Variability of Soil Organic Carbon Storage in Alluvial Landforms: A Case Study from Western Kentucky

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The storage of soil organic carbon (SOC) at depths greater than one meter in valley bottoms, and processes operating on that SOC, are not well understood. We examine the stock of SOC within alluvial landforms: floodplains, terraces, and bars, in the Clarks River National Wildlife Refuge. Preliminary data from cores along a transect from a terrace to an adjacent channel bar were collected to depths of 1 to 1.5 meters. Bulk density, particle size, and loss-on-ignition were used to estimate SOC in each landform type. Average subsoil-SOC stocks for each landform decreased towards the river channel, with the largest value of 1.8 kg/m^2 ± 0.3 SD found in the terrace and the lowest value of 0.9 kg/m^2 ± 0.18 SD found in the near-channel bar. The floodplain had an average value of 1.104 kg/m^2 ± 0.4 SD. This variability is likely due to differences in soil texture, where terraces have greater soil development due to infrequent flooding which allows for clay accumulation, a predictor for SOC storage at depth. Although floodplains and near channel features observe greater flooding and potentially greater deposition and sequestration of SOC, this may be stored temporarily and oxidized with increasing residence time. A buried soil observed within one profile had a higher total C stock than the overlying surface soil. Additional transects and measurements of SOC via combustion and gas chromatography will be used to test these observations.