1s6a A healthy soil as a basic enabling condition for the transition towards circular land management and land use

Spatial Variability of Soil Organic Carbon Under Different Land Uses in a Semi-Arid Watershed of Turkey

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Soil organic carbon plays a crucial role in soil quality and health. In this study, we evaluated spatial heterogeneity of soil organic carbon (SOC) using statistical and geostatistical methods under five different land uses in a semi-arid watershed. The study was carried out in Asartepe Dam Basin located in İlhan Çayi sub-catchment of the Sakarya Basin, Ankara, Turkey. Soil surface samples were collected using grid sampling method from five different lands uses, fallow-crop, oak forest, grassland, alluvial cropland, and colluvial cropland. The spatial distribution of SOC was estimated using ordinary kriging by minimizing the estimation error variance, and variogram model was estimated using experimental variogram model. The mean SOC contents ranged from 1.04 to 1. 68% while the highest mean value was recorded in oak forest area of the watershed. Higher mean contents of SOM were determined in oak forest (1.68%), fallow-crop area (1.62%) and grassland (1.51%) where vegetation covers are more intense than those of the cultivated agricultural areas. The coefficients of variation (CV) for SOC were moderate at 19.23–34.35% for all land uses. SOC contents showed anisotropic spatial variability in all land uses and the best fitted variogram models were exponential, spherical and Gaussian for SOC content of different land uses. According to the nugget-to-sill ratio values, a strong spatial dependence of SOC was found in oak forest area while moderate spatial dependencies of SOC were determined in other land uses. Through the indices of cross-validation, such as mean error, mean standardized error and mean abbsolute errror, were close to zero and it was indicated that ordinary kriging interpolation is a reliable method to estimate spatial distribution of SOC in different land uses of the watershed. The results indicated that, the investigated areas showed heterogeneous spatial patterns of SOC content with low levels (< 2%) for different land uses and spatial variability of SOC varies widely under pedogenetic and unsustainable soil management practices.