRODUCTION

Sg. Kalumpang is located on the east coast of Sabah, near Semporna, stretching approximately 114 KM from its headwater from Hutan Rizab Ulu Kalumpang to Kg. Pegagau, with a total basin size of 1006 km^2. The river can be considered to mainly be a rural river, with limited pollution contribution from either sewage or heavy industry. That being so, the Sg. Kalumpang basin perhaps contains the highest density of palm oil mills with impact towards the river mainly originating from this activity (EPD, 2010). There are altogether five palm oil mills within the basin, two directly contributing POME to the main-stem and three on its tributary, Sg. Pang Burong. POME contribution results in serious water quality degradation particularly on Sg. Pang Burong where elevated organic levels were prevalent, consequently resulting in anoxic DO levels. Besides the mills, the presence of palm oil plantations also results in water quality degradation, as many of these premises do not have an adequate buffer zone or riparian reserve from the waters edge to the plantation, elevating sedimentary contribution (Klapproth and Johnson, 2009).