

# Texas A&M University Hydrologic Modeling Inventory Model Description Form

**Name of Model:** Soil and Water Assessment Tool (SWAT)

**Model Type:** Watershed, River Basin Scale Hydrology of Water Quality Model

**Model Objective(s):** Provide a tool for determining impacts of climate and land management on water supply and water quality on Watersheds and river basins

**Agency and Office:**

USDA-ARS

Grassland Soil & Water Research Lab

808 East Blackland Road

Temple, TX 76502

Tel-(254)770-6500

Fax-(254)770-6561

Web site: <http://ars.usda.gov/Research/docs.htm?docid=9793>

Technical Contact, mailing and e-mail address:

Dr. Jeffrey G. Arnold (USDA-ARS)

Tel-(254)770-6502

Fax-(254)770-6561

Nancy Sammons (USDA-ARS)

Tel-(254)770-6512

Fax-(254)770-6561

Georgie Mitchell

Tel-(254)770-6514

Fax-(254)770-6561

**Model Structure or Mathematical Basis:** Soil and Water Assessment Tool  
Theoretical Documentation Version 2005 S. L. Neitsch, J. G. Arnold, J. R. Kiniry, J. R. Williams. <http://www.brc.tamus.edu/swat/doc.html>

**Model Parameters:**

**Spatial Scale Employed in the Model:** Several square kilometers to large river basin  
(ie. Mississippi Basin)

**Temporal Scale Employed in the Model:** Rainfall/Runoff and channel routing at hourly  
(or less) timestep while all other processes (ie. Water balance, plant growth, etc) are all  
daily time step

**Input Data Requirements:** SWAT requires topographic, climate, soil, land use and management input parameters.

**Computer Requirements:** ArcGIS software, code is written in FORTRAN and arrays are dynamically allocated, runs in Windows and UNIX environments. Soil and Water Assessment Input/Output File Documentation Version 2005 S. L. Neitsch, J. G. Arnold, J. R. Kiniry, J. R. Williams. <http://www.brc.tamus.edu/swat/doc.html>

**Model Output:** Each subbasin and land use has daily surface runoff, ET, groundwater, sediment yield, nitrogen, phosphorus, pesticide and pathogen loadings. Soil and Water Assessment Input/Output File Documentation Version 2005 S. L. Neitsch, J. G. Arnold, J. R. Kiniry, J. R. Williams <http://www.brc.tamus.edu/swat/doc.html>

**Parameter Estimation / Model Calibration:** Shuffled complex evolution technique for autocalibration is available in SWAT

**Model Testing and Verification:** Moriasi, D.N., J.G. Arnold, M.W. Van Liew, R.L. Binger, R.D. Harmel, and T. Veith. 2006. Model evaluation guidelines for systematic quantification of accuracy in watershed simulations. Trans. ASABE (submitted). Gassman, P. W., M. R. Reyes, C. H. Green, J. G. Arnold. The Soil and Water Assessment Tool: Historical Development, Applications, and Future Research Directions. Trans. ASABE, 50(4):1-40.

**Model Sensitivity:** An automated sensitivity analysis tool is embedded in SWAT.

**Model Reliability:**

**Model Application / Case Studies:** Used by EPA for TMDL environmental studies and NRCS in National Conservation assessments. All current applications are documented in Gassman, P. W., M. R. Reyes, C. H. Green, J. G. Arnold. The Soil and Water Assessment Tool: Historical Development, Applications, and Future Research Directions. Trans. ASABE, 50(4):1-40.

**Documentation:** Soil and Water Assessment Tool Theoretical Documentation Version 2005 S. L. Neitsch, J. G. Arnold, J. R. Kiniry, J. R. Williams. <http://www.brc.tamus.edu/swat/doc.html> Soil and Water Assessment Input/Output File Documentation Version 2005 S. L. Neitsch, J. G. Arnold, J. R. Kiniry, J. R. Williams <http://www.brc.tamus.edu/swat/doc.html>

**Other Comments:**