2-Day: Water Resources Application Level III (Advanced)

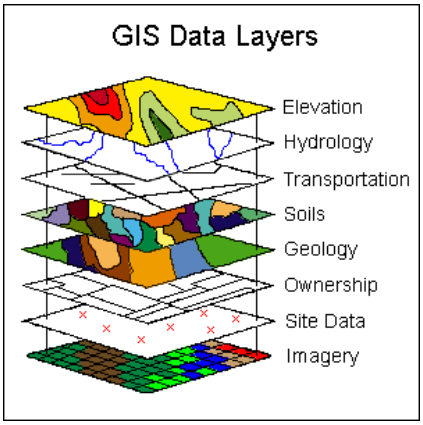
Overview
This course covers advanced GIS applications and modeling for water resources. Upon completion an attendee will know the fundamentals for data structure, modeling and model integration in GIS for water and watershed related applications, and explore how these applications work together to provide a complete GIS solution.

This course will introduce fundamentals of modeling for water related applications followed by hands-on experience working with water related data and models as well as explores advanced data mining strategies.

Prerequisites and Recommendations
Participants should know how to use MS windows software and ArcGIS Pro ™ **and completed workshops called 'Water resources Applications Level I (Beginner) and Water resources Applications Level II (Intermediate)' prior to taking this workshop**. This 2-day course is for those who have completed Level I & Level II water workshops offered by us or has equivalent knowledge. Participants should know how to use ArcGIS Pro

Module I: Review of Raster Data, Analysis and Applications

Learning Objectives
- Suitability Analysis
- Edge Effect Analysis
- Change Detection Analysis
- Summarizing Raster Data
- Review of Raster Algebra
- Data Integration



Case Study: Water Budget Calculations

Case Study: Working with Raster Data and Map Algebra

Case Study: Working with Elevation data

Module II: Introduction to Modeling
Learning Objectives
- Working with DEMs
- Data Quality, Errors and Uncertainty
- Introduction to Modeling

Case Study: GIS application of Revised Universal Soil Loss Equation

Module III: Getting Started with Watershed Delineation

Learning Objectives

- Introduction to DEMs and Flow calculation
- Introduction to Watershed Delineation with ArcHydro
- Introduction to Watershed Delineation with ArcGIS

Case Study: Watershed Delineation with Archydro

Case Study: Application of DEMs for water resources

Module IV: Watershed Characterization

Learning Objectives

- Applications of Watershed Characterization using soils, slope and landuse

Case Study: Analysis of Urbanization within a Watershed

Case Study: Characterization of Alafia Watershed

Case Study: Examining Spatio-Temporal Relationships of Landuse Change, Population Growth and Water Quality

Module V: Multi-Criteria Decision Making (MCDM) and Interpolation

Learning Objectives

- Integration of MCDM with GIS with examples
    - MCDM Model Coupling for Assessing Human Health Risks
    - Incorporating the Model into ArcGIS

Case Study: Assessment of Spatial Distribution of Groundwater Vulnerability to Pathogens

Case Study: Assessment of Aquifer Vulnerability Using the DRASTIC Methodology

Case Study: Data Integration Case Study – Hillsborough River Water Quality

Module VI: Advanced Modeling & Data Mining Strategies

Learning Objectives

- Performing Logistic Regression in R and
- Theory & Application Logistic Regression
- Theory & Application of AI tools such as fuzzy logic, artificial neural networks

Case Study: Performing Logistic Regression in R and Incorporating the Model into ArcGIS

Case Study: Incorporating Decision Maker's Uncertainty Using Fuzzy Logic

Case Study: Performing Neural Networks in R and Incorporating the Model into ArcGIS