

Texas A & M University and U.S. Bureau of Reclamation

Hydrologic Modeling Inventory

Model Description Form

July 18, 2007

Name of model: Areal Nonpoint Source Watershed Environmental Simulation (ANSWERS)

Model Type: Continuous simulation, physically-based, distributed parameter

Model Objective: simulate the impacts of watershed management practices on runoff, sediment, and nutrient losses

Agency and Office: Department of Biological Systems Engineering, Virginia Tech, Blacksburg, Virginia, USA

Technical Contact and Address:

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Model Structure or Mathematical basis:

Distributed model, using an explicit solution to the continuity equation

Model Parameter:

Spatial Scale: less than 100 km², with a maximum cell size of about 1.0 ha.

Temporal Scale: continuous simulation, 30-sec time step during storms, daily time step between storms

Input Requirement: Topography, textural soil map, land use map along with management description, breakpoint rainfall and daily mean air temperature and solar radiation

User Interface: Questions is a user-friendly interface to ANSWERS-2000. Questions runs on the Windows platform using Visual Basic 6.0, ArcView GIS 3.2, and Map Objects 2.0.

Computer Requirement: Desktop

Model Output: time series of runoff rates and sediment and nutrient concentrations; cumulative runoff, sediment load and nutrient yields; dissolved and sediment-bound nitrogen and phosphorus losses; considers particle size distribution of eroded sediment.

Parameter estimation / Model Calibration :

No routine available for auto-calibration. The model is interfaced with Arc-View decision support system, which assists the user in selecting input parameters.

Model Testing and Verification: Yes

Model sensitivity: Numerous studies - Dillaha (1983); Bouraoui (1994); Byne, 2000)

Model Reliability: the model was developed for management purposes. The quality of the information produced depends heavily of the input data availability and quality

Model Application / Case studies: Successful applications for evaluation of BMPs in construction sites in Indiana, nutrient loads estimation in agricultural watersheds in Virginia, rainfall-runoff modeling in the Andes mountains

Documentation: Limited.

Distribution: Model and documentation available at:
<http://www.bse.vt.edu/ANSWERS/>

Other Comments: Model is not supported.