RATIONALIZATION AND EVALUATION OF EVAPOTRANSPIRATION FROM LYSIMETER SIMULATIONS FOR LANDFILL CONDITIONS IN WET TROPICAL CLIMATE IN SRI LANKA

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ABSTRACT

The evapotranspiration (ET) from landfills and dumpsites are of great interest, particularly so for tropical conditions. High ET reduces leachate productions and the Hydrologic Evaluation of Landfill Performance (HELP) model predictions indicated very high accumulations of leachate. Therefore, weighing type lysimeter studies led to the development of a rationalized method for accurate mass and water balances for soil, open dumpsite and landfill simulations. The three lysimeters were weighed daily for 153 days. The freely available moisture contents, temperature, settlement height, the quantity of leachate generation of the lysimeters were measured. Rainfall and pan evaporation ($E_{Pan}$) values were obtained at the experimental site and other climatic parameters were obtained from the nearest meteorological station. At the beginning of the season, both the waste lysimeters manifested high ET values than the predicted Penman-Monteith (PM) and predicted values using $E_{Pan}$. Such levels of moisture evaporations can be expected from the initial decomposition of wastes with high moisture, more so from open dump simulation. On the contrary to the wastes, the only available moisture evaporated from the soil lysimeter and the moisture losses were less than predicted values since PM assumes freely available moisture. Once the convensional rains moistened the soil, the rainwater quickly evaporated back into the atmosphere due to the disturbed conditions of the soil lysimeter. Similarly, the settling wastes in the lysimeter had adequate void spaces to evaporate almost all of the moisture in the open dump simulation, contributing 3 % of the rainfall to leachate production. The soil cover in the landfill simulation prevented from evaporating 10 % of the rainfall received. However, towards the end of the monsoon season in February, all of the simulations approached predicted values of PM or even less than the predictions for lysimeters. The results are very useful for designing of landfills in the tropics.

REFERENCES
