Watershed Engineering with Nature (EWN) Design Workshop With WMS and GSSHA

U.S. ARMY ERDC

Goal

The goal of this course is to provide you with a basic understanding of advanced hydrologic modeling tools available through the DoD

- GSSHA
- WMS

You will have an understanding of how, when, and why to apply the tools to your specific studies and projects.

Course Objectives

1. Understand GSSHA features and formulation
2. Discover appropriate applications of GSSHA
3. Learn the basic spatial data required to parameterize GSSHA distributed models
4. Learn basics of WMS interface for developing GSSHA models
5. Set up and run basic GSSHA distributed runoff models
6. Use WMS/GSSHA to set up and simulate coastal flooding scenarios.

Meet the Models

- GSSHA (Gridded Surface Subsurface Hydrologic Analysis) – is the USACE's physics based, fully distributed hydrologic model. GSSHA is intended to determine the hydrologic response of watersheds to meteorological inputs in a variety of modeling environments.
- WMS (Watershed Modeling System) is a Graphical User Interface (GUI) developed and distributed by Aquaveo LLC that supports the development of inputs and analysis of results for a variety of hydrologic models, including GSSHA.

Meet Your Instructors

- Dr. Charles W. Downer, PE, PMP - Research Hydraulic Engineer, USACE-ERDC-CHL.
- Dr. Aaron Byrd, PE – Research Hydraulic Engineer, USACE-ERDC-CHL.
- Dr. Nawa Pradhan – Research Hydraulic Engineer, USACE-ERDC-CHL.
- Mr. Steve Turnbull, PG - Research Hydraulic Engineer, USACE-ERDC-CHL.
- Dr. Chris Smemoe – WMS Lead Developer, Aquaveo, LLC.

Course Format

- Series on various topics
  - Lecture on the GSSHA formulation and fundamentals
  - Lecture and/or demo of how to prepare inputs for the given topic
  - Hands on workshop preparing input using WMS and other software

Student Materials

- Presentations – pdfs of the presentations
- Tutorials
  - Broken down by day
  - PDFs of the tutorials
  - Follow the tutorials to locate the proper input data

Course Outline

- **Day 1 – Fundamentals and Basic *GSSHA* modeling**
  - Introduction to hydrologic modeling
  - Introduction to GSSHA
  - Using WMS
  - GSSHA model setup using the WMS Hydrologic Wizard
    - Basic model setup
    - Overland flow routing
    - Stream routing
    - Index maps and mapping tables
    - Infiltration
    - Overland roughness
- **Day 2 – EWN Project Design with GSSHA and WMS**
  - GSSHA Model setup
    - Hydraulic Structures
    - Distributed Rainfall
    - Sediment Transport Modeling
  - Designing and testing EWN-focused Watershed Management Scenarios

Acknowledgements

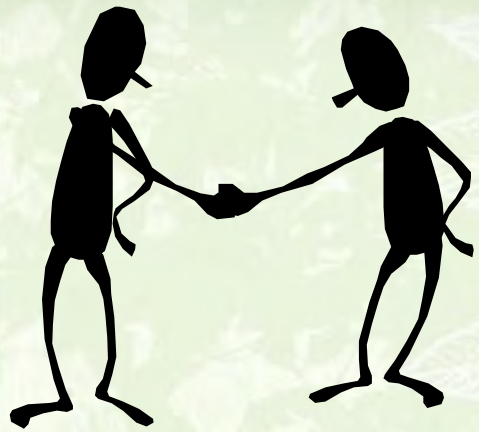
- ERDC – GSSHA development, teaching, applications, distribution

- BYU – WMS/GSSHA research, teaching

- Aquaveo – WMS development, teaching, distribution, consulting

Participant Introductions

Introduce yourself!



Important Resources

- http://gsshawiki.com
  - All there is to know about GSSHA
- http://www.xmswiki.com/index.php?title=GSDA:GSDA
  - Useful download sites for WMS-consumable digital data
- http://www.xmswiki.com
  - WMS Help-Wiki contained within
- https://ewn.erdc.dren.mil/
  - Engineering with Nature USACE homepage
- https://n-ewn.org/
  - Network for Engineering with Nature