

QUANTIFYING SUSPENDED SEDIMENT LOADING IN A MID-MISSOURI URBAN
WATERSHED USING LASER PARTICLE DIFFRACTION

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ABSTRACT

Midwestern streams and rivers of the United States are known for high suspended sediment concentrations (SSC), which is also one of the leading sources of water impairment. Unfortunately, there is a lack of understanding pertaining to land-use and suspended sediment loading relationships. A study was conducted during the spring of 2010 in Hinkson Creek Watershed (HCW) in the City of Columbia, MO, using laser diffraction (LD) technology to estimate SSC and mean particle size. Three hydroclimate/water-quality stations were installed in a nested-scale watershed study design to capture differing land-use type influences on SSC. Mean SSCs were estimated to be 66.0, 70.0, and 86.0 $\mu\text{l/l}$ for the headwater (agricultural), suburban (mixed land-use), and urban sub-basins (respectively). Mean sediment size was estimated to be 151.0, 111.0, and 79.0 μm for the headwater, suburban, and urban sub-basins respectively. Total sediment loads measured at the headwater, suburban, and urban monitoring sites were 13,183, 27,369, and 42,854 tonnes (respectively). Sediment yield was approximately 170.0, 153.0, and 208.0 tonnes/ km^2 for the headwater, suburban and urban sub-basins respectively. Results indicated that SSC, sediment load, and sediment yield were all highest in the urban sub-basin. This study is the first of its kind in Mid-Missouri to provide quantitative science-based information for improved land-use and water quality in the Midwest.