In recent years, concentrations of nutrients such as nitrogen and phosphorus have increased in surface and groundwater resources, due in part to non-point source pollution associated with stormwater runoff. The elevated nutrient concentrations found in stormwater runoff have prompted the design of best management practices (BMP’s) to mitigate the problem. The overall objective of this thesis is to analyze the hydrologic performance of innovative surface BMPs and investigate connections between the BMPs and groundwater flows to freshwater springs within a karst environment. The hydrologic performance of two novel stormwater BMPs, blanket filters and vertical reactors containing Bio-sorption Activated Media (BAM), are assessed in terms of capture efficiency and hydraulic retention time. Blanket filters are able to treat over 90% of the stormwater runoff entering a stormwater basin over a monitoring period of one year. Water content monitoring indicates that BAM has a hydraulic retention time of at least 35 days. Capture efficiency of vertical reactors is less than 1% of runoff, suggesting they are more appropriate technologies for small contributing areas. Tracking a conservative tracer from an injection point within a stormwater basin to nearby Silver Springs reveals several unique flowpaths and velocities of groundwater. Subsurface velocities observed in the basin ranged from 0.1 m/d to 1.4 m/d, while velocities from the injection well to the spring vary from 1.9 m/d to 13.5 m/d. The fastest travel times observed in the spring may represent flowpaths that include macropore/conduit flow through karst features, while the slower peaks may be more representative of matrix flow. Interaction with karst features may reduce retention time of stormwater in aquifers, altering expected nutrient transformations. Understanding the variable pathways stormwater may take from the surface to spring discharge may assist environmental managers in preserving water quality in springs and other waterbodies in karst systems.

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The public is welcome to attend.