



**Reference SON:** 2015 ER-3  
*Tools to Assess Offsite and  
Cumulative Benefits in  
Watershed Assessment*

**Lead PI:** *Chris Haring (ERDC)*

### **Project Development**

**Team (PDT):** *Craig Fischenich  
(ERDC), Brad Palmer, Jeff  
Trulick (HQUSACE), Kathryn  
Herzog (MVP), Charles Theiling  
(MVR/ERDC), Tom Darby, Davi  
Michl, Michael Dougherty  
(MVR)*

### **District Collaborators:**

*Camie Knollenberg, Marshall  
Plumley (MVP), Jason Smith  
(MVR), Monique Savage (MVS)*

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## **Tools to Assess Offsite and Cumulative Benefits in Watershed Assessments<sup>1</sup>**

### **Research Need**

The Illinois River Basin has experienced the loss of ecological integrity due to sedimentation of backwaters and side channels, degradation of tributary streams, increased water level fluctuations, reduction of floodplain and tributary connectivity, and other adverse impacts caused by human activities ([Rock Island District](#)). Illinois Basin Restoration (IL519) was designed, in part, to retain sediments in upland streams and thereby protect bottomland floodplain habitat from sediment impacts.

Sediment transport in watershed studies is typically estimated using statistical models and not field measurements. Statistical model estimates may be acceptable for general planning and regional assessments, but not for Corps project benefit analysis; the Corps 3x3x3 planning processes require a rapid, field-based benefit metric that evaluates sediment reduction anticipated from specific stream stabilization projects.

### **Project Objectives & Plan**

This study will develop tools to prioritize sites offering the greatest downstream sediment reduction benefits to navigation (reduced dredging), flood risk management (floodway maintenance), and ecosystem restoration (floodplain habitat) objectives. An HQ certified sub-watershed sediment transport evaluation procedure that estimates existing sediment transport and the incremental reduction resulting from individual ecosystem restoration projects will be developed.

This project will take a scaled watershed approach that:

- Identifies stream conditions over large spatial areas (i.e., watersheds) using existing watershed and valley characterization tools
- Develops stream channel classification tools to estimate stream mechanics using high resolution elevation data

- Assesses watershed and stream channel restoration potential in a selected watershed (Senachwine Creek), and
- Defines aquatic habitat

Under this project, researchers will also:

- Devise a new methodology for developing Regional Hydraulic Geometry Curves based on existing LiDAR data.
- Incorporate new Regional Curves to delineate stream channel metrics using remote sensing (LiDAR) terrain data for the entire watershed.
- Develop GIS toolbox to make the process efficient over entire watershed areas.
- Develop tools that will be transferable wherever appropriate terrain data exists.

## Payoff

Watershed restoration program managers will have tools to estimate the relative sediment reduction benefits of each increment of restoration in a long-term restoration program. The existing condition and cumulative benefits of incremental restoration can be monitored as part of an adaptive management program that can identify when sediment transport reduction targets are met.

## Products

### Technical Notes (TNs)

Haring, C.H, Theiling, C.H. and Dougherty, M.P. (2018). Rapid watershed assessment planning tools based on high-resolution terrain analysis. ERDC/CHL CHETN-VII-22. U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi.

### Conference Presentations/Webinars/Workshops

Haring, C. River Mechanics and Regional Sediment Management Workshop. (2016). Instructor. Grenada, MS.

Haring, C. Systems Approach to Erosion Control and River Rehabilitation Workshop. (2017). Instructor. Vicksburg, MS.

### Project Activities

Development of geomorphic channel assessment tools; these are html based expert systems tools to facilitate watershed assessment based on channel and watershed characteristics.

<sup>1</sup>Project Alias – Work Unit Documentation Title: *Tools to Assess Offsite and Cumulative Benefits in Watershed Assessment*