



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

Missouri

Collaborative Efforts at a Watershed Scale Reduce Atrazine in Drinking Water

Waterbody Improved

Intensive corn production in the watershed around Missouri's Vandalia Lake contributed high levels of the herbicide atrazine to the lake water.

In the late 1990s, water quality data showed atrazine levels at approximately 89 parts per billion (ppb), far exceeding the 3 ppb water quality criterion required for finished drinking water. As a result, Missouri added Vandalia Lake to the state's 1998 and 2002 Clean Water Act section 303(d) lists of impaired waters. To address the contamination, federal, state and local watershed stakeholders worked with farmers to implement best management practices (BMPs) to improve the quality of their drinking water source. Atrazine levels dropped, and the Missouri Department of Natural Resources (MDNR) removed Vandalia Lake from the state's 2006 303(d) list for atrazine.

Problem

Vandalia Lake is in portions of Pike, Audrain, and Lincoln counties and drains a 3,660-acre subwatershed. The 38-acre impoundment is a public drinking water source serving more than 2,500 people in northeast Missouri (Figure 1). In 1997 Vandalia's city water treatment plant operator became concerned about the amount of atrazine flowing into the city's raw water supply. The city was spending a significant portion of its available funding to remove the herbicide from the drinking water. Atrazine is typically applied to crops such as corn and sorghum—both of which are grown in the watershed and serve as a vital component of the area's economy.

Atrazine levels in Vandalia Lake were as high as 89 ppb in 1998 and 2000. Missouri's water quality standard for atrazine is 3 ppb in finished water. As a result, Missouri added Vandalia Lake to the state's 1998 and 2002 section 303(d) lists of impaired waters for atrazine.

Project Highlights

To address the contamination problem, a group of stakeholders quickly came together in 1997 to form a Watershed Management Committee. Members included grain producers, city officials, local residents, members of the Soil and Water Conservation District and representatives from the University of Missouri Outreach and Extension and state and federal agencies. MDNR helped the committee formulate plans and find solutions for reducing pesticide and nutrient loadings in the lake. The committee developed an atrazine reduction plan, which was published in 1999 as the *Vandalia City Reservoir Water Resources Plan*.

The committee launched significant education and outreach efforts to increase farmers' knowledge



Figure 1. Northeast Missouri's Vandalia Lake

about the water quality contamination problems and how they could implement new management practices to help. The committee held several meetings with rural landowners, city residents, and business leaders to look at the concerns, costs and outcomes of various options for atrazine reduction.

Initially, local farmers were asked to pay for and implement practices that would reduce atrazine levels in the reservoir. However, in 1999 federal and state programs began providing more assistance in the watershed and began providing compensation to the farmers for the additional financial and managerial burden of implementing some practices. Farmers implemented several types of management BMPs, including reducing atrazine application rates, using alternative herbicides, incorporating herbicide into the soil rather than applying it on the surface, splitting application of atrazine (applying some before and some after the crop begins growing), installing or expanding buffer strips, staggering crop rotation with neighbors and enrolling property in the Conservation Reserve Program.

Additionally, between 2002 and 2007 the MDNR Soil and Water Conservation Program worked with landowners to implement additional BMPs, including terraces, waterways, retention structures and diversions (Table 1).

Table 1. Additional BMPs implemented and the acreage treated

NRCS land treatments	Acres treated
Riparian forest buffer	6
Forestland reestablished/improved	236
Field border	29,078
Filter strip	54
Grassed waterway	62
Terraces	100,867
Conservation crop rotation	21,003
Wetlands restored	1

Results

Atrazine levels have dropped, thanks to the effective outreach, a receptive audience and adoption of BMPs. Data show that atrazine concentrations in the raw water have fallen from a high of 85 ppb in 1997 to only 1.01 ppb in 2005. These data indicate that Vandalia Lake meets the water quality criterion for atrazine to support its designated use as a public drinking water source. Therefore, MDNR removed Vandalia Lake from Missouri's 2006 303(d) list for atrazine.

Area farmers played a key role in the project's success. They were willing to absorb slight increases in production costs to show how committed they were to reducing pesticide levels in the reservoir and supporting the community. No single practice works for every farmer, but by combining several low-cost practices, the farmers have significantly improved water quality.

Partners and Funding

This project brought together new partnerships and a greater awareness of how to jointly resolve water quality problems. Many groups collaborated to organize the Vandalia Watershed Management Committee, including University of Missouri

Outreach and Extension, the Natural Resources Conservation Service (NRCS) and the city of Vandalia. Committee members included municipal employees, elected officials, residents, landowners, operators and Soil and Water Conservation Districts. Other collaborators joined including MDNR, the Missouri Department of Conservation, the Mark Twain Water Quality Initiative, the Missouri Department of Health and other agencies. State and federal incentive programs provided funds through local organizations to support organizing, planning and implementing the project.

Clean Water Act section 319 funds supported two projects that helped reduce atrazine levels in the lake. The North Fork project ran from September 2002 through August 2005. The total amount for the three-year project included federal contributions of \$187,720, plus a \$123,252 match by the project sponsor, the Clarence Cannon Wholesale Water Commission, for a total of \$310,972. Funding supported efforts to disseminate information to community leaders about water quality issues and to help build partnerships. The project team provided resources and training to help communities to prepare to address water quality issues and regulatory requirements such as total maximum daily loads (TMDLs).

The Grassroots project (also section 319-funded) provided \$383,853 in federal funds and \$257,181 in match funds to help the University of Missouri Outreach and Extension conduct watershed outreach and provide assistance in this and other watersheds from April 2000 to April 2005. Program staff helped to educate and inform watershed communities about TMDLs, assisted with watershed planning, and helped organize and facilitate watershed groups. The project benefited the University of Missouri Outreach and Extension by building new alliances, providing new avenues to train watershed stakeholders and opening up new lines of communication with watershed landowners.

Additional funding sources supported implementing BMPs. Between 2002 and 2007, MDNR Soil and Water Conservation Program provided about \$70,000 in cost share for various BMPs including terraces, waterways, retention structures, and diversions. Missouri Conservation Reserve Enhancement Program (NRCS and MDNR drinking water protection partnership) provided \$8,038 in August 2001 to support enrolling 1,678 acres in the program.



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