



**TECHNICAL REPORT
UNIVERSITY RESEARCH GRANT**

**Soft Computing Technique to Predict Total Bed
Material Load for Sand-Bed Rivers in Malaysia**

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The rising demand of river sand has led to a mushrooming of river sand mining activities which jeopardizes the natural and health of the river as well as the environmental problems associated. Various sediment transports equations with different approaches has been developed to predict the total load transport rate. Generally, the conventional approaches used in most modeling efforts begin with an assumed of empirical and analytical equation. Although many research on the total bed material load have been recorded throughout last few decades based on conventional approaches, they are still have constrained of the wider application of theoretical models. Alternatively, various kind of soft computing technique have been introduced and applied in water engineering problems since the last two decades (Nagy et al., 2002, Yang et al., 2009). Soft computing technique such as artificial neural networks (ANNs), evolutionary computation (EC), fuzzy logic (FL), and genetic programming have been successfully applied. A few studies on application of GEP in water engineering have been applied to model sediment transport. Total bed material load transport in rivers is a complex phenomenon. Therefore, the mushrooming of soft computing technique application in engineering sciences is valuable to overcome the complexity and uncertainty problems associated. The Support Vector Machine (SVM) is proposed as new predictive tool to estimate the sediment loads in three Malaysian Rivers which are Muda, Kurau and Langat rivers. The SVM technique demonstrated a superior performance compared to other traditional sediment-load methods. The performance of the SVM method demonstrates its predictive capability and the possibility of the generalization of the model to nonlinear problems for river engineering applications.