Estimation of Soil Saturated Hydraulic Conductivity in Part of Central Zagroos Using Regression and ANNs method

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Abstract

With the advent of advanced geographical informational systems (GIS) and remote sensing technologies in recent years, topographic (elevation, slope, and aspect) and vegetation attributes are routinely available from digital elevation models (DEMs) and normalized difference vegetation index (NDVI) at different spatial (watershed, regional) scales. This study explores the use of topographic and vegetation attributes in addition to soil attributes to develop pedotransfer functions (PTFs) for estimating soil saturated hydraulic conductivity in the rangeland of central Zagros. We investigated the use of artificial neural networks (ANNs) in estimating soil saturated hydraulic conductivity from measured particle size distribution, bulk density, topographic attributes, normalized difference vegetation index (NDVI), soil organic carbon (SOC), and $CaCo_3$ in topsoil and subsoil horizon. Three neural networks structures were used and compared with conventional multiple linear regression analysis. The performances of the models were evaluated using spearman's correlation coefficient (r) based on the observed and the estimated values and normalized mean square error (NMSE). Topographic and vegetation attributes were found to be the most sensitive variables to estimate soil saturated hydraulic conductivity in the rangeland of central Zagros. Improvements were achieved with neural network (r=0.87) models compared with the conventional multiple linear regression (MLR) model (r=0.69).

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