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Application of Artificial Neural Network method and Landfill Leachate Pollution Index for Prediction of Solid Waste Generation and Evaluation in Tropical Area "Langkawi Island"

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Abstract

This paper discusses the artificial neural network (ANN) with emphasis on how its role in   accurate forecasting of the amount of solid waste generation in the Langkawi Island. To achieve an accurate amount of solid waste forecasting is not an easy work because many factors or variables influence the forecasting process, which consequently increases the likelihood of variations in forecasting the amount of solid waste generation. Therefore, applying artificial neural network helps to solve this problem, which is associated with the simulation model. The establishment of Langkawi Island as a Geopark cluster makes it necessary to protect Langkawi against pollution, particularly the elements of leachate. Moreover, it is important for future planning related to the quantities of solid waste generation in Langkawi. Waste generation amount, types and the strips of trucks and personnel from 2004 to 2009 have been used as the independent variables in the ANN analysis. The suitable model, according to the mean absolute error (MAE), the mean absolute relative error (MARE) and R^2, has been selected through feed-forward-back propagation for testing and training. The best model to predict generation of solid waste is to include 16 input layers, one hidden layer and one output layer. The second section of this paper explained Leachate Pollution Index (LPI) in Langkawi Island that presented total pollution potential related to landfill site and the result indicated that LPI_{or} value is more than inorganic and heavy metal in the area.

Key words: Prediction of Solid Waste Generation, Langkawi Island, Artificial Neural Network

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