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Soils downstream of coal mines are large carbon sinks

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Left: Stratified alluvial anthracite coal in the floodplain of the North Branch of the Susquehanna River (tape scale in cm). Right: North Carolina State University Assistant Professor Matt Ricker uses a hand augur to collect deep alluvial soil samples. Photo

courtesy of Matt Ricker.

Riparian and alluvial soils have been severely affected by anthropogenic activities such as coal mining. Alluvial soils along rivers draining the Pennsylvania Anthracite region in eastern Pennsylvania have been shown to contain legacy sediments derived from erosion since European settlement as well as from coal waste and mine tailings. These riparian soils are typically well vegetated, resulting in total soil carbon (C) stocks that consist of both coal-derived (i.e., geogenic) C and C derived from plant and microbial decomposition (i.e., neogenetic).

In the *Journal of Environmental Quality*, researchers compared thermal analysis approaches to distinguishing and quantifying geogenic and neogenetic pools of soil C in island and delta soils from the North Branch of the Susquehanna River. They found that statistical curve resolution of ramped combustion analyses provided the most accurate estimates. They also found that sampled soils have accumulated 815 Mg ha^{-1} of geogenic C and 266 Mg ha^{-1} of neogenetic soil C where coal contributed 11% of soil mass and 73% of total C.

In future studies, it will be important to quantify microbial decomposition and assess how much soil C remobilizes during floods. Such investigations will be important in determining the fate of these C sinks.

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Williams, E.K., Ricker, M.C., & Plante, A.F. (2022). Quantification of geogenic carbon in anthropogenic alluvial coal soils of the Susquehanna River. *Journal of Environmental Quality*. https://doi.org/10.1002/jeq2.20391

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