AGWA – Automated Geospatial Watershed Assessment: A GIS-Based Hydrologic Modeling Tool

WHAT IS AGWA?

AGWA provides an interface that is designed to run two watershed runoff and erosion models: the Kinematic Runoff and Erosion Model (KINEROS), and the Soil & Water Assessment Tool (SWAT). The interface was developed in a geographic information system (GIS) to facilitate the preparation of model inputs, and the visualization of model outputs.

AGWA is an extension for ArcView versions 3.X. It is available as a stand-alone tool, or as an integrated part of BASINS - Better Assessment Science Integrating point and Nonpoint Sources, version 3.1. AGWA and BASINS are in the process of being migrated to ArcGIS.

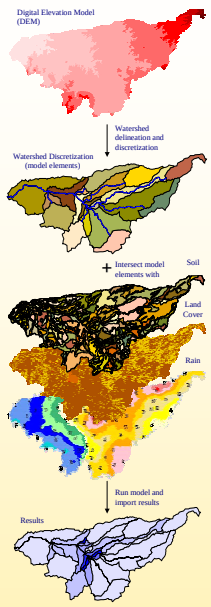
HOW WILL IT HELP ME?

- **Locating potential impairment**
  - ✓ AGWA can be used to quickly and inexpensively identify and prioritize problem areas at the basin and watershed scales
- **Evaluate the impacts of land cover/use change**
  - ✓ Past landscape change - AGWA can be used to evaluate the impacts of landscape change, and where they have been most significant
  - ✓ Future change - AGWA can be used to evaluate where the impacts of forecasted or planned land-use change are likely to be most significant. Future land-cover scenarios can be generated in AGWA using a land-cover modification tool
- **Mapping results**
  - ✓ All model outputs can be mapped for both the streams and upland areas to facilitate comparisons with other data layers and the presentation of results.

BASINS-AGWA

AGWA adds to the collection of integrated analytical tools and modeling programs in BASINS that support the development of TMDLs. With its modular design, BASINS users can easily transfer input data between tools, and compare results from multiple types of analyses.

Data layers used and tasks performed in a watershed assessment.



Output results that can be displayed in AGWA

KINEROS Outputs	SWAT Outputs
Channel Infiltration (m^3/km)	Precipitation (mm)
Plane Infiltration (mm)	ET (mm)
Runoff (mm or m^3)	Percolation (mm)
Sediment yield (kg)	Surface runoff (mm)
Peak flow (m^3/s or mm/hr)	Transmission loss (mm)
Channel Scour (mm)	Water yield (mm)
Sediment discharge (kg/s)	Sediment yield (t/ha)

USING AGWA

A schematic of the procedure for utilizing AGWA is presented to the left. AGWA is a modular program that is designed to be run in a step-wise manner. Five steps are necessary to conduct a watershed assessment:

Step 1: Watershed delineation and discretization (subdivision of the watershed into model elements).

Step 2: Land cover and soils parameterization.

Step 3: Generating rainfall input files.

Step 4: Writing input files, running the model, and importing model output.

Step 5: Viewing and comparing results.

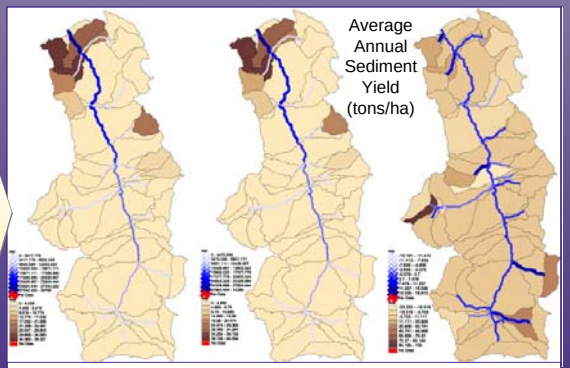
COMPONENT MODELS

- ***KINEROS***
  - ✓ Small-watershed model (≤ ~100 km^2)
  - ✓ Event based, short time step (minutes)
  - ✓ Simulates surface runoff and sediment transport
  - ✓ **http://www.tucson.ars.ag.gov/kineros**
- ***SWAT***
  - ✓ Basin-scale model (> ~100 km^2)
  - ✓ Continuous-simulation model, daily time step
  - ✓ Simulates water, sediment, and agricultural chemical yields.
  - ✓ **http://www.brc.tamus.edu/swat**

EXAMPLE OUTPUT

Average annual sediment yield (tons/ha) for subwatersheds and (tons) stream reaches

- Simulation results for different points in time (1973 and 1997)
- Difference between simulation results highlights where impacts of land-use change are greatest



DATA REQUIREMENTS

AGWA uses readily available GIS data that can be downloaded from the Internet free of charge:

- ***Topography*** – USGS DEMs (30m resolution or finer is optimal)
- ***Soils*** - NRCS STATSGO or SSURGO soil maps
- ***Land cover*** - US-EPA MRLC or NALC land-cover grids (easily customized for use with State maps)
- ***Precipitation*** – NWS, NOAA, NRCS, and any local data

SYSTEM REQUIREMENTS

To use AGWA, you will need version 3.1 or later of ArcView and version 1.1 of the Spatial Analyst extension. AGWA works with Windows 95, 98, 2000, NT, ME, and XP operating systems.

WHERE CAN I GET AGWA?

AGWA, example datasets, training exercises, and documentation can be downloaded via the Internet free of charge from:

http://www.tucson.ars.ag.gov/agwa
or
http://www.epa.gov/nerlesd1/land-sci/agwa

BASINS-AGWA can be downloaded with BASINS version 3.1 from:
http://www.epa.gov/docs/ostwater/BASINS

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