Taking SPARROW to the Web: A Tool for Water-Quality Research and Resource Management

Nathaniel L Booth, USGS, Middleton, WI
Eric Everman, USGS, Middleton, WI

Abstract

The U.S. Geological Survey (USGS) National Water Quality Assessment Program (NAWQA) is developing water-quality predictive models for six regions covering most of the conterminous United States. These six regional models are being built using the Spatially Referenced Regressions On Watershed Attributes (SPARROW) methodology. A calibrated SPARROW model can be used to both extrapolate measured water-quality conditions to unmonitored areas and produce statistical predictions (with error estimates) of load, concentration or yield of any modeled constituent expected for each stream reach under different land use and management scenarios.

DSS (DSS) offer sophisticated predictive, scenario testing, and regulatory impact assessment capabilities for water-quality research and resource management. The DSS is being developed as a unified application accessible through a standard web-browser interface, allowing the system to be used without client software licenses or significant training.

Four general capabilities are planned. The first will allow the estimation of load or concentration for river reaches of interest under different management scenarios. Users can adjust source terms in upstream basins individually or across entire source categories (i.e. fertilizer usage) and view maps of source distributions, model prediction metrics and changes from the model baseline. The second will allow the user to identify reaches expected to be in "non-attainment" (under USEPA 305b/303d reporting), rank and map those non-attainment reaches, and produce summary reports for river miles impacted (with error estimates). The third will allow the user to rank catchments by the amount that they are expected to contribute load to a targeted downstream water body of interest. And the fourth will perform cost-based optimization for either a targeted load reduction or the maximum water-quality impact for a fixed amount of available mitigation efforts, such as additional water treatment or non-point source reduction. The cost-based optimization will help the user to develop a cost-effective strategy for focusing treatment dollars on those catchments that contribute the greatest loads to downstream receiving waters.

Keywords

SPARROW