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The potential of shear wave velocity as an erosion risk index

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Abstract

Soil erosion is a captious environmental problem in regions of hot tropical climates, causing loss of land and natural disasters such as river sedimentation, flooding, and slope failures. Based on soil properties and their response to erosion agents, efforts have been made to develop simplified models and indices for the estimation of erosion . ROM scale is proven to be effective in forecasting risk levels for erosion assessment. However, the method requires soil sampling and laboratory experimentation, which is time-consuming and laborious, especially when analyzing huge areas. Therefore, this study aims to develop a relation between ROM scale and shear wave velocity estimated by the spectral-analysis-of-surface-waves (SASW) method. For this purpose, 36 soil samples were extracted, and twelve SASW tests were conducted at twelve sites identified along Sungai Langat. Soil particle distribution was carried out to calculate the ROM erosion index value for all the extracted soil samples. The fast Fourier Transform (FFT) algorithm was used to transform the time-recorded signals into the frequency domain, and the dispersion curves were generated after the masking process. The shear wave velocity erosion risk ranged from 10 m/s to 120 m/s, indicating critical risk and low risk , respectively. Low erosion risk levels were observed for high shear wave velocity values, representing a decaying pattern in exponential relation. The resulting correlation between ROM scale and shear wave velocity produced a coefficient of determination value of 0.71, indicating a strong relation. This study indicated the potential of shear wave velocity as an erosion risk index . © 2022 Elsevier Ltd

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Erosion risk index ; ROM scale; SASW; Shear wave velocity

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