

## Abstract for Poster Presentation

### Application of Water Prism, a Decision Support System for Examining Strategies to Address Water, Energy, Food and Ecosystem Security Challenges

**Authors:** Laura Weintraub, LimnoTech, Ann Arbor MI, USA and Robert A. Goldstein, EPRI, Palo Alto, CA, USA.

\*Corresponding author [lweintraub@limno.com](mailto:lweintraub@limno.com)

#### Introduction

Energy and food production, and ecosystem protection depend on freshwater supply. Under future scenarios of population growth and climate variability, many localities and regions throughout the world may find their economic growth and vitality constrained by available freshwater. The implementation of strategies to reduce freshwater use may help accommodate future energy and food demands and ensure ecological requirements are met. Under sponsorship from the Electric Power Research Institute (EPRI), a watershed-scale decision support system, Water Prism, was developed to support the evaluation and design of sustainable water use strategies in watersheds/catchments and basins.

#### Approach

Water Prism is highly visual, yet computationally robust. The tool provides a watershed-scale assessment of water demands (withdrawals and consumption) from various water use sectors in the context of available supply, and includes an evaluation of both surface water and groundwater systems. Water Prism interfaces with an underlying hydrologic model to establish the available water reference conditions (natural streamflow without influence of withdrawals or discharges). Water availability and demands are projected for a 50 year planning horizon for all points within a watershed. Demands are characterized by individual sector (electric power, municipal, industrial, and agricultural).

#### Results

Water balance results are visualized as a 'prism' graphic with each sector's demand as a discrete color band within a spectrum as referenced against 'dry' and 'wet' available water conditions. After assessing the level of risk under "business as usual" (BAU) conditions, a suite of potential water management strategies can be constructed and evaluated within Water Prism. Scenarios can explore the benefits of water saving strategies such as nonpotable or in-plant reuse for industry, alternative cooling of power plants, low water crops and water efficient irrigation for agriculture, and reuse and improved water efficiency for municipal use. The tool also accounts for ecological demands and management objectives for reservoirs. Water Prism computes the aggregated benefits of community water sharing strategies as both reduced demand and net savings. Review of predicted outcomes of these strategies may bring to light surprising observations, confirm a relative range of expected benefits in terms of reduced water shortage risk, or simply provide an opportunity to educate watershed decision makers on the overall water balance of the system and demands from various water use sectors. The design of the tool promotes collaborative scenario development and evaluation of results. Water Prism has been successfully applied to several United States watersheds with differing water supply and demand characteristics: Muskingum River Basin (Ohio), Green River Basin (Kentucky), and Big Cypress/Sulphur Basin (Texas). These Water Prism case studies provide an opportunity to examine regional similarities and differences in terms of water demands, features of the natural system, and options for improved water management. The benefits of collaboration to achieve improved multi-sector water management are also highlighted through case study evaluation.

**Link to Poster (best viewed in FireFox or Google Chrome):**

<http://poster.worldwaterweek.org/Default.aspx?s=1D-8B-21-0D-5E-B8-30-FE-0B-AB-0D-AA-7C-F6-B9-1D>

*Presented at World Water Week, Stockholm, Aug 31- Sep 5, 2014*

<http://www.worldwaterweek.org/>