



EPRI NUTRIENT TRADING PROJECT

Agenda Item 13b



Who is EPRI?

- Non profit, membership based organization
- Conduct research and development relating to the generation, delivery and use of electricity
- Began looking into nutrient trading in 2005



Rational for Water Quality Trading

- N load from power plants will increase in the future
 - Flue Gas Desulfurization (FGD)
 - Selective Catalytic Reduction (SCR)
 - NOx Scrubbing
- New NPDES Permits
- High cost of compliance



Ohio River Basin

- High Nutrient Loads
- Drivers
 - Pending nutrient criteria
 - Gulf of Mexico Hypoxia
- WQT credit demand
- Presence of multiple sources of N & P
 - 116 power plants, 539 industrial facilities, 1911 POTWs

Project Details

■ Funding:

- EPRI \$700K to date
- EPA Targeted Watershed Grant, \$1M
- Seeking \$5M for total project funding
- TWG funding through 2010
- EPRI anticipates handing off program management after 5 year

■ Partners:

- EPRI
- ORSANCO
- Kieser & Associates
- American Farmland Trust
- Miami Conservancy District
- Hunton & Williams
- UC Santa Barbara
- Duke Energy
- American Electric Power

Project Details - Modeling

- Project uses Watershed Analysis Risk Management Framework (WARMF) model
 - <http://www.epa.gov/athens/wwqtsc/html/warmf.html>
 - “GIS based watershed model that calculates daily runoff, shallow groundwater flow, hydrology and water quality of a river basin”
 - Used to evaluate trading ratios, simulate trades prior to occurring
- Scioto, Muskingum, Great Miami already modeled
- Seeking funding to complete entire Ohio River Basin



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Watershed Analysis Risk Management Framework (WARMF)

To facilitate TMDL analysis and watershed planning, WARMF was developed under sponsorship from the Electric Power Research Institute (EPRI) as a decision support system for watershed management. The system provides a road map to calculate TMDLs for most conventional pollutants (coliform, TSS, BOD, nutrients). It also provides a road map to guide stakeholders to reach consensus on an implementation plan. The scientific basis of the model and the consensus process have undergone several peer reviews by independent experts under EPA guidelines. WARMF is now compatible with the data extraction and watershed delineation tools of EPA BASINS. WARMF is organized into five (5) linked modules under one, GIS-based graphical user interface (GUI). It is a very user friendly tool suitable for expert modelers as well as general stakeholders.

WARMF Components

The Engineering Module is a GIS-based watershed model that calculates daily runoff, shallow ground water flow, hydrology and water quality of a river basin. A river basin is divided into a network of land catchments (including canopy and soil layers), stream segments, and lake layers for hydrologic and water quality simulations. Land surface is characterized by land use / land cover and precipitation is deposited on the land catchments to calculate snow and soil hydrology, and resulting surface runoff and groundwater accretion to river segments. Water is then routed from one river segment to the next, from river segments to reservoirs, and then from a reservoirs to river segments, until watershed terminus is reached. Instead of using export coefficients, a complete mass balance is performed starting with atmospheric deposition and land application as boundary conditions. Pollutants are routed with water in throughfall, infiltration, soil adsorption, exfiltration, and overland flow. The sources of point and nonpoint loads are routed through the system with the mass so the source of nonpoint loading can be tracked back to land use and location. WARMF provides several options for modeling reservoirs using 1D or 2D approaches. The algorithms of WARMF were derived from many well established codes such as ILWAS, SWMM, ANSWERS, WASP.

WWQTCS Info

- [WWQTCS Home](#)
- [Technical Support](#)
- [Tools](#)
 - [Watershed Models](#)
 - [Basins](#)
 - [LSPC](#)
 - [WAMView](#)
 - [SWMM](#)
 - [WARMF](#)
 - [Water Quality Models](#)
 - [WASP](#)
 - [QUAL2K](#)
 - [Aquatox](#)
 - [EPD-RIV1](#)
 - [Hydrodynamic Models](#)
 - [EFDC](#)
 - [EPD-RIV1](#)
 - [Database](#)
 - [Training](#)



Project Progress

- Public Webcast in April - about 100 attendees
 - Another planned for end of June
- Meeting in Washington D.C. between project partners and interested parties
- Meeting mid-June with US EPA – discuss funding WARMF model
- Reviewing proposals from credit registry services
- Waiting for TWG funds
- Project Web Site
 - www.epri.com/ohiorivertrading

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Water and Ecosystems Research

[>> Water and Ecosystems](#)

2009 Research Offerings

[>> View the 2009 Water and Ecosystems Research Portfolio](#)

2008 Research Summaries

[>> Water Quality Criteria Development and Assessment - Program 53 \(110KB PDF\)](#)

[>> Fish Protection at Steam Electric Power Plants - Program 54 \(121KB PDF\)](#)

[>> Watershed and Water Resource Management - Program 55 \(128KB PDF\)](#)

Ohio River Basin Trading Pilot Project

Water quality trading is an innovative market-based approach to achieving water quality standards through programs that allow emitters to purchase pollution reductions from another source. Control costs for any one pollutant can differ from one emitter to another, and water quality trading provides an option for meeting pollution permit targets in a cost-effective manner. Properly designed and deployed, the proposed trading program in the Ohio River Basin will produce water quality credits for nitrogen and phosphorus, protecting watersheds at lower overall costs. This will be a first-of-its-kind regional trading project and represents a comprehensive approach to designing and developing markets for nitrogen and phosphorus.

EPRI leads this effort with support from [Kieser & Associates, LLC](#), [American Farmland Trust](#), [Hunton & Williams LLP](#), [University of California at Santa Barbara](#), [The Miami Conservancy District](#), and [Ohio River Valley Water Sanitation Commission \(ORSANCO\)](#). American Electric Power and Duke Energy are also participating in the development of this project.



[Read the Full Supplemental Project Notice\(PDF 169KB\)](#)

[Read the Program Summary \(PDF 367KB\)](#)





Future Actions for ORSANCO

- Program Advisory Committee
 - Mission Statement
 - Operating Guidelines
- Looking to us to consider frameworks that will enable interstate trading
- Continued support in seeking funding