



Fact Sheet

Addressing Water Quality through Nutrient Management

November 2016

Agricultural pollution poses a significant threat to maintaining acceptable water quality, which is important for drinking water supplies, recreation, fisheries and wildlife habitat. The 2000 National Water Quality Inventory found agriculture to be the leading source of water contamination in surveyed rivers and lakes.¹ It has become increasingly clear that nonpoint source pollution (pollution that comes from many diffuse sources) plays a critical role in water quality. Much of the agricultural pollution in water bodies is the result of nutrient runoff. Nutrients like nitrogen and phosphorus are commonly used in fertilizer and can cause serious water quality problems when they run off farm soils and into water bodies. Further climate change is expected to exacerbate the problem. Many farmers in areas of concern, like the Mississippi River Watershed, are adopting voluntary conservation measures to improve their nutrient management and downstream water quality.

Case Study: Nutrient Management in the Upper Midwest

With about 40 percent of its land used for agriculture or livestock, the Upper Midwest faces unique challenges as it balances growing food, fuel, feed, fiber and preserving healthy ecosystems.² Recent events in the region have highlighted the ongoing efforts of farmers as they adopt new techniques to manage nutrients and protect water quality downstream.

In 2015, Des Moines Water Works, Iowa's largest water utility, filed a lawsuit targeting four rural counties' water flows. The water utility argues that the nitrates released downstream by these rural counties are a violation of the *Safe Drinking Water Act*, as the company has had to run a costly denitrification system in order to provide drinking water.³

Agricultural Nutrient Runoff – Two Examples

Between 1945 and 1980, riverine nitrate increased up to fivefold in the Midwest and coincided with elevated nitrogen inputs from livestock and agriculture fertilizer. Riverine nitrate is a well-known driver of eutrophication, the over-enrichment of water with nutrients. Excess nutrients can drive short-lived algal blooms, which then sink and decompose in bottom waters. The decomposition process consumes dissolved oxygen, which if not replenished, can create a hypoxic zone, or an area with such low oxygen concentrations (generally defined as levels below 2 milligrams per liter) that it cannot sustain most animal life.⁴ This can lead to mass die-offs. Since 1980, changes in nitrates have slowed down but continue to drive eutrophication and harmful algal blooms in the Great Lakes and the Gulf of Mexico.⁵

Great Lakes

Excess nutrient runoff of nitrogen and phosphorous can lead to harmful algal blooms in the Great Lakes, as was the case in August 2014, when a harmful algal bloom event left 400,000 people without safe drinking water for three days in Toledo, Ohio.⁶ Nonpoint nutrient sources from agriculture, the dominant land use on the western side of Lake Erie, were found to account for 71 percent of the lake's nutrient loading.

Gulf of Mexico

A 2013 United States Geological Survey (USGS) report found that agricultural nonpoint source pollution contributes 60 percent of nitrogen loads and 49 percent of phosphorous loads delivered to the Gulf of Mexico.⁷ The hypoxic zone (or "dead zone") in the Gulf of Mexico, which annually encompasses an area approximately the size of Connecticut, has prompted 12 states that fall within the Mississippi River Basin to form a coalition that will research new ways to reduce nitrogen and phosphorous pollution in this watershed.⁸



Climate Change & Water Quality

In 2015, the extent of the hypoxic zone was over 930 square miles larger than the average size for the last five years (5,543 square miles) and three times larger than the Hypoxia Task Force's target of 1,991 square miles. Scientists believe that this increase in size is likely due to heavy rains in June and subsequent high river discharges in July.⁹ Climate change will increase the frequency and intensity of such extreme weather events. More frequent heavy rains will increase nutrient runoff and further impair water quality. Multi-level and cross-sectoral collaboration is needed to ensure healthy waterways in the face of a changing climate.

Conservation programs such as the Regional Conservation Partnership Program (RCPP) are targeting the effects of agricultural nonpoint source pollutants on nearby waterways or further downstream through a range of tools available to farmers. Thanks to conservation practices in the Mississippi River Basin, nitrogen and sediment loading to the Gulf of Mexico have been reduced by 28 and 45 percent, respectively.¹⁰

Fig 1: Designated Critical Conservation Area within the Mississippi River Basin

Addressing Nutrient Runoff through Conservation

Currently, the *Clean Water Act* does not regulate water leaving farmers' fields, which falls into an exempted category reserved for irrigated agriculture.^{11, 12} However, some farmers in the Upper Midwest region are taking voluntary steps to improve water quality and keep nitrates and phosphorous from leaving their fields with support from state agencies, Farm Bill programs, growers groups, and others.

Many states in the Mississippi River Basin have adopted voluntary and/or mandatory conservation practices to address water quality. For example, the State of Iowa and Iowa State University developed the voluntary, science-based Iowa Nutrient Reduction Strategy, which provides a framework to assess and reduce nutrients to Iowa waters and the Gulf of Mexico.¹³ In a recent attempt to minimize nutrient runoff into waterways, Ohio has banned fertilizer application on frozen, snow-covered or saturated soil in 24 counties within the Western Lake Erie Basin.¹⁴ The state also introduced the first law in the nation to require farmers to complete a fertilizer applicator certification program prior to applying nutrients to their fields.¹⁵ In Michigan, a voluntary-led program, the Michigan Agriculture Environmental Assurance Program (MAEAP), is providing farmers with on-farm verification and risk assessment to implement environmentally sound practices that reduce pollution.¹⁶ While many of these programs are voluntary, successful efforts in this region will have lasting effects downstream and in the Gulf of Mexico.

Federal Action: Regional Conservation Partnership Program

Ongoing water quality issues in the United States, such as phosphorus-driven, harmful algal blooms in Lake Erie and high nitrate levels in municipal drinking water in the Midwest, are bringing heightened attention to the nutrient loss challenge for water utilities and farmers. The newest conservation tool of the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) is the Regional Conservation Partnership Program (RCPP). RCPP helps farmers better manage nutrient application of nitrogen and phosphorous and improve soil and water quality.

Authorized by the 2014 Farm Bill, the Regional Conservation Partnership Program pushes for cross-sectoral partnerships, including agricultural producers, municipal water treatment entities, water and irrigation districts, and nongovernmental institutions, to increase the restoration and sustainable use of soil, water, wildlife, and natural resources on regional or watershed scales.¹⁷ RCPP consolidates four pre-existing conservation programs (the Agricultural Water Enhancement Program; Chesapeake Bay Watershed Program; Cooperative Conservation Partnership Initiative; and Great Lakes Basin Program) and serves as a platform to promote coordination between NRCS and its partners as they assist producers and landowners pursuing voluntary conservation efforts.

USDA plans to invest up to \$1.2 billion and expects matching funds from its partners, making for a total of \$2.4 billion for conservation through 2018.¹⁷ In February 2016, Agriculture Secretary Tom Vilsack announced more than \$600 million in funding from USDA for RCPP projects, plus \$900 million more in partner contributions.¹⁸ RCPP funding is divided into three categories: national, state-level, and eight critical conservation areas, receiving 40 percent, 25 percent, and 35 percent of funding respectively. By targeting natural resource concerns through local conservation partnerships, RCPP helps farmers adopt best management practices on farms, such as crop rotations, cover crops, soil quality improvement, and no-till operations. The program places a priority on projects that tackle nutrient management and water quality in areas of greatest conservation need, such as the Great Lakes and the Mississippi River Basin.

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¹ Can Soil Save Us? Making the Case for Cover Crops as Extreme Weather Risk Management. National Wildlife Federation, Jun. 2015.

<http://www.nwf.org/~media/PDFs/Water/2015/Drought-and-Flood-Report-Final.pdf>

² Regional Earth Science Applications Center. NASA, Jun. 2002.

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³ Iowa planting season begins while water lawsuit looms. Iowa Public Radio, Apr. 2015.

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⁴ What is a dead zone? NOAA, Sep. 2014.

<http://oceanservice.noaa.gov/facts/deadzone.html>

⁵ Regional and Temporal Differences in Nitrate Trends Discerned from Long-Term Water Quality Monitoring Data. USGS, Jun. 2015.

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⁶ Agriculture. Upper Midwest Regional Earth Science Applications Center.

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⁷ Mississippi River Gulf of Mexico Watershed Nutrient Task Force. EPA. http://www2.epa.gov/sites/production/files/2015-03/documents/hf_fact_sheet_-_2014.pdf

⁸ Looking Forward: The Strategy of the Federal Members of the Hypoxia Task Force. EPA, Sep. 2013.

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⁹ Press Release. Louisiana Universities Marine Consortium, Aug. 2015.

http://www.gulfhypoxia.net/Research/Shelfwide%20Cruises/2015/PRESS_RELEASE_2015.pdf

¹⁰ Mississippi River Basin. USDA NRCS.

<http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/farmbill/rcpp/?cid=stelprdb1254130>

¹¹ Federal Water Pollution Control Act. U.S. Senate, Nov. 2002.

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¹² Tile Drains: Exploration of Best Management Practices and Remediation Techniques. University of Vermont, 2014.

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¹³ Iowa Nutrient Reduction Strategy. Iowa State University.

<http://www.nutrientstrategy.iastate.edu/>

¹⁴ Senate Bill 1 Passes. Ohio Dairy Producers Association.

<http://www.odpa.org/news-issues/senate-bill-1-passes.aspx>

¹⁵ Senate Bill 150. The Ohio Legislature.

<https://www.legislature.ohio.gov/legislation/legislation-summary?id=GA131-SB-150>

¹⁶ Michigan Agriculture Environmental Assurance Program.

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

¹⁷ Regional Conservation Partnership Program. USDA NRCS.

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/farmbill/rcpp/>

¹⁸ News Release. USDA NRCS, Feb. 2016.

<https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/newsroom/releases/?cid=NRCSEPRD624406>