**ABSTRACT**

The disposal of 95% of the 1.4 million tonnes of MSW from Selangor, the fastest developing state in Malaysia, is rapidly exhausting landfill space and is also jeopardizing public health. Therefore, proper planning of waste management based on accurate information is essential. The objectives of this research are to collate data from landfills and to investigate the level of public awareness on waste management issues, to analyze the current pollution impacts of landfills and to propose viable options to improve the waste management system in the state. Nine non-sanitary landfills in Selangor were investigated for waste composition and quantification, detailed waste and leachate analysis and treatment, and methane oxidation studies, from 2002 to 2007. Public surveys (2003-2007) were conducted to determine the impact of socio-economic factors on waste management, while modeling of suitable waste management priorities was achieved using SWPlan software.

The largest component of waste generated was organic waste (55%), followed by plastic (17%) and paper (13%), depicting typical developing countries' waste generation profile. Organic waste was best treated via vermi-composting where 500g of 50% food waste and 50% vermi-compost can be fully degraded by 80g of *Eisenia feotida* within 21 days. This was found to be the most appropriate set-up for household scale vermi-composting. Indiscriminate disposal of MSW resulted with leachate and landfill gas emissions from the landfills averaging at 28,200L and 188,000$m^3$, respectively. $BOD_5$ of the leachate samples ranged from 62 – 322 mg/L, which is generally low due to dilution of the leachate with the surface run-off. COD averaged at 4,300 mg/L due to the presence of organic waste in the waste cells. Both COD and $BOD_5$ exceeded the Standard B (EQA

1974) limit of 100mg/L and 50 mg/L, respectively. On the contrary, the metal elements in the leachate were mainly below the limit stipulated in Standard B (EQA 1974) with the exception of Cr. Leachate treatment studies demonstrated that the best combination was chemical treatment with ferric chloride at 0.8g/L at pH4, followed by the application of microbial cocktails. The removal efficiency was up to 70% for physico-chemical treatment while biological treatment removed another 35-73%, to enable all parameters to be below the Standard B (EQA 1974). On the other hand, the emission of $CH_4$ can be reduced via $CH_4$ oxidation. Wheaton bottle experiments identified that soil from active waste cell was the most suitable cover media to enhance rapid $CH_4$ oxidation. The optimal temperature ranged from 30-40$^o$C, while optimal moisture content was 5-10%.

Approximately 76% of the public are aware of the MSW issues in Selangor but less than 25% are willing to participate in 3Rs. This indicated that environmental awareness alone is insufficient to improve the environmental quality of a country. However, the majority of the public in Selangor indicated their willingness to participate if recycling is made mandatory. Therefore, the implementation of Solid Waste and Public Cleansing Management (SWPCM) Act 2007, is expected to make a major impact on the current waste management system in the state, particularly in raising the rate of recycling in Selangor. Computation using SWPlan indicated that recycling will generate an annual revenue of RM7 million (USD2 million) while composting could generate RM46 million (USD13.1 million) per year. Also, landfill management costs will be reduced by 75%. Integrated waste management options (recycling, composting, leachate and landfill gas treatment) are economically advantageous and offer a more sustainable solution for waste management in Selangor.