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**DESIGN, DEVELOPMENT AND EVALUATION OF EXPERIMENTAL
BIOFILM LEACHATE TREATMENT SYSTEMS**

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K.P.M.N. PATHIRANA

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ABSTRACT
DESIGN, DEVELOPMENT AND EVALUATION OF
EXPERIMENTAL BIOFILM LEACHATE TREATMENT
SYSTEMS

K.P.M.N.Pathirana

Postgraduate Institute of Science

University of Peradeniya

Sri Lanka

Leachate treatment is a standard practice in land filling operation. Because leachate is a potentially polluted liquid, which unless returned to the environment in a carefully controlled manner may cause harmful effects. Lack of knowledge and training on leachate management has caused negative impacts on environment and human health. Biological treatments are well known alternative for treating the putrescent fraction of leachate. Therefore, this study focused on development of an anaerobic biofilm leachate treatment system and evaluation of performance of a system. Initially (Experiment-1), an up flow anaerobic reactor fed through a vertical column packed with activated carbon and waste polyethylene was evaluated. A biofilm was developed on supporting media using the nutrient available in the leachate. In the second stage (experiment-2) another three anaerobic biofilm columns were designed by adding gravel, sand, soil, waste polyethylene, and partially degraded raw waste of 0.5kg. Finally (Experiment-3), the weight of raw wastes was increased from 0.5 to 2.5 kg in five columns accordingly.

In all three experiments the inlet and outlet samples were analyzed for pH, Total Dissolved Solid, Chemical Oxygen Demand, Biochemical Oxygen Demand, Total Solid, Volatile Solid, Total Suspended Solid and Volatile Suspended Solid. The Chemical Oxygen Demand and Biochemical Oxygen Demand at outlet showed lower values compared to the inlet. This could be due to the removal of organic matter by the microorganism within the biofilm. For the parameters of Total Solid, Volatile Solid, Total Suspended Solid and Volatile Suspended Solid the rate of removal increased with time. The column with internal layers of gravel,

sand, soil, waste polyethylene, and raw waste shows better results compared to the column with activated carbon and waste polyethylene. The best leachate treatment was observed in the column having the maximum quantity of raw waste (2.5kg). The leachate going through layers of filling media interacts with soil particles imbedded in the polyethylene as the support media. These solid phase reactions had been more effective with the solid wastes. The raw waste layer within the system enhances the growth of the biofilm. Therefore, this could be a viable technology for treating leachate of municipal solid waste within the landfill.