



USDA-CSREES 2006 National Water Quality Conference

WEPP—A Process-Based Hydrology and Erosion Model for Watershed Assessment and Restoration

Situation:

Protecting and improving the quality of water resources in agriculturally managed watersheds are major goals of the CSREES National Water Quality Program. For many watersheds, sediment is the greatest pollutant. In watershed assessment, it is essential to understand the sedimentation processes and their impact on water quality. Similarly, for successful implementation of erosion control best management practices (BMP), it is necessary to determine the spatiotemporal distribution of sediment sources and the long-term effectiveness of sediment reduction by BMPs prior to implementation.

WEPP (Water Erosion Prediction Project) is a process-based erosion prediction model built on the fundamentals of hydrology, plant science, hydraulics, and erosion mechanics. WEPP's most notable advantages include its capabilities for estimating spatial and temporal distributions of soil detachment and deposition on an event or continuous basis. WEPP has the potential to predict watershed responses to management practices, thereby serving as an efficient tool for BMP assessment.

Objectives: To refine and apply the WEPP model for watershed assessment and restoration under different land-use, climatic and hydrologic conditions.

Methods:

In conjunction with field investigations, extensive efforts were devoted to examining and improving WEPP routines, including those for subsurface runoff and winter hydrology. Model application and assessment have been conducted for four differing geographic locations and hydrologic conditions of northern Idaho, eastern Washington, northeastern Oregon, and Bologna, Italy.

Partnerships:

USDA ARS (PWA, NSERL), USDA FS, University of Idaho, University of Bologna.

Resources:

Key resources are provided by USDA FS, USGS, USDA CSREES NRI, Washington State University, and USDA ARS PWA.

Integration of Research, Teaching, and Extension:

This continuous effort integrates research, teaching and extension. Several graduate and undergraduate students have received training and developed their theses from the study. A series of scientific manuscripts have been generated from the study. Important progress and major research findings have been presented at multiple local and state extension meetings.

Results:

Significant improvement to the USDA's WEPP model has been made so that it is suitable for field and watershed hydrology and erosion modeling (regularly updated release accessible at the NSERL's website <http://topsoil.nserl.purdue.edu/nserlweb/index.html>). Model assessment has been conducted through a number of case applications under various geographic and hydrologic conditions.

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