

Realtime Interactive Watershed Modeling

A web-based, data-enabled, real-time interactive SWAT platform for watershed simulation

The interface consists of several overlapping panels, each representing a step in the modeling process:

- Watershed selection:** Welcome to the SWAT modeling platform at Magnet4Water.
- Watershed Delineation:** Start a new watershed. Options include Draw watershed, Select watershed, and Upload watershed. A 'Load existing' button is also present.
- Weather data definition:** Select monthly weather database. Options include Precipitation, Rainfall time, No. of PCP, Temperature, No. of TMP, Relative humidity, Solar radiation, Number of wind speed, and Number of wind direction.
- Edit SWAT Input:** Edit SWAT database. Options include Land cover, Soil type, and Subbasin.
- Simulation Options:** Simulation period: Year, Month, Day. Options include Watershed, Subbasin, Reach, HRU, and Simulation type (Daily, Monthly, Yearly).
- Calibration Helper:** Observed streamflow data. Options include Choose File, No file chosen, and Calibration.
- Result visualization:** Monthly flow, Daily data, Calibration result. The calibration result graph shows Flow rate (m³/s) vs. Date (6/26/2012 to 3/28/2013) with Observed (blue line) and Simulated (orange line) data.

M4W SwaNET is a web-based data-enabled platform for real-time interactive use of the Soil and Water Assessment Tool (SWAT). SWAT is a small watershed to river basin-scale model used to simulate the quality and quantity of surface and subsurface water and predict the environmental impact of land use, land management practices, and climate change. The unique aspect of M4W SwaNET is that users spend very little time building the model, but can rather spend most of their time focusing on management scenario analysis, stress evaluation, and hypothesis testing. This is because M4W SwaNET is real-time interactive (model parameters, results, and analyses are displayed throughout the simulation process) and data enabled (preprocessed spatial framework data and calibration data are dynamically live-linked to the modeling tools).

There are three ways users can build models with M4W SwaNET:

1. Users can create a new SWAT project and delineate their own watershed, similar to the ArcSWAT or QSWAT.
2. Users can save the model from M4W SwaNET and upload it to the platform.
3. Users can upload their own SWAT models created using ArcSWAT or QSWAT.

Once a watershed model is created/loaded, users can modify input parameters and update the model. Moreover, users can either extract from M4W SwaNET or upload own weather data, observed streamflow or water quality data and perform model calibration through interactive process in real time. Finally, users can visualize the results in 1D, 2D or 3D formats and download the results in publication ready format.

In short, M4W SwaNET allows users to:

- Delineate a new watershed, similar to the desktop version of SWAT
- Upload own swat model for modification, calibration and visualization
- Extract or upload observed data and perform calibration in real-time
- Visualize the SWAT output results in an interactive way
- Create water balance and flood maps
- Use the SWAT model outputs on groundwater modeling
- Download the final result in graphical or tabular format