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The legacy of land-use is revealed in the biogeochemistry of urban streams

Urban streams are among the most profoundly impacted aquatic ecosystems, characterized by altered hydrology or burial, increased sediment input, and myriad pollutants. We present results from a series of urban stream studies that revealed unique geochemical and biochemical patterns in urban watersheds at multiple temporal and spatial scales. We found that historic land-use, beginning centuries ago, is illustrated in present-day ground water chemistry and hydrology. Carbon and nitrogen are closely linked in both ground and surface water, often driving microbial processes such as denitrification. Organic carbon quality, as dictated by present-day vegetation type is a critically important driver determining the rates of microbial process, while historic and pre-historic subsurface carbon sources can influence nitrogen transformation in long flow paths of ground water. Ecosystem functions such as GPP and respiration are severely suppressed in buried streams, while degraded but exposed streams function significantly better. Restoration may alter hydrology and nitrogen transformation but not the dynamics of pollutants like road salts.