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Carbon in Watershed Catchments of Piñon -Juniper Woodlands

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Piñon-juniper woodlands are a mosaic of two patch types: canopy areas under trees and intercanopy areas between trees. Soils of the intercanopy areas are susceptible to wind and water erosion, and the carbon in these potentially eroded areas can be transported to other locations within a defined watershed or beyond. Within watersheds, obstructions such as fallen trees or cacti often block erosional paths and create catchments of a few square meters or more. These small catchments sequester carbon and other nutrients. In order to estimate the amount of carbon in piñon-juniper woodlands, it is necessary to account for carbon under canopies, in the intercanopies, carbon that is trapped in small, intra-watershed catchments, and carbon that is transported out of the watershed. We estimated the carbon in sediments trapped upstream and downstream of several logs within a long-term watershed plot established at Bandelier National Monument, New Mexico. Since the catchments above the logs represent the depositional surfaces from locally eroding soils, we expected to measure carbon concentrations that increased with depth from the soil surface rather than decreased with depth. Below the logs we expected to see either nearly constant or decreasing carbon concentrations with depth and significantly shallower soils. Carbon concentrations in catchments above the logs increased to a maximum at 15 cm depth in all but one case, and then decreased smoothly. Carbon concentrations downstream from the logs, as expected, decreased with depth, and soils were generally shallow and eroded. Our results show that the carbon trapped in catchments within watersheds can be a significant portion of the total carbon inventory in piñon-juniper woodlands, and the estimates help reduce uncertainty in inventory measurements.