Public Abstract

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Graduation Term:FS 2012

Department:Forestry

Degree:PhD

Title:MEASURING AND MODELING WATER AND NUTRIENT FLUX BETWEEN A MID-MISSOURI STREAM AND FORESTED RIPARIAN ZONE IN THE CENTRAL U.S.

To improve process based understanding of stream water-groundwater interactions, high-frequency water quantity data were collected from four stilling wells and two transects of piezometers (n = 6 each) during the 2011 water year along Brushy Creek, located in central Missouri. Weekly water quality data were also collected. Results indicate that Brushy Creek alternates between being a losing and gaining reach, along the study reach (length = 830 m), but is on average a losing stream. Annual average stream water nitrate was 0.53 mg/L, while phosphorous, potassium and ammonium concentrations were 0.13, 3.29 and 0.06 mg/L, respectively. Annual average groundwater nitrate was 0.01 mg/L, while total phosphorus, potassium and ammonium concentrations were 0.03, 1.7 and 0.04 mg/L, respectively. Results of the hyperbolic dilution model indicated that nitrate and potassium exhibited dilution behavior while ammonium had a concentration effect and phosphorus was hydrologically constant. Groundwater modeling with MODFLOW and HYDRUS-1D indicates that karst geology promotes rapid water movement that can increase dominance of geochemical nutrient cycling pathways relative to biochemical nutrient cycling pathways. Baseline data and results of analysis presented in this dissertation will aid in identification, improvement and validation of management tools (i.e. models) that will contribute to advancements in stream - riparian zone best management practices, in particular in karst hydrogeological environments.