



**JAMES MADISON**  
UNIVERSITY®

**SEMINAR**

**Friday, September 22**

*3:50pm in King 159*

**Dr. Dhanuska Wijesinghe**

Department of Geology & Environmental Science

*James Madison University*

Harrisonburg, VA

## **Application of Geospatial and Statistical Tools for Soil and Water Analysis**

Geospatial and statistical tools are vital in determining soil and water quality changes. My primary research focus is on how land use/land cover changes impact soil and water quality changes. This presentation will provide details of two research studies conducted to determine the applications of geospatial and statistical tools in soil and water quality studies. Study one was part of my dissertation, which involved determining pollutant reduction efficiencies affected by seasonality and type of wetlands in Coastal SC. This work's primary objective was to characterize hydrology and the water quality of runoff from coastal wetland landscapes – including both natural and engineered systems. The change detection analysis was also used to explain the high variability in water quality parameters between two wetland systems. The second research study, which was initiated in Summer 2023 (summer REU project), evaluated the stream health of the farming systems in the Shenandoah Valley region. The study focused on several farms in Shenandoah Valley (with riparian buffer systems) to determine the water quality by measuring pH levels and concentrations of certain anions and cations such as chloride, sulfate, nitrate, magnesium, etc. Moreover, GIS software was used to quantify some environmental factors that include but are not limited to land slope, elevation, and distance to the farm from the stream. We developed linear models to determine the impact of riparian buffer characteristics and other farm characteristics on the variability of stream health of those farming systems. These findings will help the farmers to think about better management strategies to manage riparian buffers. I will also discuss the potential undergraduate research opportunities, including the UROCKS summer REU program available at the Department of Geology and Environmental Science.