

From Field to Faucet

How states can protect drinking water in agricultural areas, using the carrot and the stick

Minnesota Environmental Partnership
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Background

With support from the Walton Family Foundation, Minnesota Environmental Partnership (MEP) conducted a pilot project in 2017-2018 to understand wellhead protection issues in agricultural communities and how states can help local governments protect their citizens and their environment. MEP had long-standing interest in how changes to traditional agricultural cropping systems could improve water quality, including transitioning to perennial and winter annual crops.

The purpose of this report is to document the lessons learned in Minnesota for possible reference or to inform actions in other states, especially in the areas of the Mississippi River and Great Lakes basins where summer annual row crops dominate the agricultural landscape.

Rationale

Before farming, this land was covered with native species. Most of Minnesota's prime agricultural land was, before settlement, either tallgrass prairie or Big Woods deciduous forest.

Native species are terrific at providing ecosystem services, but they are not so good at providing human foods.

Today, we've gotten really good at producing vast quantities of grain from this land. But our primary crops are not so good at providing other ecosystem services on which we all depend.

For the long term, we need to have options that can do both well.

Cities and city officials have a great responsibility to their citizens to protect their community drinking water supply. Safeguarding these water supplies has become more challenging as wells across many states have faced rising nitrate levels. Mitigation strategies of drilling deeper wells or building treatment system are costly. But science has taught us a lot in recent years about what strains or sustains the health of our soil and the quality of our water.

The carrot or the stick?

Regulation of land use for municipal water supply quality improvement has been rare in Minnesota. In June 2015, the City of Burnsville, Minn. established a Drinking Water Protection Overlay District ordinance, to help protect the City's drinking water supply in an area in the northern part of the City determined "highly vulnerable" to contamination. This legal precedent could set the stage for similar overlay districts in agricultural areas.

Zoning authority is a powerful “stick” that local governments have, but generally do not think of as a tool when considering how to address agricultural pollution of their drinking water supply. While in some states, local cities may already have, or could be given, authority to create zoning restrictions on what types of agricultural crops could be grown in drinking water recharge areas, the goals of “Conservation Agriculture” of perennial or winter annual crops might be best accomplished through other means.

In fact, in some states advocates may be defending existing statutory authority for protecting groundwater rather than extending it.

With zoning authority in mind, local governments are expected to continue to rely heavily on the traditional approaches of education, incentives, and easements. That makes it ever more important to put efforts into educating municipalities about ways they can effectively safeguard their wellhead protection areas within their boundaries, and providing them with the messaging and tools to make this case with their citizens and landowners.

Common myths about wellhead protection

MEP heard from many voices in the state.

Myth: Wellhead protection areas are outside of city jurisdiction.

Local governments are not always aware of the meaningful authority they already have to regulate those areas.

Myth: Excess nitrogen and other agricultural pollution are inevitable.

This might be a challenge to move communities toward envisioning and seeking a desired solution.

Myth: This is a government land grab.

Controls over land use and fears of annexation raise strong concerns, especially from rural landowners and residents.

Myth: Wellfields don't last forever.

Cities and local governments are hesitant to make permanent easements or land purchases for nonpermanent water supplies.

Project research demonstrated

- Most stakeholders would like to consider Drinking Water Protection Districts as an available tool, rather than a requirement across the state.
- Over 30 communities in Minnesota have elevated levels of nitrate due to excess fertilizers, and thousands of private wells have water that is unsafe to drink.
- There is interest in expanding perennials and winter annuals in wellhead protection areas.
- There is an excellent opportunity to provide municipalities with a useful new tool for source water protection and increase the adoption of perennial and winter annual crops.
- Minnesota's current zoning laws limit municipal power to regulate land use to within a municipality's jurisdiction. Extraterritorial jurisdiction and joint planning present alternative means for municipalities to extend their current authority.

Local governments and wellhead protection

The stick: zoning authority

MEP took the following steps to better understand zoning authority in Minnesota and the interest for potentially using this authority in communities affected by issues with nitrates in groundwater.

1. Engaging decision makers in local government and natural resource agencies

One-on-one or small group meetings with community leaders (for instance city council members, mayors, public works directors and water treatment facility operators) can help get the ball rolling. At these smaller, private sessions, advocates can discuss the city's knowledge of its zoning authority on its wellhead protection areas, any barriers the city has to using that authority, and how the city could use that authority to transition the critical acres of wellhead protection areas to perennials.

Working through statewide associations or other entities that have ongoing relationships with the local governments has been a successful way to engage these local leaders.

Local community leaders were generally not aware of the zoning options they could employ for wellhead areas that fall within their city limits. They might be open to discuss nitrate contamination and potential solutions.

2. Providing locally-relevant or even custom information on water quality issues.

If it's possible to identify specific cities that have heightened nitrate levels compounded by the row crops growing on their wellheads, those cities should be the "low-hanging fruit" for wellhead protection work. Garnering this information may require communicating with multiple agencies, such as agriculture and health.

It's important to frame perennials and winter annuals as an opportunity for farmers and communities to regenerate soil, grow farmer profitability through diverse cropping options, and increase community resiliency. By continuing to build a collection of success stories, these can be used to convince more people that there are workable solutions and the problem of increasing nitrate levels is not intractable.

Particularly useful for informed conversations with municipal officials are:

- Land uses/crops currently grown on the community's wellhead protection area, and what water quality and quantity implications they carry.
- Graphs of local water quality trends over time, especially covering nitrate level in the drinking water supply. What is the trajectory of nitrate levels in their wellhead?
- Up-to-date maps of Drinking Water Supply Area, zoning, land-use, township and city boundaries. Relevant here, among other things, is the percentage of wellhead protection area within the city's zoning authority
- Overview of relevant state regulations and authorities
- Overview of relevant agreements with local townships.

3. Work with cities to make strategic use of existing regulatory tools that protect wellheads and drinking water in their communities.

Cities can consider utilizing the regulatory tool they have available – zoning authority – in order to protect the safety of their community water supply in ways that are affordable to the community and protect their health. Advocates can work with municipalities to help them use their already-existing authorities to increase crops that provide year round living cover on wellhead protection areas.

In Minnesota, state statute (462.357) provides:

“For the purpose of promoting the public health, safety, morals and general welfare, a municipality may by ordinance regulate on the earth’s surface, in the air space above the surface, and in subsurface areas... the uses of land for agriculture, soil conservation, water supply conservation... and may establish standards and procedures regulating such uses...”

Further,

“...A city may by ordinance extend the application of its zoning regulations to unincorporated territory located within two miles of its limits from those in any direction, but not in a county or town which has adopted zoning regulations...”

Zoning Options

Municipalities will wonder how they can impact how land is used when it is not under their jurisdiction.

Actually, in many places, the city already has jurisdiction over land important to its community water supply. And, it most likely has jurisdiction for a 2-mile radius surrounding the city limits as well (depending on agreements with townships and counties).

The carrot: Incentives, easements, and education

States and local governments can offer options for ways to protect water quality in their wellheads while strengthening farmer profits and community resiliency.

Traditional incentive programs go a long way to protecting water supplies. In Minnesota, the Minnesota Agricultural Water Quality Certification Program awards up to \$5000 annually to producers following best management practices. Local Soil and Water Conservation Districts (SWCDs) work with producers to tailor fit protection measures. While these incentives have been developed around run-off issues, they generally are also supportive of ground water protection as well.

For another example, look to Joint Powers boards and state clean water funding. In 2019, the Minnesota Board of Water and Soil Resources (BWSR) recommended \$269,356 in funding to the Southeast Minnesota Water Resources Board for a drinking water protection project. The project will provide cost-share funds to landowners in already-identified vulnerable groundwater areas, for the incorporation of cover crops in their crop rotation. The project also will provide education related to nitrogen BMPs. An anticipated 100 producers, in highly vulnerable areas, will plant 3,000 acres of cover crops resulting in preventing potentially 19,800 pounds of nitrate from leaching into groundwater.

In Minnesota, a project known as Working Lands for Drinking Water Protection is advancing a proposal in partnership with BWSR at the state Legislature to secure funds for SWCDs to contract with producers

for perennial and winter annual crops on the most vulnerable wellhead protection areas. Under the state's innovative Forever Green Initiative, a new crop known as Kernza[®] will soon be available for widespread trials, potentially seeding 300,000 acres in this perennial grain and simultaneously helping to develop the commercial market for this deeply sustainable crop. Producers are expected to enter into long-term growing contracts.

Conservation funding and planning opportunities

State programs

Through existing conservation agencies, state and local governments can promote further government investment in practices that can help farmers:

- 1) mitigate the risk and
- 2) pay for the cost of transitioning to soil and water friendly practices that exist now.

States have many types of conservation agencies. Minnesota has SWCDs, Watershed Management Organizations (WMO) and Watershed Districts. WMOs are primarily in the Minneapolis St. Paul metropolitan area. SWCDs are found across the state. Watershed Districts are found primarily in the western parts of Minnesota. Watershed districts are local units of government that work to solve and prevent water-related problems. The boundaries of the districts follow those of a natural watershed (an area in which all water drains to one point).

Federal programs

The new Farm bill, the Agriculture Improvement Act of 2018, is creating a major paradigm shift for federal funding and protecting of drinking water. The national nonprofit group Environmental Defense Fund went as far as to say the Farm bill "signals the start of a new conservation era."

The new Farm Bill, just passed in December 2018, authorizes increased funding through the Regional Conservation Partnership Program. It also mandates that 10 percent of funds authorized for conservation programs must be used to protect sources of drinking water.

The 2018 Farm Bill increases incentives for agricultural producers to implement practices that benefit source water protection and authorizes community water systems to work with state technical committees for agricultural programs to identify local priorities for source water protection.

The Environmental Defense Fund says the 2018 Farm Bill "recognize(s) the role that America's vast farms and ranches can play in building resilient land and water systems that will allow people and nature to thrive on a changing planet."

The goal: Cropping options that protect water quality

A producer in a wellhead protection area plays a very important role in protecting municipal water supplies and reducing the amount of contaminants like nitrates entering the system. Whether the producer is required by zoning to accomplish these reductions or does so on their own through voluntary measures, the range of water-protecting options is broad.

Farmers in wellhead protection areas have options that can keep the land productive and profitable while protecting public drinking water quality. Through its Forever Green Initiative, Minnesota has taken the lead in developing new crops that are both economically viable and protect water quality.

1) Planting perennials

Perennial plants used to cover the landscape year round. Grasses, shrubs, trees and crops like alfalfa provide us many ecological benefits: habitat and shade, resiliency to drought and storms – and clean water, while sequestering carbon. Existing crops include:

- Alfalfa
- Switchgrass
- Mixed Prairie
- Cool season perennial grasses mixtures

All of these perennials improve the soil while sequestering carbon.

The Forever Green Initiative at the University of Minnesota is developing and refining dozens of new cropping systems for Minnesota's climate that provide profitable products while giving great water quality and soil health benefits.

- Kernza – This intermediate wheatgrass lives for several years before needing to be replanted. Seed is being grown in pilot plantings in Chatfield, Cold Spring, Edgerton, and the Lincoln Pipestone rural water area with the goal of having enough seed to plant 300,000 acres in by the fall of 2020. Kernza needs to be planted by September 1st, so growers need to coordinate with current crops when planning for planting Kernza.
- Perennial Oilseeds (Silphium) – Drought-tolerant, with roots that reach meters deep, this oilseed variety being developed by Forever Green Initiative could replace oilseeds that need planting every year like sunflower, canola and soybean and provide many ecological benefits.
- Dual use Alfalfa—Efforts are underway in the Forever Green Initiative to develop alfalfa as a source of human protein and as high quality forage.
- Hybrid/Native Hazelnuts – A long-term perennial that produces high quality oil and protein products for human consumption.

2) Planting winter annual cover crops

Winter annual crops can provide ground coverage in the fall and most importantly in the early spring, when most runoff occurs. These crops are under development to fit into a production cycle with existing summer annual cropping systems to provide a continuous living cover.

Winter Annuals available today include Winter Rye and Camelina, an oil seed.

The Forever Green Initiative at the University of Minnesota has new Winter Annuals coming in 2020 and beyond:

- Pennycress – A food grade oilseed crop that will be a new source of high oleic oil and protein, currently being domesticated by the Forever Green Initiative. Pennycress matures in early spring,

allowing farmers to use the new crop in double or relay cropping systems with soybean, sweetcorn, sugar beet, and small grains.

- Winter Barley – Increasing in demand as a health food, winter barley is being bred by the Forever Green Initiative to improve its hardiness in Minnesota’s climate. Winter barley is planted in the fall and an early harvest allows farmers to optimize their operations with another crop.

3) Integrating grazing:

Integrating livestock onto the land is one of the best things a landowner can do to improve soil health. Animals can graze on pasture in summer, or leftover residues or cover crops in colder months.

Even if a landowner doesn’t have livestock, someone nearby may. And livestock farmers are often looking for places to graze their animals. The Minnesota Department of Agriculture manages The Cropland Grazing Exchange, which matches livestock farmers with crop farmers who have forage (crop residues, cover crops, etc.) to harvest.

4) Incorporating solar: (agrophotovoltaics)

Land can host solar panels – and that solar can power the surrounding farms and towns. Approximately 100 acres of solar can power more than 3,000 homes – reducing energy costs to homeowners and local governments, cleaning our air, and helping municipalities drive down carbon contributions to zero.

Whether the panels are placed closer to the ground or held aloft by scaffolding to allow animal grazing or farm machinery to operate, the land below can still be productive. Examples of successful land uses associated with solar panels include:

- Perennials and native plants that are good for water quality and great for pollinators
- Forage for dairy and beef cattle and other livestock.
- Even crops like fruits and vegetables.

5) Creating an oasis for pollinators:

Pollinators are perhaps a farmer’s best unpaid helper. But pesticides, habitat loss and disease have caused dramatic losses in pollinator populations over the last decade. Planting for pollinators will help the area’s pollinator population thrive, so they can go about their business while helping area farmers.

Moving forward

With the 2018 Farm Bill, it is clear that state and federal agencies will continue to work together to accomplish important advances in agricultural water quality improvement and protection. In Minnesota, the partnership between multiple state agencies, local governments, research institutes, commercial sector and nonprofits has led to accelerating change and is promising breakthroughs such as new crops and new integration of broader policy objectives like renewable energy and pollinators.

For more information

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