MACROINVERTBRATE ASSEMBLAGE COMPOSITION ALONG A LONGITUDINAL MULTIPLE-LAND-USE GRADIENT IN A MIDWESTERN STREAM

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ABSTRACT

Land use changes often alter hydrogeomorphology and hydrologic flow regimes, which can adversely impact stream aquatic biota. Hinkson Creek Watershed (HCW, 231km^2) located in Boone County, central Missouri, is comprised of 50% agriculture, 26% forest, and 20% urban (City of Columbia; 2010 population, 108,500) land use types. Five replicated study sites were established to investigate land use effects on macroinvertebrate assemblages using a nested-scale experimental watershed study design. Water temperature, suspended sediment, chlorophyll-a, pH, chloride, discharge, physical habitat and benthic macroinvertebrates were monitored at each site. Missouri Biotic Index was higher ($P < 0.05$) in urban sites (6.77) compared to rural sites (6.26). Percentage of fine substrate increased 328% from the headwaters to the lower reaches. Submerged woody rootmats were 78% smaller in the lower reaches of the stream. Average winter Chloride concentrations were 126% higher in urban reaches of the stream compared to rural reaches (116.6 mg/L and 51.5 mg/L respectively). Mean suspended sediment particle size decreased with stream length ($P < 0.05$) from 108.2µm to 66.6µm. Results indicate that the influence of disturbance regimes associated with local hydrogeomorphology may be as important in structuring benthic community composition as anthropogenic effects associated with agriculture and urbanization.