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Soil salinity modeling and Mapping Using Remote sensing and GIS: the case of Wonji sugar cane irrigation farm, Ethiopia

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Abstract

Soil salinization is one of the most common land degradation processes, especially in arid and semi-arid regions, where precipitation exceeds evaporation. Under such climatic conditions, soluble salts are accumulated in the soil, influencing soil properties with ultimate decline in productivity. An integrated approach using remote sensing in addition to various statistical methods has shown success for developing soil salinity prediction models. The present study presents a model to map soil salinity using remote sensing and geographic information systems. Different spectral indices were calculated from original bands of landsat images. Statistical correlation between field measurements of electrical conductivity (EC_e) and remote sensing spectral indices showed that salinity index (SI) had the highest correlation with EC_e. Combining these remotely sensed and EC_e variables into one model yielded the best fit with $R^2 = 0.78$. The result obtained from SI was not only area-wise, but also with its intensity. Out of the total area, 18.8% and 23% was identified as moderately and slightly saline, respectively. This shows that remote sensing data can be effectively used to model and map spatial variations of soil salinity in irrigation areas.

Keywords: Electrical conductivity, GIS, prediction model, salinity model, salinity index

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