Automated Geospatial Watershed Assessment (AGWA) Tool

What is AGWA?

More than 80 percent of our freshwater comes from watersheds. Watersheds collect water from various sources, like rain, snow and runoff that drains into nearby waterways, such as lakes, streams and rivers. Land use in our nation's watersheds is complex and varied, ranging from crop production areas to rangelands, pastures, forests, meadows and urban areas. How we manage the activities that take place on watersheds influences the quantity and quality of water available for domestic, industrial, agricultural and ecological uses.

EPA, U.S. Department of Agriculture – Agricultural Research Services (USDA-ARS), and the University of Arizona co-developed the Automated Geospatial Watershed Assessment (AGWA) tool to help manage and analyze water quantity and quality. AGWA utilizes two watershed models, the Kinematic Runoff and Erosion (KINEROS2) hydrologic model and the Soil and Water Assessment Tool (SWAT), to evaluate small to large, complex watersheds with varying soils, land uses and management conditions, and their related environmental and economic impact.

Using basic, easily attainable geographic information systems (GIS) data, AGWA provides a

AGWA The Automated Geospatial Watershed Assessment Tool

simple, direct, and repeatable methodology for hydrologic model setup, execution, and visualization.

KINEROS2:

The KINEROS2 model is an event-oriented, physically-based model used to describe the processes of interception, infiltration, surface runoff and erosion from small watersheds dominated by overland flow. KINEROS2 can be used to determine effects of various artificial features, including urban development, small detention reservoirs, various low-impact development methods, and lined channels on flood hydrographs and sediment yield.

SWAT:

SWAT is used to predict the impact of land management practices on water, sediment and agricultural chemical yields in large, complex watersheds with varying soils, land use and management conditions over long periods of time (> 1 year).

How AGWA works:

AGWA conducts hydrologic modeling and runoff assessments at multiple temporal and spatial scales. The tool provides a visual display of results, and information that can help decision-makers identify potential problem areas that may need additional monitoring or mitigation actions. AGWA can generate alternative future land-use/cover scenarios and display differences between simulation outputs (potential change) designed to provide decision support when combined with planning efforts.

AGWA Tool Applications:

In 2013, a wildfire burned over 130,000 acres east of Boise, Idaho. Nearly 75 percent of the burned area had moderate to high burn severity, threatening the ecosystem and the regions' water. The U.S. Department of Interior (DOI) National Burn Area Emergency Response (BAER) team used

AGWA to help develop emergency stabilization plans that identified potential threats to people, wildlife and land from post-fire flooding and erosion. The BAER team estimated that approximately $7-8 million was saved by using AGWA to target 2,000 acres for treatment instead of the initial 16,000 acres identified through more traditional methods. Since 2011, AGWA has been used by BAER teams on over 20 wildfires.

AGWA has also been used in a variety of other projects:

- Analyzing land impacts of coal bed methane extraction;
- Supporting management of impacts from military training activities;
- Evaluating flow in intermittent and ephemeral streams on military bases in the southwestern U.S.;
- Assessing connectivity of ephemeral streams for Clean Water Act applications;
- Aiding in development of watershed protection plans (e.g. Best Management Practices); and
- Evaluating relative non-point source pollution (Clean Water Act, Sec. 319).

AGWA versions:
Three versions of AGWA are available:
- AGWA 1.5 for Environmental Systems Research Institute (ESRI) ArcView 3.x
- AGWA 2.x for ESRI ArcGIS 9.x
- AGWA 3.X for ESRI ArcGIS 10.x

System Requirements:
AGWA requires Microsoft Windows, an internet connection and the following downloads:

- Environmental Systems Research Institute (ESRI)* ArcGIS 10.x, ArcGIS 9.x or ArcView 3.x

- AGWA add-in/extension, which includes the AGWA user interface and functionality to set up the models

- AGWA Directory, which includes the KINEROS2 and SWAT models

- GIS data
  - Digital Elevation Model
  - Raster land cover/land use map
  - Soil data
  - Optional precipitation data

Download AGWA
AGWA example datasets, training exercises and documentation can be downloaded free of charge: www.tucson.ars.ag.gov/agwa

EPA's AGWA resource page:
www.epa.gov/water-research/automated-geospatial-watershed-assessment-tool

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