

Landsat 8 data for soil salinity mapping in Tra Vinh Province, Mekong Delta, Vietnam

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Salinity intrusion is a major environmental issue in the coastal area. It causes devastating impacts on agricultural and aqua-cultural production. Lower Mekong Delta of Vietnam is a growing and developing region. It is the major producer and exporter of paddy rice, crop and fish products of Vietnam. This research focuses on the evaluation of soil salinity by using freely accessible optical Landsat 8 data over the Tra Vinh Province, Mekong Delta, Vietnam. Salinity is assessed through several indices including the single bands, Vegetation Soil Salinity Index (VSSI), Soil Adjusted Vegetation Index (SAVI), Normalized Difference Vegetation Index (NDVI), and Normalized Difference Salinity Index (NDSI). Statistical analysis between the electrical conductivity ($EC_{1:5}$, dS/m) and the environmental indices derived from Landsat 8 OLI image was performed. Results indicated that spectral values of near-infrared (NIR) band and VSSI were better correlated with $EC_{1:5}$ ($r^2 = 0.8$ and $r^2 = 0.7$, respectively) than the other indices. Comparative results show that soil salinity derived from Landsat 8 was consistent with *in situ* data with coefficient of determination, $R^2 = 0.89$ and RMSE = 0.96 dS/m for NIR band and $R^2 = 0.77$ and RMSE = 1.27 dS/m for VSSI index. Findings of this study demonstrate that Landsat 8 OLI images reveal a high potential for spatiotemporally monitoring the magnitude of soil salinity at the top soil layer. This study documents the current status of soil salinity over the Tra Vinh Province of Vietnam. Our proposed assessment method allows fast-detection of the salinity in the soil with low cost and sufficient accuracy. It is suggested that regular monitoring and assessment of soil salinity level would be useful to manage the crop and fisheries in the coastal regions.

Keywords: Soil salinity, environmental issue, Landsat 8, Mekong Delta, Vietnam

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Abstract:

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