

Workshops on May 23, 2016 for the
10th International Symposium AgroEnviron 2016
and the 7th International Symposium on Gully Erosion

1. **WEPP Model Introduction and Application** – full day
 - a. Instructors: Dennis Flanagan & Jim Frankenberger
 - b. Minimum attendees: 5
 - c. Maximum attendees: 30
 - d. Attendees should bring their own Windows OS laptop
2. **WEPS Model Introduction and Application** – full day
 - a. Instructors: Larry Wagner, Fred Fox, & John Tatarko
 - b. Minimum attendees: 5
 - c. Maximum attendees: 30
 - d. Attendees should bring their own Windows OS laptop
- ~~3. **APEX Model Application** – full day (cancelled due to insufficient registrants by 5/10)~~
 - ~~a. Instructors: Qingyu Feng & Susan Wang~~
 - ~~b. Minimum attendees: 5~~
 - ~~c. Maximum attendees: 30~~
 - ~~d. Attendees should bring their own Windows OS laptop~~
- ~~4. **SWAT Model Introduction** – full day (cancelled due to insufficient registrants by 5/10)~~
 - ~~a. Instructors: Cibin Raj & Nina Omani~~
 - ~~b. Minimum attendees: 5~~
 - ~~c. Maximum attendees: 30~~
 - ~~d. Attendees should bring their own laptops with ArcGIS and ArcSWAT installed~~
5. **RUSLE2 Technology and Extensions to GIS and Ephemeral Gully Estimation** – half day morning
 - a. Instructors – Seth Dabney & Dalmo Vieira
 - b. Minimum attendees: 5
 - c. Maximum attendees: 30
 - d. Attendees should bring their own Windows OS laptop
6. **AnnAGNPS Model – Simulation and Evaluation of Conservation Practices & Ephemeral Gullies**
– full day (morning – conservation practice simulation; afternoon – ephemeral gully simulation)
 - a. Instructor – Ron Bingner & Henrique Momm
 - b. Minimum attendees: 5
 - c. Maximum attendees: 30
 - d. Attendees should bring their Windows OS laptop
7. **Soil Erosion Process Research Technology Showcase** – half day afternoon
 - a. Instructors – Chi-hua Huang, Robert R. Wells, and cooperators
 - b. Minimum attendees: no limit
 - c. Maximum attendees: no-limit

WEPP Model Introduction and Application

Dennis Flanagan and Jim Frankenberger

May 23, 2015 - Stewart Center

8:30 a.m. – 5:30 p.m.

This workshop will introduce participants to the process-based Water Erosion Prediction Project (WEPP) model. WEPP is a continuous simulation model for predicting runoff, soil erosion, and sediment loss from hillslope profiles and small watersheds at the field and farm scales. Developed by the USDA-ARS over the past 30 years, the model simulates the important physical processes responsible for soil erosion by water, including infiltration, runoff, plant growth, residue decomposition, soil disturbance by tillage and other management operations, soil detachment by raindrops, soil detachment by excess flow shear stress, sediment transport in flowing water, and sediment deposition. In watershed simulations it can calculate sediment detachment in ephemeral gullies and sediment deposition in impoundments, and route water and sediment through a network of hillslopes, channels, and impoundments.

The course will introduce participants to the science contained in the model, and required model inputs for slope, soil, climate, and cropping/management. The WEPP Windows interface will be installed on individual's personal computers, and instruction given on setting up model simulations, editing input parameters, and interpreting model output results. Additionally, other web-based interfaces will be demonstrated and explored, which allow rapid model simulations using existing databases for climate, soils, cropping/management, and topography. Several exercises will be provided to allow users to apply the model and discuss results with the instructors.

Participants should bring their own laptop computers running a recent Windows operating system, such as Windows 7, 8, or 10. Also, a wireless adaptor is highly recommended to allow connection to the Purdue guest network and running the WEPP web-based interfaces.

WEPS Model Introduction and Application

Larry Wagner, Fred Fox, and John Tatarko

May 23, 2015 - Stewart Center

8:30 a.m. – 5:30 p.m.

This workshop will introduce participants to the process-based Wind Erosion Prediction System (WEPS) model. WEPS is a continuous simulation model for predicting creep, saltation, and suspension sediment losses due to wind erosion. Developed by the USDA-ARS over the past 25+ years, the model simulates the important physical processes responsible for soil erosion by wind, including infiltration, runoff, water balance, soil crusting, plant growth, residue decomposition, soil disturbance by tillage and other management operations, soil detachment by abrasion, soil detachment by wind shear stress, sediment transport, and sediment deposition. Effects of field orientation, tillage row direction and roughness, and edge-of-field buffers are simulated.

This WEPS workshop will start by providing a general introduction to wind erosion processes, a short discussion of common control practices applied in the U.S. on cropland and a brief history of how WEPS came about and why. The WEPS software installation process will be outlined and the attendees will be introduced to the WEPS interface, including the reasons for the various default configurations/releases provided. The workshop attendees will also be shown how to provide the required inputs with the WEPS GUI to make WEPS runs and interpret their output. The remainder of the workshop will then consist of both instructor led example scenarios to address specific wind erosion issues such as changing or better timing tillage practices to reduce a site's susceptibility to wind erosion, how to apply wind barriers within the model and to properly evaluate strip cropping as a possible wind erosion control practice. Time will be reserved for the individual attendees to also evaluate specific scenarios of interest to them as well.

Participants should bring their own laptop computers running a recent Windows operating system, such as Windows 7, 8, or 10. Minimum PC requirements are 4 GB RAM, 5 GB free disk space, administrator access, wi-fi enabled, latest version of Java 8 (32-bit version) installed. It is also highly recommended to download and install the current public release version of WEPS from <http://www.ars.usda.gov/services/software/download.htm?softwareid=415> prior to the workshop, if possible.

RUSLE2 Technology and Extensions to GIS and Ephemeral Gully Estimation

Seth Dabney and Dalmo Vieira

May 23, 2015 - Stewart Center

8:30 a.m. – 12:30 p.m.

The workshop will introduce new capabilities of the Revised Universal Soil Loss Equation – Version 2 – 2015 release through a series of presentations and hand-on sessions with the RUSLE2 Windows program. New extensions including 2D field erosion calculations and gully erosion estimation using EphGEE will be demonstrated using web-based applications.

Participants should bring their own laptop computers running a recent Windows operating system, such as Windows 7, 8, or 10.

AnnAGNPS Model – Simulation and Evaluation of Conservation Practices Including those for Ephemeral Gully Erosion Control

Ron Bingner and Henrique Momm

May 23, 2015 - Stewart Center

8:30 a.m. – 5:30 p.m.

The Annualized Agricultural Non-Point Source (AnnAGNPS) model has been developed by the USDA-ARS and NRCS over the past 25 years. The model can be applied to watersheds to evaluate the impact of conservation practices on runoff, sediment, nutrient, and agricultural chemical losses. Capabilities of the model will be described to identify and target practices that are sources of high pollutant load production for implementation of more effective conservation practices. Participants will learn how to track pollutants from any source to any location within the watershed to assess the integrated effectiveness of field, edge-of-field, and channel practices using AnnAGNPS. Conservation practices that can be assessed consist of conservation tillage, cover crops, riparian buffers, ephemeral gully erosion control measures, constructed wetlands, contouring, terracing, controlled subsurface drainage, as well nutrient management practices to name a few.

The morning portion of the AnnAGNPS workshop will focus on the development of watershed management simulations for evaluation of conservation practices. This will be a beginning class for learning how to develop AnnAGNPS watershed simulations for evaluating existing practices or implementation of alternative and integrated conservation practices, and should be appropriate for any level of interest.

The afternoon portion of the AnnAGNPS workshop will be on development of simulations for evaluation of ephemeral gully control practices on ephemeral gully erosion and evolution. This will be a beginning class for individuals to develop AnnAGNPS simulations for understanding how to characterize ephemeral gullies in a watershed and how to evaluate their placement, evolution and control practices on the entire watershed sediment and chemical load. This may include integrating many conservation practices together, such as conservation tillage, buffers and constructed wetlands, to provide the most efficient management plan for the watershed.

Participants can attend either the morning or afternoon session, or both sessions, and should bring their own laptop computers running a recent Windows operating system, such as Windows 7, 8, or 10. Administrative privileges will be required to install the AnnAGNPS software on each participant's computer during the workshop.

Soil Erosion Process Research Technology Showcase

Chi-hua Huang, Robert R. Wells, and cooperators

May 23, 2016 National Soil Erosion Research Laboratory

1:30 p.m. – 5:30 p.m.

This half day technology showcase will allow participants to observe and interact with National Soil Erosion Research Lab (NSERL) and National Sedimentation Lab (NSL) scientists and their cooperators on many of the current experimental techniques used for measurement of soil erosion and ephemeral gully processes. The following is a list of the hands-on demonstrations that will be presented and discussed.

NSERL Soil Erosion Assessment: (Chi-hua Huang and other staff, USDA-ARS NSERL)

- Rainfall simulation technologies.
- Kinetic energy measurement techniques.
- Flow and nutrient measurement in soil beds/flumes with both surface and subsurface hydrologic controls.
- Fluidized bed technique to gauge soil cohesion.
- Soil crust strength measurements.

NSL Soil Erosion Assessment: (Robert R. Wells, USDA-ARS NSL)

- Close-range photogrammetry has emerged as a common technique for geomorphic research. Here, we will demonstrate a typical deployment of a two-camera system to capture 3-dimensional surface topography of a prepared soil bed. This will include a demonstration of commercially available software used to create digital elevation models (DEM) from captured images. An alternative Structure from Motion (SfM) single camera technology for the reconstruction of 3-D surface topography will also be demonstrated by NSERL staff.
- Ground-based LiDAR (Light Detection And Ranging) is another common approach used to quantify geomorphic surfaces. Here, we will demonstrate the use of a commercially available LiDAR system to capture 3-dimensional surface topography of a prepared soil bed from a single base station. This will include the stepwise transformation of these raw data into a georeferenced DEM.
- The JET is an ASTM standard method that uses a submerged impinging jet to quantify the erodibility of cohesive sediment. Here, we will demonstrate the operation of the device and the creation of a scour hole, and how these observations can be used to derive the critical tractive shear stress and erodibility coefficients of a prepared soil bed.

The NSERL is Building SOIL on a campus map, and is about a 15 minute walk from the Stewart Center.