Abstract:
This research reports the applicability of a hydrological model, the Soil and Water Assessment Tool (SWAT), integrated with a Geographic Information System (GIS) to examine the effects of landuse (LU) change (urbanization) on a streamflow for the Charlie Creek watershed (FL, U.S.A.). This watershed was selected because it is intensely studied by various state and federal agencies and has long-term historical data for meteorology and stream discharge. The overall goal of this project is to examine applicability of the SWAT model to predict streamflow with varying LU and meteorological data including the ability to predict hydrographs for future LU. This goal was accomplished by comparing SWAT-generated hydrographs for i) various LU scenarios (viz. to determine the effects of urbanization on streamflow/hydrograph) with current and future/simulated LU, and ii) real and simulated meteorological data. The resultant ‘SWAT model-predicted streamflow’ for all LU and meteorological scenarios (real and simulated datasets) were then validated with United States Geological Survey (USGS) ‘measured streamflow data’. The SWAT model’s built-in method was used to generate simulated meteorological data. Results indicate that the SWAT model can facilitate analysis of various LU change (for example, as the LU changed to more urban) on the streamflow. However, results also show that the SWAT model-predicted hydrographs were sensitive to the meteorological data used (i.e. real vs. simulated and short-term vs. long-term).

Keywords: Urbanization; Landuse; Hydrologic; Model; Simulation; GIS