

## BASINS

<b>Model Uses</b>	BASINS is a physical model used for the evaluation of point and non-point source watershed pollution and TMDL modeling.	
<b>Major Categories</b>	Hydrology and Water Use; Water Quality	<u>Subject Knowledge Level</u> Advanced
<b>Minor Categories</b>	Point Source; Non-Point Source; TMDL; Watershed Conditions	<u>Technical Difficulty Level</u> Advanced
<b>Model Type</b>	Physical Model	<u>Geographic in Nature?</u> Yes

### **Abstract**

Better Assessment Science Integrating point and Nonpoint Sources (BASINS) is a system developed to meet the needs of local, state, and federal agencies. It integrates a geographic information system (GIS), national watershed and meteorologic data, and state-of-the-art environmental assessment and modeling tools into one convenient package.

Originally released in September 1996, BASINS addresses three objectives: (1) to facilitate examination of environmental information, (2) to provide an integrated watershed and modeling framework, and (3) to support analysis of point and nonpoint source management alternatives.

BASINS supports the development of total maximum daily loads (TMDLs), which require a watershed-based approach that integrates both point and nonpoint sources. It can support the analysis of a variety of pollutants at multiple scales, using tools that range from simple to sophisticated.

Overcoming the lack of integration, limited coordination, and time-intensive execution typical of more traditional assessment tools, BASINS makes watershed and water quality studies easier by bringing key data and analytical components together "under one roof."

Beside BASINS' primary role in creating TMDL analysis, it has been useful in identifying impaired surface waters from point and nonpoint pollution, wet weather combined sewer overflows (CSO), storm water management issues, and drinking water source protection. BASINS also has been used in urban/rural landuse evaluations, animal feeding operations, and habitat management practices. Another unexpected use of BASINS is providing schools and educational institutions with a quick, free resource of GIS and surface water data for the United States.

The heart of BASINS is its suite of interrelated components essential for performing watershed and water quality analysis. These components are grouped into several categories:

1. nationally derived environmental and GIS databases (the 48 continuous states and the District of Columbia);
2. assessment tools (TARGET, ASSESS, and DATA MINING) for evaluating water quality and point source loadings at a large or small scales;
3. utilities including local data import and management of local water quality observation data;
4. two watershed delineation tools;
5. utilities for classifying elevation (DEM), landuse, soils, and water quality data;
6. an in-stream water quality model (QUAL2E);
7. a simplified GIS based nonpoint source annual loading model (PLOAD);
8. two watershed loading and transport models (HSPF and SWAT);
9. a postprocessor (GenScn) of model data and scenario generator to visualize, analyze, and compare results from HSPF and SWAT; and
10. many mapping, graphing, and reporting formats for documentation.

BASINS' databases and assessment tools are directly integrated within an ArcView GIS environment. By using GIS, a user can fully visualize, explore, and query to bring a watershed to life. The simulation models run in a Windows environment, using data input files generated in ArcView.

**Future Developments**  
None currently planned

**Model Limitations**  
Steep learning curve; see website for training seminars.

**Model Features**  
• None listed

**Required Data Types**  
The new and updated datasets in BASINS (see metadata) have been added to the data download directory for each 8-digit watershed or HUC in the lower 48 states. The data by HUCs can be found on the web at [http://www.epa.gov/waterscience/ftp/basins/gis\\_data/huc](http://www.epa.gov/waterscience/ftp/basins/gis_data/huc). BASINS 3 will require at least the core and the new PCS3 data to run properly. There are some HUCs that do not have PCS3 data but BASINS will prompt you for the PCS3 data. To solve that problem download PCS3 data from the tutorial or a neighboring HUC with the data.

**Model Outputs**  
Maps, graphs, and tables summarizing point and non-point pollution in watersheds.

The DEM (Digital Elevation Model) shapefile and grid datasets can be added to BASINS before or after the BASINS project has been created.

Weather data by states for the models can be found at [http://www.epa.gov/waterscience/ftp/basins/wdm\\_data/](http://www.epa.gov/waterscience/ftp/basins/wdm_data/). Uncompress the self-extracting file to the "\basins\data\met\_data" folder or directory.

The SWAT model in BASINS requires STATSGO data . A self-extracting file of STATSGO by states can be found at <http://www.epa.gov/waterscience/ftp/basins/statsgo>. After downloading the file to your PC, execute (double-click) the file and type the drive letter of your "\basins\" directory after the prompt. It then loads the states's data in the proper folder or directory under "\basins\models\swat\database\AllUS\statsgo'.

**Source**  
Standards and Health Protection Division (4305T)  
Office of Science and Technology  
Office of Water  
U.S. Environmental Protection Agency  
1200 Pennsylvania Avenue, NW, Washington, DC 20460

**Source (URL)**  
<http://www.epa.gov/OST/BASINS/>

**Hardware Requirements**  
Processor 166-MHz Pentium (min.); 400-MHz or higher Pentium (preferred)  
Available hard disk space: For a single 8-digit watershed (cataloging unit), allow for 300mb (50mb for BASINS system, 100mb for temporary file processing space, and 150mb for BASINS Environmental Data) For 1 State allow for approx. 2GB (50mb for BASINS system, 1.2GB for temporary file processing space, and 750mb for BASINS environmental data for approximately 1 state)  
Random access memory (RAM) 64MB of RAM + 128MB of permanent virtual memory swap space (required); 128MB or more of RAM + 256MB of permanent virtual memory

Supported Platforms			
DOS	<input type="checkbox"/>	UNIX	<input type="checkbox"/>
Windows	<input checked="" type="checkbox"/>	Macintosh	<input type="checkbox"/>

swap space (preferred)  
Compact disc reader Quad speed reader (one-time use)  
24X or higher reader (one-time use)  
Color monitor Configured for 16 colors (800x600)  
Configured for 256 colors (1024x768)

**Software Requirements**

ArcView 3.1, 3.2, or 3.3 (required); with the Spatial Analyst extension (preferred)

**Cost, Licensing and Availability**

Free