Digital Soil Mapping of Soil Phosphorus in the Santa Fe River Watershed

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ABSTRACT

Digital soil mapping techniques have shown much promise to reduce soil mapping costs and produce high-resolution soil maps covering large areas. Numerous pedometrical methods have been developed that use Geographic Information Systems (GIS), Global Positioning Systems (GPS), advanced statistical and geostatistical methods, and field data.

Our goal was to compare various digital soil mapping methods to predict soil phosphorus across the Santa Fe River Watershed (SFRW) [3,585 sq km] in north-east Florida. A stratified random sampling based on land use and soil order combinations was used to collect soil samples in four layers (0 to 30, 30 to 60, 60 to 120 and 120 to 180cm) at 141 sites in 2003 and 2004. We used an univariate interpolation method (Ordinary Kriging) and multivariate methods (Regression Kriging and Co-kriging) to predict and map geospatial distributions of soil phosphorus (Mehlich-1 P; MP) and soil total phosphorus (TP) using ancillary spatial environmental datasets across the SFRW.

The functional relationships between soil properties and different environmental landscape properties were identified. Results showed that multivariate methods produced better predictions of soil MP and TP across the watershed. This study showed that digital soil mapping can predict soil properties and their spatial variation across large regions. Output maps are in grid (raster) format that provide higher density data pertaining to the variability and distribution of soil properties when compared to polygon-based maps.

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