Understanding the Bacterial Community, and Their Response to Nutrients in Little Washita River Experimental Watershed Reservoirs, Oklahoma, USA

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Over the last few decades, the Little Washita River Experimental Watershed (LWREW), located in central Oklahoma, USA, has experienced a loss of flood storage capacity due to sedimentation. However, limited information is available on the accumulated sediment's quality and microbial composition. This study analyzed the sediment samples collected from three reservoirs (cropland, forest, and grazing) of the LWREW to determine the nutrient dynamics, identify the dominant microbial communities, and evaluate the relationship between nutrient levels and microbial composition. The results showed that extractable concentrations of Ca, K, Mg, Mn, NH_4-N, NO_3-N, Na, and Zn varied with land use types and sediment depth. Additionally, sediments from all reservoirs exhibited alkaline pH ranging from 8.01 to 8.69. To characterize the bacterial communities, 16S rRNA gene sequencing was conducted, yielding 35355, 27830, and 36391 high-quality sequences from the grazing, forest, and cropland reservoirs, respectively. The results indicated that proteobacteria emerged as the dominant phylum across all land use types, followed by Bacteroidetes in forest sediment and Actinobacteria in grazing sediment. Thus, these microorganisms might play essential roles in multiple biogeochemical processes and environmental resilience.