FINAL
Post-Conference
Version

MODELING SUMMIT 2011

Advancing the Science of Modeling

March 29-31, 2011
Renaissance Denver Hotel
Denver, Colorado

SOIL AND WATER CONSERVATION SOCIETY

945 SW Ankeny Road | Ankeny, IA 50023
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SOIL AND WATER CONSERVATION SOCIETY

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MODELING SUMMIT 2011
Advancing the Science of Modeling

Introduction

The Soil and Water Conservation Society and the meeting organizers welcome you to this Modeling Summit. We are proud to provide this new forum and hope to provide some direction to the science of modeling by getting model practitioners, data set stewards, regulators, and resource managers together to discuss ways to better utilize and integrate available models and data sets to address conservation needs and conservation program benefits.

Most of you come from federal and state agencies, non-profit organizations, industry, private consulting firms and universities. Wherever you work, we invite you to share your thoughts on the advantages and limitations of current or future models and available data sets in order to more fully address upcoming conservation and policy decisions.

We expect that:

- Modelers will learn about and discuss the availability of similar models and data sets.
- Data managers will share limitations and identify potential new applications for their data.
- End users will identify current and anticipated needs.
- All attendees will discuss opportunities for collaboration on potential new applications for models and data sets.

This meeting is organized by
the Soil and Water Conservation Society,
in cooperation with USDA-NRCS, USDA-ARS, USGS,
US EPA, and Monsanto. Many thanks to the conference
organizing committee for all their hard work
in making this meeting a reality.

Dozens of models and data sets are in use for determining potential outcomes of conservation and natural resources practices. These models provide guidance and information to multiple levels of policy makers at public agencies and private companies throughout the United States, but many operate independently, without interaction with other modelers and data stewards. The intent of this meeting is to provide an opportunity for interaction between advanced modelers, data stewards, and end users. The presentations you will hear and the posters displayed have been prepared with the intent to demonstrate how particular policy or regulatory decisions can be answered using models, and what data sets are and will be needed to use and develop these models. We invite you to view these posters at any time, but especially during the poster sessions at the end of each day.

Over the second day of this meeting, we invite you to explore ideas, share concerns, and identify needs about models and data sets. The conversations will occur first in small groups with a report to all attendees and further discussion. We encourage you to fully participate in active discussion, as this will be the core of the meeting.

Ideally the program will lead to new uses in current and future conservation programs and practices, improving the science and art of modeling for conservation programs and policy decisions. It differentiates itself from most of the meetings SWCS hosts in that this is strictly a tool and technology focused event and will not directly address any of the conservation policy implications that may result from the outcomes of the computer simulation models.

Modeling Summit 2011
March 29-31, 2011 | Denver, Colorado
Denver Renaissance Hotel
www.swcs.org/modelingsummit

Agenda

March 29, 2011

1:00 PM: Opening Session (Colorado Ballroom C/D)

- Introduction and Purpose of this Summit
- Modeling to Meet Local Watershed Managers' Needs – *Jane Frankenberger, Purdue University*
- Scaling models to meet resource management needs:
  The Spavinaw River TMDL and farm-scale planning in Oklahoma – *Dan Storm, Oklahoma State University*
- Integrating models of various scales to show program performance – *Jeff Arnold, ARS & Ana Maria Garcia, USGS*
- Industry Perspectives – *Dave Gustafson, Monsanto*
- Addressing the critical issue of "Data in" – *Jean Steiner, ARS*
- Panel Discussion

3:30 PM: BREAK

4:00 PM: Case Studies & Lessons Learned

- APEX & SWAT: *Phil Gassman, Iowa State University*
- SPARROW: *Dale Robertson, USGS*

5:00 PM: Moderated Poster Session followed by Evening Poster Session (reception food)

1) Paul Fixen, IPNI: NuGIS: Nutrient Use Geographic Information System
2) Carl Unkrich, USDA-ARS: The RHEM - WEPPCAT - KINEROS2 - AGWA Suite of Modeling Tools

March 30, 2011

8:00 AM: Gathering Meeting for Instructions (Colorado Ballroom C/D)

8:15 AM: Small Group Discussion: Session I (Clear Creek, Big Thompson, & Platte River)

- Model developers (Big Thompson)
- Data managers (Platte River)
- Policy makers and model practitioners (Clear Creek)

9:45 AM: BREAK

10:15 AM: Report back and large group discussion (Colorado Ballroom C/D)

11:30 AM: OMS/Modular Modeling – *Olaf David, Colorado State University & USDA-ARS*

12:00 PM: Lunch & Speaker – *Silvia Secchi, Southern Illinois University*

1:30 PM: Data Sets, databases, and data issues:

- Research Data Sets: *Keith Paustian, Colorado State University*
- Soils Data: *M. Lee Norfleet, USDA NRCS RIAD*
- Weather/Climate Data: *Caspar Ammann, National Center for Atmospheric Research*

3:00 PM: BREAK

3:15 PM: Small Group Discussion: Session II (Clear Creek, Big Thompson, & Platte River)

4:30 PM: Report back and large group discussion (Colorado Ballroom C/D)

5:30 PM: Moderated Poster Session followed by Evening Poster Session (reception food)

1) Lori Sprague, USGS: SPARROW
2) Claire Baffaut, USDA-ARS: SWAT and APEX

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Agenda - Continued

March 31, 2011

8:00 AM: Results & Lessons Learned on large-scale efforts (Colorado Ballroom C/D)

- CEAP – *Bob Kellogg, USDA-NRCS*
- National Water Quality Assessment – *Rich Alexander, USGS*
- Chesapeake Bay – *Gary Shenk, US EPA*

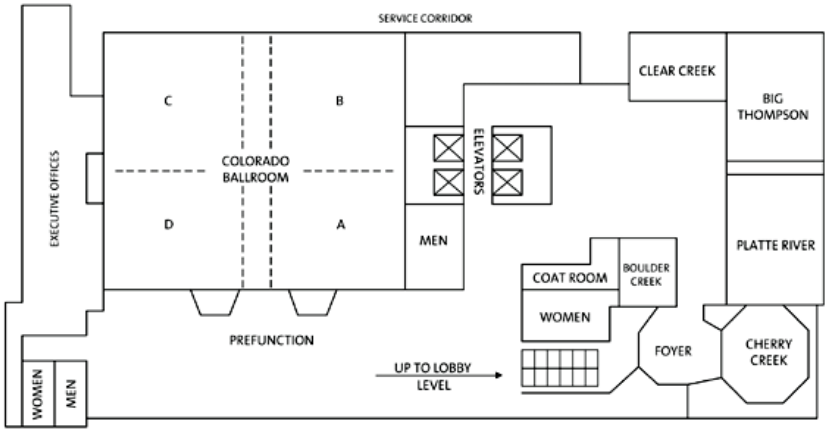
10:00 AM: BREAK

10:30 AM: Review of Nutrient Models – *Mazdak Arabi, Colorado State University*

11:00 AM: Closing – *Dennis Ojima, Colorado State University*

Noon: Adjourn

Ballroom Level



Workshop Organizing Committee

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- Jean Steiner, ARS
- Mike Woodside, USGS

Speaker Bios

Modeling to Meet Local Watershed Managers' Needs – Jane Frankenberger, Purdue University

Jane Frankenberger is Professor and Extension Specialist in the Department of Agricultural and Biological Engineering at Purdue University. Her extension program, focusing on educating Indiana's watershed leaders and stakeholders, informs her research interest in making watershed models more usable, transparent, and applicable to the challenges of local watershed management.

Scaling models to meet resource management needs: The Spavinaw River TMDL and farm-scale planning in Oklahoma – Dan Storm, Oklahoma State University

Dr. Dan Storm is a professor in Biosystems and Agricultural Engineering at Oklahoma State University. His major research and teaching interests include Water quality and quantity modeling and hydrologic processes; Critical source area identification; Lotic (stream/river) ecosystem dynamics; Water quality standards; Developing tools and guidelines for TMDLs; Environmental statistics; and Wetland Treatment Design.

Integrating models of various scales to show program performance – Jeff Arnold, ARS & Ana Maria Garcia, USGS

Dr. Jeff Arnold is a Supervisory Agricultural Engineer at the Grassland Soil and Water Research Laboratory for the USDA-Agricultural research Service.
Dr. Garcia is a hydrologist with the U. S. Geological Survey at the North Carolina Water Science Center. She recently completed an assessment of natural and human sources of phosphorus to the South Atlantic and Gulf Coasts using the SPARROW model

Industry Perspectives – Dave Gustafson, Monsanto

Dave Gustafson is a Senior Fellow at Monsanto Company, which he first joined in 1985 and where he serves as the Regulatory lead for Water Quality and Ag Sustainability. His academic training was at Stanford University and the University of Washington in Seattle, where he received his B.S. and Ph.D. degrees, both in chemical engineering.

Addressing the critical issue of "Data in" – Jean Steiner, ARS

Jean L. Steiner is Director of the USDA-ARS Grazinglands Research Laboratory in El Reno, Oklahoma and conducts water resources and agroclimatology research. She was a Team Leader for development of STEWARDS, a web-based system for ARS long-term watershed research data documentation, archiving, and provision.

APEX & SWAT: Phil Gassman, Iowa State University

Phil Gassman is an environmental scientist in the Resource and Environmental Policy (REP) Division at the Center for Agricultural and Rural Development at Iowa State University. His research efforts support the integration of environmental and economic models that are used to assess policy scenario impacts for watersheds and other regions, and the testing of field- and watershed-scale environmental models.

SPARROW: Dale Robertson, USGS

Dr. Dale M. Robertson is a Research Hydrologist with the U.S. Geological Survey, Wisconsin Water Science Center, in Middleton, WI. His current research deals with estimating loads and concentrations of nutrients and sediment in streams over large geographic areas, such as the Great Lakes and Mississippi River Basins, developing nutrient criteria for streams and rivers, modeling mixing and eutrophication in lakes, and examining the effects of climate change on the physical dynamics, ice cover, and productivity of lakes. He has been deeply involved in using SPARROW models to rank areas in the Mississippi River Basin based on their relative contributions to the Gulf of Mexico.

Evening Poster Session I:

Paul Fixen, IPNI: NuGIS: Nutrient Use Geographic Information System

Paul Fixen is Senior Vice President of the International Plant Nutrition Institute (IPNI) where he coordinates their programs in the Americas and Oceania and serves as global Director of Research. Quentin Rund and Ryan Williams are with PAQ Interactive out of Monticello, IL.

Carl Unkrich, USDA-ARS: The RHEM - WEPPCAT - KINEROS2 - AGWA Suite of Modeling Tools

Carl Unkrich is a Hydrologist with the USDA-ARS Southwest Watershed Research Center in Tucson, Arizona. He's been involved in development of the KINEROS2 model and software for processing and QA/QC of data from their instrument network.

OMS/Modular Modeling – Olaf David, Colorado State University & USDA-ARS

Olaf David is a computer scientist with the Agricultural Systems Research Unit for USDA-ARS in Fort Collins, Colorado.

Wednesday Lunch & Speaker – Silvia Secchi, Southern Illinois University

Silvia Secchi is an Assistant Professor in Energy Economics and Policy and co-Director of the Environmental Resources and Policy PhD program at Southern Illinois University, Carbondale. She is involved in several interdisciplinary projects that address the interface between agricultural activities, agricultural and energy policy, and the environment, particularly soil and water quality and greenhouse gas emissions.

Research Data Sets: Keith Paustian, Colorado State University

Keith Paustian is a professor in the Dept. of Soil and Crop Sciences at CSU, in Fort Collins. A focus of his work is quantifying soil C dynamics and greenhouse gas emissions from agricultural systems, from farm- to national scales, for which long-term field experiments are a crucial component.

Soils Data: M. Lee Norfleet, USDA NRCS Resources Inventory and Assessment Division

Dr. Lee Norfleet is with the NRCS Resources Inventory and Assessment Division . He is the NRCS Environmental Modeler.

Weather/Climate Data: Caspar Ammann, National Center for Atmospheric Research

Caspar M. Ammann is a Scientist II in the Climate and Global Dynamics Division of National Center for Atmospheric Research studying past and present climate changes. The primary focus of the research is on natural climate variability and change over the past centuries and millennia.

Evening Poster Session II:

Lori Sprague, USGS: SPARROW

Lori Sprague is a hydrologist with the U.S. Geological Survey in Denver, Colorado. She currently conducts nutrient studies for the National Water-Quality Assessment Program of the USGS, including a SPARROW modeling study in the Missouri River Basin.

Claire Baffaut, USDA-ARS: SWAT and APEX

Dr. Claire Baffaut is a Research Hydrologist with the USDA Agricultural Research Service. Dr. Baffaut's research interests include investigating and modeling surface and subsurface hydrological processes at the field and watershed scales, evaluating cropping systems and site specific management practices for environmental impacts, investigating the socio-economic factors in agricultural management.

CEAP – Bob Kellogg, USDA-NRCS

Robert Kellogg is a natural resource analyst at the Natural Resources Conservation Service (NRCS), working in the Resource Assessment Division located in Beltsville, MD. Bob helped organize the Conservation Effects Assessment Project (CEAP) at NRCS and is currently responsible for carrying out the National Assessment for Cropland.

National Water Quality Assessment – Rich Alexander, USGS

Richard Alexander is a senior Research Hydrologist with the USGS in Reston, VA, and a co-developer of the USGS SPARROW model. He?s published widely in the hydrological and biogeochemical sciences on topics related to modeling of stream water quality, including studies of nutrient sources and transport in large river basins such as the Mississippi.

Chesapeake Bay – Gary Shenk, US EPA

Gary Shenk is the integrated analysis coordinator at the EPA's Chesapeake Bay Program Office in Annapolis, Maryland. In this position he is the lead developer of the watershed model used in the Chesapeake Bay TMDL.

Closing Presentation – Dennis Ojima, Colorado State University

Dennis Ojima is a Senior Research Scientist and Professor at Colorado State University and is involved with ecosystem responses to climate and land use changes. He has been active ecosystem modeling of climate effects to ecosystems ranging from grasslands, forests, and croplands in the US and other regions of the world. These ecosystem modeling efforts have been extensively to evaluate greenhouse gas (GHG) emissions of various land systems as part of the International Panel on Climate Change findings and US national climate change efforts.

Modeling Poster Abstracts

1) AgroEcoSystem-Watershed (AgES-W)

James C. Ascough, II, USDA-ARS, ASRU, jim.ascough@ars.usda.gov

The Object Modeling System 3 (OMS3) provides a component-based environmental modeling framework for development and deployment of custom-tailored model applications. A new watershed model development effort was initiated for the ARS CEAP Watershed Assessment Study (WAS) to take advantage of OMS3 framework capabilities. Specific research objectives were to: 1) disaggregate and refactor various agroecosystem models (e.g., J2K-S, SWAT, WEPP) and implement hydrological, N/P dynamics, erosion, and crop growth science components under OMS3; 2) use the implemented components to develop the new modular AgroEcoSystem-Watershed (AgES-W) model for fully-distributed transfer of water and chemicals between land units and stream channels; and 3) evaluate the accuracy and applicability of AgES-W. The Cedar Creek watershed (CCW) in northeastern Indiana, USA was selected for initial AgES-W application and model performance for stream flow was assessed. The results show that the AgES-W model was able to reproduce the hydrological dynamics of the CCW with sufficient quality, and should serve as a foundation upon which to better quantify additional water quality indicators (e.g., sediment and N/P loading) at the watershed scale.

2) Bank-Stability and Toe-Erosion Model (BSTEM)

Andrew Simon, USDA-ARS, andrew.simon@ars.usda.gov

The Bank-Stability and Toe Erosion Model (BSTEM) is a simple spreadsheet tool to simulate streambank erosion in a completely mechanistic framework. It has been successfully used in a range of alluvial environments in both static mode to simulate bank-stability conditions and design of streambank stabilization measures, and iteratively over a series of hydrographs to evaluate surficial, hydraulic erosion, bank failure frequency and thus, the volume of sediment eroded from a bank over a given period of time. In combination with the sub-model RipRoot, the reinforcing effects of riparian vegetation can be quantified and included in analysis of mitigation strategies. In addition, the model has been shown to be very useful in testing the effect of potential mitigation measures that might be used to reduce the frequency of bank instability and decrease sediment loadings emanating from streambanks. Finally, the results of iterative BSTEM analysis can be used to spatially extrapolate bank-derived volumes of sediment from individual sites to entire reaches. Results of these case studies have shown that the relative contribution of suspended sediment from streambanks can vary considerably, ranging from as low as 10% in the predominantly low as 10% in the predominantly low gradient, agricultural watershed of the Big Sioux River, SD to more than 50% in two steep, forested watershed of the Lake Tahoe Basin, CA. Modeling of streambank mitigation strategies has also shown that the addition of toe protection to eroding streambanks can reduce overall volumes of eroded sediment up to 85-100%, notwithstanding that hydraulic erosion of the toe in this particular case makes up only 15-20% of total bank erosion. BSTEM is available to the public free of charge at http://www.ars.usda.gov/Research/docs.htm?docid=5044.

3) BioSAT - Biomass Site Assessment Tool

Timothy Young, University of Tennessee, tmyoung1@utk.edu

Key to ensuring long-term, sustainable cellulose supply is the assessment of the economic availability of woody and agricultural residue cellulosic feedstocks. A key component of any commercial venture must include a profitable strategy. This study addresses the problem with the development of web-based system for optimal siting of cellulose using mills called the Biomass Site Assessment Tool (BioSAT), www.BioSAT.net. The project integrates contemporary web-based information technology with existing U.S. Forest Service and agricultural residue data to estimate harvest and transport costs for residue and merchantable feedstocks. BioSAT generates total costs, average total costs, and marginal cost curves for user-selected zip code tabulation areas (ZCTAs). BioSAT estimates are available for logging residues, mill residues, agricultural residues, and merchantable trees (pulpwood and sawtimber) for 33 Eastern United States.

4) High Impact Targeting (HIT) Decision Support System for BMPs

Jon Bartholic, Institute of Water Research, Michigan State University, bartholi@msu.edu

High Impact Targeting (HIT) Decision Support System for BMPs to Most Effectively Reduce NPS Pollution. HIT combines an erosion model and a sediment delivery model (SEDMOD – Spatially Explicit Delivery Model2) to calculate annual sediment loading to streams. This combination yields field-scale maps identifying areas at risk and estimates at watershed scales. This on-line tool allows users to interact with these data spatially, and evaluate the potential impacts of best management practices (BMPs) on selected watersheds.

5) Hydrologic Enforcement Modeling

Brian Gelder, Iowa State University, bkgelder@iastate.edu

High resolution Digital Elevation Models, such as those resulting from LiDAR data, are not directly suitable for hydrologic modeling due to inclusion of elevation points from features such as bridges, culverts, and trees, restricting water flow. Researchers at Iowa State University are working on techniques to remove these obstructions from the elevation model to enable advanced hydraulic and hydrologic analyses. Detection of stream channels is possible using a combination of basic hydrologic analysis and image analysis algorithms which can be applied in a relatively short time, approximately 3-6 hours per 50 km^2 watershed at 1 meter resolution. These features can then be enforced, resulting in a hydrologically correct digital elevation model. This model has been applied to a number of Hydrologic Unit Code (HUC) 12 watersheds and will eventually be applied to all watersheds in the state of Iowa. The poster will detail the model procedures along with an analysis of the initial and final DEMs.

6) Instream Nitrogen Assimilation Tool

Jon Witter, The Ohio State University, witter.7@osu.edu

The Instream Nitrogen Assimilation Tool was developed to assess the water quality impacts of agricultural channel management strategies. The simple spreadsheet model is designed to evaluate and compare nitrogen uptake potential in: 1) traditional agricultural channels with incised, trapezoidal geometry, and 2) two-stage channels which incorporate small floodplain benches within the confines of the channel. The spreadsheet tool integrates knowledge of channel form, hydrology, and biogeochemical uptake rates to estimate nitrogen uptake potential. Parameter values can be user input or selected from a database of published values. The user can specify a range of input values and the model predicts a range of outputs using a Monte Carlo simulation approach.

7) NuGIS: Nutrient Use Geographic Information System

Paul Fixen, International Plant Nutrition Institute, pfixen@ipni.net
P. E. Fixen, Q. Rund, and R. Williams

Several critical contemporary agricultural issues have the potential to impact nutrient balance for U.S. cropland. Considering the potential future impact of these issues, it is critical to understand the current status of nutrient balance, temporal trends in balance estimates, and relevant inferences about nutrient use efficiency. The Nutrient Use Geographic Information System (NuGIS) integrates multiple tabular and spatial datasets to create county-level estimates of nutrients applied to the soil in fertilizer and livestock manure, and nutrients removed by harvested agricultural crops. The current version of NuGIS makes estimates for five years, coinciding with the USDA Census of Agriculture, from 1987 - 2007. A version that can be updated annually for non-Census years is under development. Geospatial techniques are used to estimate balances for 8-digit hydrologic units using the county-level data. Preliminary results are currently available in a 58-page bulletin and also accessible on-line through interactive thematic maps (http://www.ipni.net/nugis). A final version of the NuGIS model which will have improved estimates of fertilizer use on farms, nutrient removal coefficients, crop land area, and specialty crop production as well as a data export feature is planned for release in July of 2011. The analysis reveals areas of both highly positive and highly negative nutrient balances. The NuGIS model is being developed by the International Plant Nutrition Institute (IPNI) and PAQ Interactive.

8) Object Modeling System - Knowledge Base Platform

Jack Carlson, Colorado State University, Jack.Carlson@colostate.edu

Most natural resource models focus on few concerns, whereas conservation programs usually address several concerns, forcing conservationists to use multiple models. The models are stovepipes, with redundant databases, data, and process definitions. This can be mitigated by (1) creating a really big stovepipe model, (2) chaining models together, and/or (3) creating a model base of science components. No approach can achieve success without modeling the biophysical concepts and translating them to a model design. Building a concept model (ontology) in Protégé enables a modeling community to establish core classes and properties for space, time, hydrology, plant growth, nutrient cycling, and other entities, providing a controlled vocabulary. Concept models are semantically rooted in description logic, a formal knowledge representation language. The resulting OWL output drives database design, UML-based source code design, and provides metadata to maintain model integrity as size and complexity increases. The Object Modeling System (OMS) provides a knowledge base platform for communities building natural resource models.

9) PRiME

Michael Guzy, Oregon State University, guzym@engr.orst.edu

Pesticide Risk Mitigation Engine (PRiME) Mission Statement. Our mission is to provide an efficient, user-friendly and economically sustainable tool for farmers, advisors, program managers, policy makers and others to fully evaluate pesticide options for impacts on health, environment and economics, and to improve the quality and quantity of IPM by facilitating implementation of practices that prevent and minimize pest pressure, and mitigate the impact of pesticide applications. By "quantity" of IPM, we mean increasing the numbers of growers and pest managers practicing IPM, as well as the land area managed under IPM. Increasing the "quality" of IPM means progressing along the IPM continuum toward prevention-based systems.

In fulfilling our mission, we will assist NRCS in achieving its resource protection goals on an ongoing basis. In sustaining our tool financially, we will strive to provide broad access at no charge to all users for basic functions. We will consider ability to pay including providing no or low-cost access for users developing countries.

10) The RHEM - WEPPCAT - KINEROS2 - AGWA Suite of Modeling Tools

Carl Unkrich, USDA-ARS, carl.unkrich@ars.usda.gov

The Water Erosion Prediction Project Climate Assessment Tool (WEPPCAT) is an easy-to-use, web-based erosion model that allows users to adjust climate inputs for user-specified climate scenarios within the continental United States in order to assess changes in surface water runoff and erosion rates. RHEM (Rangeland Hydrology and Erosion Model) is designed for government agencies, land managers and conservationists who need sound, science-based technology to model and predict runoff and erosion rates on rangelands and to assist in assessing the effects of rangeland conservation practices. KINEROS2 is a distributed event-based rainfall-runoff-erosion model representing a watershed as an array of cascading overland flow elements contributing to a network of trapezoidal channel elements. Flow is routed by kinematic flow equations, with interactive coupling to the infiltration model, and using the core RHEM erosion algorithm for overland flow elements. The need to parameterize these models motivated the development of AGWA, the Automated Geospatial Watershed Assessment tool. This ArcGIS-based tool uses commonly available GIS data layers to fully parameterize, execute, and visualize results from the SWAT, RHEM, and KINEROS2 models.

11) SPARROW

Lori Sprague, USGS, lsprague@usgs.gov

The U.S. Geological Survey's National Water-Quality Assessment Program has completed a number of water-quality prediction models for nitrogen and phosphorus for the entire conterminous United States as well as for regional areas of the Nation. Calibrated SPAtially Referenced Regressions On Watershed Attributes (SPARROW) models can be used to produce estimates of in-stream yield, flow-weighted concentration, or load under various land-use or resource-management scenarios. A web-based decision support infrastructure has been developed to provide access to SPARROW simulation results and to offer scenario testing capabilities for research and water-quality planning via a graphical user interface with familiar controls. The SPARROW Decision Support System (DSS) is delivered through a web browser over an Internet connection, making it widely accessible to the public in a format that allows users to easily display water-quality conditions and to describe, test, and share modeled scenarios of future conditions. SPARROW models currently supported by the DSS are based on the modified digital versions of the 1:500,000-scale River Reach File and 1:100,000-scale National Hydrography Dataset stream networks.

12) Surrogate CENTURY Model

Ho-Young Kwon, University of Illinois at Urbana-Champaign, hkwon2@illinois.edu

As a tool to obtain site-specific CENTURY parameters and to investigate hypotheses to explain historical soil organic carbon (SOC) dynamics, we developed a highly-accurate surrogate model for CENTURY's SOC sub-model (SCSOC). The SCSOC has mass balance and decomposition kinetics equations for residue and soil organic matter (SOM) pools identical to those of CENTURY, but it differs by being 1) decoupled from models of plant growth, nutrient cycling, and hydrologic processes, 2) capable of employing daily or monthly, time steps, and 3) solvable using widely available non-linear regression software. As an example application, we analyzed SOC data from a single subplot of the Morrow Plots that has been cropped continuously in corn since 1876 using management practices common in east-central Illinois. The results of different set of assumptions typically used for calibration were examined by estimating a corresponding parameter set that 1) govern SOM decomposition kinetics and 2) define the initial mass and fractionation of the SOM. In the best-fitting (lowest Akaike information criterion) models, SOM turnover increased by ~5-fold after modern management practices (nitrogen fertilization under conventional tillage) were implemented.

13) SWAT

Philip Gassman, CARD, Iowa State University, pwgassma@iastate.edu
Calvin F. Wolter, Iowa Geological and Water Survey, Iowa Dept. of Natural Resources
Keith E. Schilling, Iowa Geological and Water Survey, Iowa Dept. of Natural Resources
Manoj K. Jha, Civil Engineering Dept., North Carolina A&T University
Melinda Buyck, Watershed Improvement Section, Iowa Dept. of Natural Resources

This study describes a collaborative research effort between the Iowa State University Center for Agricultural and Rural Development, the North Carolina A&T University Civil Engineering Department, and two Iowa Department of Natural Resources (IDNR) units: the Iowa Geological and Water Survey and the Watershed Improvement Section. The objectives of the study are: (1) to determine the most appropriate choices of input parameter ranges for performing hydrologic assessments with the Soil and Water Assessment Tool (SWAT) model in seven principal Iowa landform regions, and (2) to use these input parameter ranges as guidance for future IDNR Total Maximum Daily Load (TMDL) studies. The seven ecoregions cover the majority of the intensively cropped regions in the state and represent distinct biological and physical characteristics, which potentially require unique combinations of SWAT input parameters. The appropriate input parameters for each landform region are being determined by calibrating SWAT on an initial watershed in a given landform region and then validating SWAT on a second watershed within the same landform region, without further calibration of the hydrologic input parameters. A total of seven pairs of watersheds have been chosen to perform the required simulations, which are located at least partially in each landform region and have adequate streamflow data required for SWAT calibration or validation. Current results are described here for calibration and validation simulations performed for the Des Moines Lobe and Paleozoic Plateau ecoregions, which verify that different parameter choices are important for accurate SWAT simulations in different Iowa landform regions.

14) SWAT

Cole Rossi, USDA-ARS, cole.rossi@ars.usda.gov

The SWAT model is well documented however it was designed as a river basin-scale model primarily for agricultural croplands where enough water flows that could transport potential contaminants. As increasingly complex questions are asked by agricultural managers and decision makers, the adequacy and efficiency in producing realistic results has to be addressed. The Leon River watershed (LRW) in central Texas has been evaluated for a 30-year time period for nine manure management scenarios. The computer simulations aid in the reduction of costs and time required for analysis however limited nutrient and sediment data require complete dependence on simulation results for the decision makers. In addition, the water quality results are completely dependent on an accurate hydrologic assessment. Results for the LRW simulations will be presented in addition to new phosphorus model developments to demonstrate the impact of realistic representation of nutrient processes.

15) SWAT

Yongping Yuan, US EPA, yuan.yongping@epa.gov

The assessment of Landuse and Landcover (LULC) changes on hydrology is essential for the development of sustainable water resource strategies. Specifically, understanding how change in each LULC class influences hydrological components will greatly improve predictability of hydrological consequences to LULC changes and thus can help stakeholders make better decisions. However, given the limited availability of digital LULC maps and simultaneous changes of multiple LULC classes, it is difficult to quantify impacts of change in individual LULC class on hydrology. In this study, SWAT model was applied to assess lULC changes on hydrology. According to the land use dataset from the US Geological Survey, the most significant land use change from 1992 to 2001 in the upper Santa Cruz watershed was urbanization. Urbanization caused increased runoff and peak discharge which potentially result in more soil erosion.

16) SWAT and APEX

Claire Baffaut, USDA-ARS, claire.baffaut@ars.usda.gov

Example of an index validated by a model.
A method is proposed to identify sub-field areas that need conservation practices to reduce sediment, nutrient, and pesticide loss in a 32-ha field of the Goodwater Creek watershed, located in the claypan area in Missouri. The field was divided into 35 subareas based on slope, soils, and depth to claypan. Runoff and water quality data were used to calibrate the APEX model. Simulated output by subarea was correlated with physical parameters including depth to claypan (CD), surface saturated hydraulic conductivity (Ksat) and subarea slope (SL). Two indices were developed, CD*Ksat /SL, and CD/SL, which correlated with runoff, atrazine and sediment loads. These indices captured 100% of the runoff and sediment yield and 60% of the atrazine critical areas predicted by APEX; they also identified areas with lower crop yields. Subsequently, the indices were calculated for each HRU of a SWAT model of the watershed, and correlated with the HRU output variables of interest. Upon verification that the correlation was good, the conservation need was based on these index values calculated for polygons resulting from the overlay of the field boundary and soil layers.

17) Water Erosion Prediction Project (WEPP) Model

James Frankenberger, USDA-ARS, Jim.Frankenberger@ars.usda.gov

The Water Erosion Prediction Project (WEPP) model is a computer simulation program that predicts runoff, soil erosion and sediment losses from hillslopes and small watersheds. WEPP simulates a large number of physical processes, including weather, surface and subsurface hydrology, plant growth, residue decomposition, soil disturbance and consolidation, soil detachment by rainfall and flowing water, and sediment transport and deposition. Both single storm and continuous simulations can be conducted. WEPP outputs include detailed individual storm runoff, spatial soil loss, and sediment yield results, as well as extensive daily information on water balance, plant/residue status, and soil parameters.

The WEPP science model is separate from the user interfaces and passes information through a series of text files. This allows the model to be utilized with a wide range of user interfaces. Current user interfaces include a standalone Windows application, an ArcGIS extension and customized web browser interfaces. Recent work has focused on extending the web based interfaces. This poster will describe the various WEPP user interfaces and the range of customized outputs.

18) Wind Erosion Prediction System

Michael Sporcic, USDA-NRCS, michael.sporcic@ftw.usda.gov

The Wind Erosion Prediction System (WEPS) model is a process based, daily time step wind erosion model developed by the ARS. The simple to use interface and the extensive Natural Resource Conservation Service (NRCS) databases allows over 1100 NRCS field office to make accurate field soil loss estimate for cropland. Users only need to specify the size of the field, the county field is located, management being used, and the soil in the field to get answer. Out puts include soil loss (t/ac/yr), suspension (t/ac & t/1000'), saltation (t/ac & t/1000'), PM-10 (t/ac & t/1000') are some of the outputs.

19) Nutrient Tracking Tool (APEX)

Shaun McKinney, USDA-NRCS, shaun.mckinney@por.usda.gov

The Nutrient Tracking Tool (NTT)utilizes a user friendly web interface to easily load the Agricultural Policy Extender (APEX) model with corporate data including: climate, soils and agronomic information. There have been numerous papers and posters on NTT but the focus of this poster is to highlight the use of behind the scene "web-services" to provision the APEX model with prerequisite data to run APEX. The NTT interface allows users to select farm or field scale areas of interest. From those polygons, web-services make automated data calls to the Web Soil Survey and High Resolution Climate Data repositories managed by the Natural Resource Conservation Service (NRCS) and the Agricultural Research Service (ARS) respectively.

Future development will focus the creation of both the web-service and the corporate agronomic data set for the NRCS.

The NTT model has long been viewed as a resource analysis model or interface to APEX. Although this is accurate, one of the significant advancements has been its ability to easily and rigorously provision the APEX model. NTT and the web service it encompasses may well have broader application with other models and further corporate data sets.

20) Comparison of Model-Estimated Loads for Cultivated Cropland in the Chesapeake Bay Watershed

Tad Slawecki, LimnoTech, tad@limno.com

The Chesapeake Bay is a national treasure and a valued natural resource that provides recreational, economic, and environmental services to its watershed's 17 million inhabitants. The Bay is also greatly impacted by those inhabitants, and its restoration has been a high priority. EPA announced its intent to finalize in 2010 a TMDL for nitrogen, sediment and phosphorus, basing the reduction requirements in the TMDL on results from the Phase 5.3 version of the Chesapeake Bay Program's Watershed Model (CBP-WSM). In October 2010, the United States Department of Agriculture's Natural Resources Conservation Service (NRCS) released a report titled "DRAFT Assessment of the Effects of Conservation Practices on Cultivated Cropland in the Chesapeake Bay Watershed." At the request of the Agricultural Nutrient Policy Council, LimnoTech compared the load estimates in the NRCS report with CBP-WM model results made available online, and published in December 2010 a report titled "Comparison of Draft Load Estimates for Cultivated Cropland."

This poster presents the approach and analytical results from the draft comparison, incorporating updated NRCS load estimates taken from the finalized NRCS assessment.

Submitted Information on Data Sets

Name of Data Set	Pioneer Farm Edge-of-Field Runoff
Organization responsible for collection	University of Wisconsin-Platteville Pioneer Farm
Contact Information	Randy Mentz 1 University Plz. School of Agriculture Platteville, WI 53818 Work Phone: (608) 342-1819 Email: mentzr@uwplatt.edu
Topics Covered	Water quality, nutrients, sediment
Dates covered	2002-present
How often is the data set updated?	Annually
How is the data accessible?	Special Request
In what form is the data accessible?	Edge-of-field runoff data and ancillary information (field notes, photographs, etc.) are organized by water year on DVDs. Raw data files are in Excel (.xls) format and provide sediment and nutrient concentration and load values for each runoff event (including snow-melt runoff). Detailed hydro-graphs are also available for each runoff event. On-site meteorological station provides detailed precipitation (non-frozen only), relative humidity, wind, solar, soil moisture, and soil temperature data. Monitored fields are planted on a seven-year rotation of 3 years of corn, 1 year of oats, and 3 years of alfalfa. A mix of manure and commercial fertilizer is used to meet crop needs. Pioneer Farm is in the headwaters of the Galena River watershed (070600050304).
Current Uses	Wisconsin Phosphorus Index
Potential Uses	Has been used for SWAT modelling and the Precision Agricultural Landscape Modelling System (PALMS).
Limitations	Dataset is limited to a single 430-acre farm. Early data was collected to establish an environmental baseline with no research plan in place. Starting in 2007, unpaired basins were no longer monitored. Dataset is not in a combined database. Metadata is available, but is not linked directly to the data (user would have to find the metadata based on the date and station).
Does the database have meta-data?	Yes

Name of Data Set	GeoCeap Framework of Data sets and Models
Organization responsible for collection	Texas AgriLife Research and USDA NRCS
Contact Information	Mauro Di Luzio Texas AgriLife Research Blackland Research Center 720 E Blackland Rd Temple, TX 76502 Work Phone: (254) 774-6100 Email: mdiluzio@brc.tamus.edu
Topics Covered	Hydrology and Water Quality Modeling
Dates covered	1960-2006
States or area covered	Nation
How often is the data set updated?	Every two years
How is the data accessible?	Internal to agency
In what form is the data accessible?	GIS and text format
Current Uses	CEAP National project
Potential Uses	Modeling
Limitations	Variety of scales
Does the database have meta-data?	Yes

Name of Data Set	Southwest Watershed Research Center Database
Organization responsible for collection	Southwest Watershed Research Center
Contact Information	Tim Keefer 2000 East Allen Road Tucson, AZ 85719 Work Phone: (520) 670-6380 Email: tim.keefer@ars.usda.gov
Topics Covered	Precipitation, runoff, erosion, meteorologic, soil moisture, other
Dates covered	1950's to current depending on types of observations
States or area covered	Southeastern Arizona
How often is the data set updated?	Updated daily, monthly, occasional depending on types of observations
How is the data accessible?	Web
In what form is the data accessible?	various digital formats including interactive database, flatfiles, GIS layers, etc depending on type of observation
Current Uses	KINEROS2, AGWA, RHEM, others
Potential Uses	hydrologic and erosion analysis and modeling
Limitations	
Does the database have meta-data?	Yes

Name of Data Set	STEWARDS
Organization responsible for collection - Data Steward(s)	USDA-ARS
Contact Information	Jean Steiner USDA-ARS 7207 West Cheyenne Street El Reno, OK 73036 Email: jean.steiner@ars.usda.gov
Topics Covered	water quality, hydrology, conservation and land use, soils
Dates covered	1955 to 2010, variable
States or area covered	GA, IA, ID, IN, MD, MO, MS, OH, OK, PA, TX
How often is the data set updated?	Variable, annual
How is the data accessible?	Web
In what form is the data accessible?	Zip files with Excel spreadsheets, pdf descriptive files, and/or GIS files.
Current Uses	ARS, university, and other research applications with a variety of models.
Potential Uses	Diverse research applications to address watershed scale questions in single or multiple watersheds from key agricultural regions from around the USA.
Limitations	Data are highly heterogeneous across watersheds and across time.
Does the database have meta-data?	Yes

Name of Data Set	NRCS/UMass Extension Pesticide Properties and Toxicity Databases
Organization responsible for collection - Data Steward(s)	USDA NRCS and University of Massachusetts Extension
Contact Information	Eric Hesketh Address: USDA NRCS 451 West Street Amherst, MA 01002 Work Phone: (413) 253-4377 Email: eric.hesketh@ma.usda.gov
Topics Covered	Pesticide properties, Toxicity Thresholds
Dates covered	current
States or area covered	general representative values that are based on agricultural soils
How often is the data set updated?	semiannually
How is the data accessible?	Web
In what form is the data accessible?	Data are available on the NRCS WIN-PST website.
Current Uses	Used in WIN-PST pesticide screening tool and USDA Conservation Effects Assessment Project (CEAP) Cropland National Assessment
Potential Uses	Ideally suited for pesticide modeling assessments and risk analyses.
Limitations	Pesticide properties and toxicities do not include degradates and daughter products. Pesticide properties are representative values. Actual properties vary with soil pH, temperature and aerobic conditions. The majority of pesticides do not have foliar half-life or foliar wash-off fraction values. Best use of data is for relative screening assessment.
Does the database have meta-data?	Yes

Modeling Summit 2011
March 29-31, 2011 | Denver, Colorado
Denver Renaissance Hotel
www.swcs.org/modelingsummit

Registered Attendee List

Name	Company	Title
Alexander, Richard	U.S. Geological Survey	Research Hydrologist
Ammann, Caspar	National Center for Atmospheric Research	
Arabi, Mazdak	Colorado State University	
Arnold, Jeff	USDA-ARS	Agricultural Engineer
Ascough II, James C.	USDA-ARS, ASRU	Hydrologic Engineer
Baffaut, Claire	USDA-ARS	Research Hydrologist
Bagdon, Joe	USDA-NRCS-WNTSC	Pest Management Specialist
Bankhead, Natasha	USDA-ARS / University of Tennessee	Research Associate
Bartholic, Jon	MSU - Institute of Water Research	Director
Bartling, Jeff	Ecosystem Services Exchange	COO
Brennan, Michael	EPA	Analyst
Carlson, Jack	Colorado State University	
Carney, Tim	USDA-NRCS-CDSI	Natural Resource Specialist
Chambers, Adam	USDA - NRCS - WNTSC	Physical Scientist
Chaubey, Indrajeet	Purdue University	Associate Professor
David, Olaf	Colorado State University & USDA-ARS	
Di Luzio, Mauro	Texas AgriLife Research	Research Scientist
Douglas-Mankin, Kyle	Kansas State University	Professor
Erskine, Rob	USDA ARS	Physical Scientist
Fixen, Paul	International Plant Nutrition Institute	Senior Vice President
Frankenberger, James	USDA	IT Specialist
Frankenberger, Jane	Purdue Univ	
Garcia, Ana Maria	USGS	Hydrologist
Gassman, Philip	CARD, Iowa State University	Associate Scientist
Gelder, Brian	Iowa State University	Associate Scientist
Gerik, Thomas	Texas AgriLife Research - Temple	Director and Professor
Green, Tim	USDA ARS	Hydrologic Engineer
Gross, Chris	USDA - NRCS - WNTSC	Nutrient Management Specialist
Gustafson, David	Monsanto	Senior Fellow
Guzy, Michael	Oregon State University	Assistant Professor SR
Hendley, Paul	Syngenta Crop Protection Inc	Senior Syngenta Fellow
Hesketh, Eric	USDA - NRCS - WNTSC	Soil Scientist
Jaiswal, Deepak	University of Illinois	Postdoc
Johnson, Greg	USDA-NRCS-WNTSC	Team Leader AQQT
Keller, Arturo	University of California, Santa Barbara	Professor
Kellogg, Robert	USDA-NRCS	Agricultural Economist
Kwon, Ho-Young	University of Illinois	Postdoctoral Associate
Langendoen, Eddy	USDA-ARS National Sedimentation Laboratory	Hydraulic Engineer
Lee, Joon Hee	USDA, ARS, NWISRL	Research Agricultural Engineer
Lehman, Stuart	U.S. EPA	Environmental Scientist

Modeling Summit 2011
March 29-31, 2011 | Denver, Colorado
Denver Renaissance Hotel
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Name	Company	Title
Lyon, James	Colorado State University	
McCarty, Gregory	USDA-ARS	Soil Scientist
McKinney, Shaun	USDA-NRCS-WNTSC	Team Leader WQQT
McLellan, Eileen	Environmental Defense Fund	Scientist
Mentz, Randy	University of WI Platteville	
Moreda, Fekadu	RTI - International	
Nein, Anita	SWCS	Board of Directors
Norfleet, Lee	USDA-NRCS	Modeling Team Leader
Ojima, Dennis	Colorado State University	Professor
Olson, Carolyn	USDA Natural Resources Conservation Service	National Leader Climate Change
Paustian, Keith	Colorado State University	
Plotkin, Stephen	University of Massachusetts	Environmental Engineer
Preston, Steve	U.S. Geological Survey	Hydrologist
Robertson, Dale	U.S. Geological Survey	Research Hydrologist
Rojas, Ken	USDA-NRCS	
Rund, Quentin	PAQ Interactive	Senior Consultant
Saleh, Ali	TIAER-Tarleton State University	
Secchi, Silvia	Southern Illinois University Carbondale	Assistant Professor
Shenk, Gary	US EPA	
Sheshukov, Aleksey	Kansas State University	
Simon, Andrew	USDA-ARS	Research Geologist
Slawecki, Tad	Limno Tech	
Sporcic, Mike	USDA-NRCS	
Sprague, Lori	U.S. Geological Survey	Hydrologist
Steiner, Jean	USDA-ARS Grazinglands Research Lab	Lab Director
Stevens, David	Utah State University	Professor
Storm, Dan	Oklahoma State University	
Tatarko, John	USDA-ARS	Soil Scientist
Unkrich, Carl	USDA-ARS-SWRC	Hydrologist
Van Liew, Michael	University of Nebraska-Lincoln	Research Specialist
Volkman, Chad	USDA NRCS	Cartographer
Wagner, Larry	USDA-ARS-EWERU	Ag. Engineer
Williams, Ryan	PAQ Interactive	GIS Analyst / Programmer
Wilson, Rick	USGS	Hydrologist
Witter, Jon	The Ohio State University	
Young, Tim	University of Tennessee	
Yuan, Yongping	USEPA	Research Hydrologist

ASABE's

21st Century Watershed Technology Conference

Improving Water Quality and the Environment

2012 Bari, Italy

POINTS OF INTEREST

- Join peers in discussions of state-of-the-art watershed technologies
- Expand or join the network of professionals focused on watershed technology
- Communicate your findings and experience on improving watershed technology outcomes
- Publish your work on ASABE's on line technical library

Abstract Submission Deadline Dec. 15, 2011

We are pleased to extend an invitation to professionals working in watershed technology, and related areas, to submit an abstract for consideration to be presented during the Conference in Bari, Italy on May 26th -31st, 2012.

The Conference will provide a forum for agriculture related professionals to exchange information on science, applications and developments in the use of watershed science and technology. It will cover a wide array of topics.

These range from new applications of well established and understood technologies to innovative and entrepreneurial applications of emerging technologies, in addition to issues related to policy and knowledge dissemination. Topics may include any subject that contributes to an improved understanding and sustainable management of watersheds, such as research and development, the environment, assessment, emerging technologies and tools, education and awareness and policy.

www.watershedtech.org

Background

This is one of a series of highly successful international conferences sponsored by ASABE focusing on water quality. Over the last decade there has been a maturing of watershed science with new research findings and modeling approaches. These new solutions have resolved many of the problems that first faced watershed managers in dealing with water quality and quantity issues, but there are also emerging impediments to watershed assessments and achieving water quality goals. This conference will look at emerging problems and new solutions to managing watersheds to meet water quality and quantity standards.

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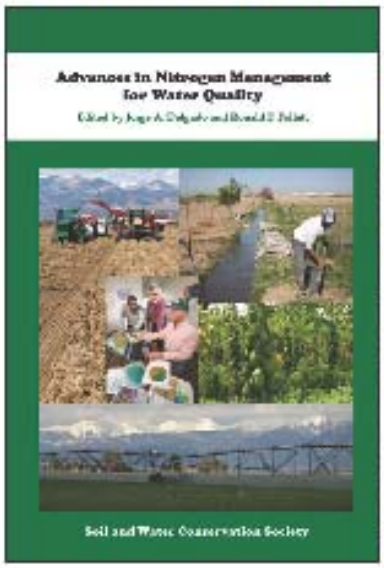
Advances in Nitrogen Management for Water Quality



Edited by Jorge A. Delgado and Ronald F. Follett
2010, 424 pages, hardcover
$62/copy
ISBN 978-0-9769432-7-3

This book is the newest addition to the SWCS publications. The book is the result of a collaborative effort between SWCS and the Soil Science Society of America. The authors of the 15 chapters review some of the newest advances in nitrogen management and explain how these advances can potentially reduce nitrogen losses to the environment.

Several management practices and principles presented in this book can be applied across continents and/or regions and show that nitrogen use efficiencies can be increased while maintaining agricultural production levels. This book covers a few of the new tools and concepts that can be used to evaluate nitrogen management practices and ultimately to increase nitrogen use efficiencies. It also covers practical applications of new concepts that can be used to improve conservation practices, such as precision conservation (also known as target conservation) in nitrogen management. Finally, this book covers recent advances that will contribute to improvements in nitrogen management for the conservation of water quality and our biosphere.

The Sciences and Art of Adaptive Management

Edited by Keith M. Moore
2009, 264 pages
$28/copy
ISBN 978-0-9769432-7-3

This book is the newest addition to the SWCS publications. The 25 authors represent a rich international knowledge base related to sustainable agriculture and natural resource management.

As Moore describes in the preface, "Adaptive management is a structured process of learning by doing." Adaptive management is not just a trendy term of the day; it is an approach that will become even more essential in the future to adequately understand the interlinking systems that affect landscape health and to successfully mitigate negative impacts on the environment. Landscapes are described in the book as "complex adaptive systems." Managing landscape resources requires considering the interplay of many factors, from biophysical to cultural. The book develops an approach that promotes resilient systems over nonresilient systems.

The Sciences and Art of Adaptive Management is an indispensable resource for the conservation community and the basis of much future work—research, policy, and practice.

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