

SAFE AND SUSTAINABLE WATER RESOURCES RESEARCH PROGRAM



2015 BOSC Review

Examples of Publically Available Models and Tools

The following are examples of models that are currently available and being used by the public. Additional models can be found on EPA's water research website:

<http://www2.epa.gov/water-research/methods-models-tools-and-databases-water-research>

Nutrient Loading

❖ Estuary Data Mapper (EDM)

EDM is a downloadable application which provides utilities for data discovery, visualization and access. Data types include nitrogen sources and loads for coastal watersheds and estuaries, including atmospheric deposition, point source loads, and nonpoint source loads as well as response endpoints such as seagrass and chlorophyll a.

Additional information and download: www.epa.gov/edm

❖ Water Quality Analysis Simulation Program (WASP)

WASP is one of the most widely used water quality models in the United States and throughout the world. Because of the models capabilities of handling multiple pollutant types it has been widely applied in the development of Total Maximum Daily Loads (TMDL). WASP has capabilities of linking with hydrodynamic and watershed models which allows for multi-year analysis under varying meteorological and environmental conditions. WASP has been applied to all of the major estuaries in Florida where it was linked with a hydrodynamic and watershed model simulating 12 continuous years to aid EPA in the development of numeric nutrient criteria. WASP has been widely applied in the development of TMDLs. EPA's Office of Wastewater Management routinely uses this model to address nitrogen (N) and phosphorus (P) loadings.

Additional information and download: <http://epa.gov/athens/wwqts/html/wasp.html>

❖ AQUATOX

AQUATOX is a simulation model for aquatic systems. AQUATOX predicts the fate of various pollutants, such as nutrients and organic chemicals, and their effects on the ecosystem, including fish, invertebrates, and aquatic plants. This model is a valuable tool for ecologists, biologists, water quality modelers, and anyone involved in performing ecological risk assessments for aquatic ecosystems. Although incorporating constructs from classic ecosystem and chemodynamic models, AQUATOX was developed from the beginning as an applied model for use by environmental analysts. It includes an option to model nutrient limitation in plants based on internal rather than external nutrients, which should improve the prediction of the timing and duration of algal blooms.

Additional information and download: <http://www2.epa.gov/exposure-assessment-models/aquatox>

Green Infrastructure and Stormwater Management

❖ National Stormwater Calculator (SWC) with Climate Scenarios

The SWC is a desktop application designed to help support local, state, and national stormwater management objectives using GI practices. The primary focus of the SWC is to inform site developers on how well they can meet a desired stormwater retention target, but it can also be used by landscapers and homeowners. In January 2014, it was updated to include the ability to analyze different future climate change scenarios. Users can apply these different scenarios to determine how well GI increases the resiliency of stormwater management approaches to a changing climate. The SWC was mentioned in President Obama's Climate Action Plan and is now a resource for LEED Project Credit 16 (Rainwater Management) certification by the U.S. Green Building Council for projects that are designed to reduce runoff volume and improve water quality of a site.

Additional information and download:

<http://www2.epa.gov/water-research/national-stormwater-calculator>

❖ Storm Water Management Model with Climate Adjustment Tool (SWMM CAT)

SWMM, first released in 1971, models hydrology and hydraulics to simulate the movement of water through the landscape and into and through sewer systems. It is widely used throughout the world and considered the "gold standard" in the design of urban wet-weather flow pollution abatement approaches. SWMM includes a green infrastructure module to simulate the integration of green infrastructure practices, ranging from green roofs to permeable parking lots, into a community's stormwater management plan. It allows users to include any combination of low impact development/green infrastructure controls to determine their effectiveness in managing stormwater and sewer overflows. The new CAT update is a simple to use utility that applies monthly climate adjustment factors onto historical precipitation and temperature data to consider potential impacts of future climate on stormwater. The climate scenarios are based on statistically downscaled Global Climate Model simulations that were developed for the Intergovernmental Panel on Climate Change Fourth Assessment. As one of EPA's most downloaded models, SWMM averages over 25,000 downloads annually.

Additional information and download:

<http://www2.epa.gov/water-research/storm-water-management-model-swmm>

Drinking Water Systems

❖ EPANET

EPANET is a general tool that allows utilities to better manage the operations of their distribution networks. It allows users to simulate hydraulics and water quality in drinking water distribution networks. EPANET is a Windows program freely distributed in the public domain. EPANET performs extended period simulation of pressures, flows, and disinfectant concentrations within pressurized pipe networks. Using EPANET engineers can plan and design modifications to existing distribution systems. Using the model they can gain insight into the operation of their system and can perform studies to diagnose and fix problems. As one of EPA's most downloaded models, EPANET averages over 50,000 downloads annually.

Additional information and download:

<http://www2.epa.gov/water-research/epanet>

Risk Assessment

❖ **Mercury Geospatial Assessments for the New England Region (MERGANSER)**

MERGANSER was developed by EPA and a team of mercury (Hg) researchers to relate atmospheric Hg deposition and lake and watershed characteristics to Hg concentrations in fish and fish-eating wildlife (common loons). MERGANSER provides predicted mercury levels in fish and loons via a web-based interactive tool for 4,404 lakes in New England. This model can be used by environmental scientists and managers to assess the risk of Hg contamination in fish and loons throughout New England and to help plan Hg-pollution reduction efforts. EPA is also working on validation/evaluation of MERGANSERs model fish Hg predictions compared with measured Hg values for selected species of fish in RI and NH lakes and ponds.

Fact Sheet: http://cfpub.epa.gov/si/si_public_file_download.cfm?p_download_id=501200

Web Tool: <http://gispub4.epa.gov/Merganser/>