

## **The Impact of Land Use Change on Watershed Processes at Varying Spatial Scales**

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**Abstract.** Land use change and urbanization can have significant impacts on hydrologic processes within watershed systems. Monitoring data, however, are rarely sufficient to fully understand the spatial and temporal factors that contribute to the change in streamflows. This study presents a modeling approach to evaluate changes in flow regimes at various spatial scales as a result of rapid urbanization in the 273 km<sup>2</sup> Eagle Creek watershed in the Midwestern United States. The components of land use change and preexisting conditions, which include previous land use and soil type, were evaluated to determine which components have greater impacts on changes in the streamflows. The Soil and Water Assessment Tool (SWAT) model was used to simulate 50 years of flows for the watershed under the land use conditions of the years 2000 and 2004, as defined by the National Agricultural Statistics Service (NASS) and National Land Cover Data (NLCD) geospatial datasets. Flow duration curves (FDCs) were constructed for 230 subbasins and 230 stream locations within the watershed under the 2000 and 2004 land use conditions. A multivariate regression analysis indicated that change in forest and urban areas, and coverage by soils having moderate to high permeability would bear the greatest impact on the change in streamflow characteristics in the watershed. An analysis of FDCs from several pairs of subbasins that were similar size and land use changes, but were covered by different soil types showed that the paired subbasins did not always experience similar levels of flow regime change. This suggests that the subbasins which are covered by moderate to highly permeable soils are predisposed to larger increases in streamflows under urbanization.

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