Watershed Management Optimization Support Tool (WMOST)

Tool that facilitates integrated water resources management across wet and dry climate regions

What is WMOST?

WMOST is a software application that allows water resources managers and planners to screen a wide range of practices for cost-effectiveness and environmental and economic sustainability. These practices include, meeting projected water demand, maintaining minimum in-stream flow targets, reducing flooding, meeting water quality criteria or loading targets for Total Maximum Daily Loads, and reducing combined sewer overflows across their watershed or jurisdiction.

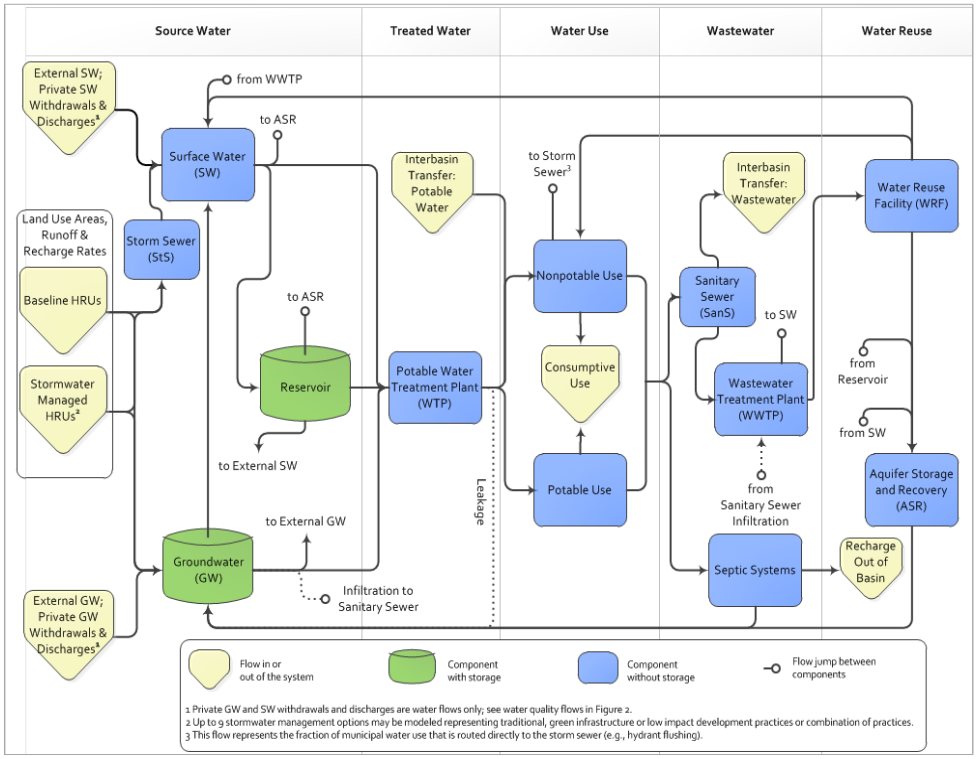

Figure 1. Watershed and human water system components represented in WMOST.

Uses

WMOST screens management practices for water and water-related resources within a watershed content for an optimal mix, while accounting for the direct and indirect cost and performance of each practice (Figure 1). It can be used to (1) identify the most cost-effective mix of management practices to meet projected human demand, in-stream flow standards, water quality standards, and target pollutant loads; (2) understand trade-offs between meeting management goals and total annual costs; and (3) characterize the sensitivity of the solution to input data and parameters, such as the effects of climate variability and resulting changes in runoff and recharge rates on the mix of least-cost practices, and the robustness of the recommended mix of practices to a range of cost assumptions.

Cost savings associated with reducing probability of flooding damage are incorporated using outputs of the Federal Emergency Management Agency's HAZUS tool (methodology that contains models for estimating potential losses from earthquakes, floods and hurricanes), which uses publically available data from flood insurance studies.

Process

WMOST calculates the optimal solution based on user inputs of watershed characteristics, human water system characteristics, management practices, and management goals (Figure 2).

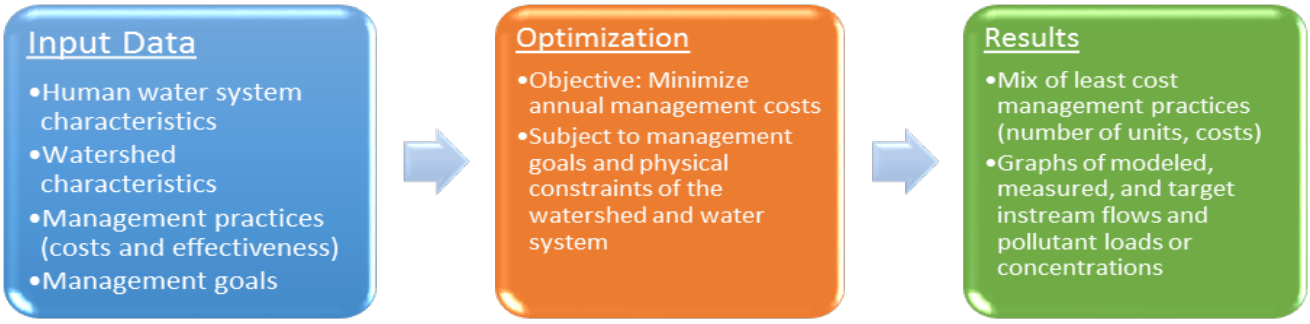

Figure 2. WMOST modeling process from user inputs through to results used to derive optimal solutions.

Features

- Implementation in Microsoft Excel 2016©, allowing development of input files that can be submitted to an online server with optimization programs, eliminating the need for specialized software.
- Availability of over twenty potential management practices and goals related to the following:
  - *Stormwater and agricultural best management practices (BMPs):* Up to fifteen BMPs (structural and nonstructural), including traditional grey infrastructure, riparian buffers, green infrastructure, and other low impact development practices.
  - *Water supply:* Demand management practices, surface and groundwater pumping, surface water storage, water treatment plant, and drinking water distribution system leak repair.
  - *Wastewater:* Septic systems, wastewater treatment plant, and infiltration repair in wastewater collection systems (combined or separate sewers).
  - *Nonpotable water reuse:* Wastewater reuse facility and nonpotable distribution systems.
  - *Others:* Aquifer storage and recharge, transfer of water and wastewater between drainage basins, land conservation, minimum human demand, and minimum and maximum in-stream flow targets, maximum combined sewer overflow events, maximum water quality concentrations or loads.
- Spatially lumped calculations modeling one basin and one reach, but with flexibility in the number of hydrologic response units.
- Modeling time step of a day or month without a limit on the length of the modeling period.
- Consideration of baseflow, peak water flows, water quality (concentration and pollutant loads).
- Automated import of runoff and groundwater recharge rate time series and pollutant loads from existing hydrology/water quality models and estimated performance of proposed BMPs.

Technical Contact

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Model Download

WMOST Versions 2 and 3: epa.gov/exposure-assessment-models/wmost