Illinois' Ignored Water Crisis

Preventing Nitrates from Contaminating Illinois Drinking Water

prairierivers network

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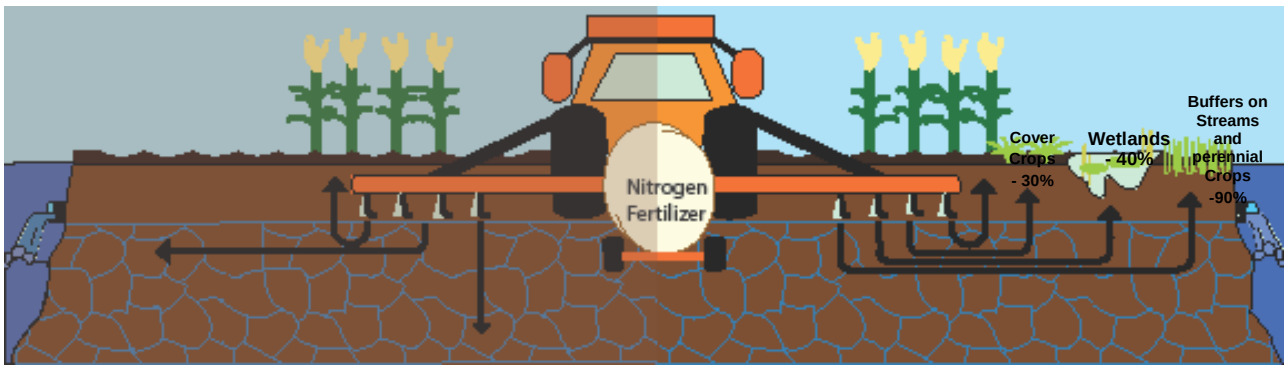
The Crisis and Cause

Nitrates in Illinois waters are on the rise and making their way into our source water. Our local surface and groundwater bodies are important sources of drinking water to communities yet nitrate contamination in them and its impact has been largely in the shadows (Illinois Environmental Protection Agency [IEPA], 2016a). Data from Illinois drinking water systems point to a growing concentration of nitrates in Illinois waters—especially in shallow source waters—used as the source of drinking water by many Illinois communities and rural residents.

In a heavily agricultural state such as Illinois, our farmland is the source of a disproportionate amount of the nitrate entering our water. Before reaching the Mississippi River, these nutrients first flow through our local surface and groundwater bodies. In so doing, these waters become contaminated with increased levels of nitrates which need to be removed at considerable cost.

Luckily, Illinois has a strategy for reducing nitrate contamination in our water—Illinois' Nutrient Loss Reduction Strategy (NLRS). Illinois' Nutrient Loss Reduction Strategy has as its goal an eventual 45% reduction in the loss of nitrogen and phosphorous to Illinois waters and the Mississippi in order to reverse the still growing dead zone in the Gulf of Mexico. Yet, Illinois' Nutrient Loss Reduction Strategy lacks the resources to be an effective solution. More needs to be done now.



80% of the nitrates in our water come from agriculture, and conservation agriculture practices can prevent these nitrates from entering our water in the first place.

Risks to the Community

The Environmental Protection Agency (EPA) has set a Maximum Contaminant Level (MCL) of 10 mg/L of nitrate for safe drinking water (IEPA, 2016b) to protect infants from methemoglobinemia, better known as Blue Baby Syndrome, which decreases their ability to get oxygen (VanDerslice, 2008).

New research suggests that consuming water with chronically elevated nitrate levels yet below the MCL is not safe (Iowa Environmental Council, 2016). Research has found that people who were consuming water with chronically elevated levels of nitrate even below the drinking water standard are at an increased risk for bladder, ovarian, and thyroid cancer (Inoue-Choi et al., 2016; Jones et al., 2016; Ward et al., 2010). Increased birth defects such as spina bifida, limb deficiencies, and cleft palate have also been found to be elevated in populations drinking water high in nitrates (Brender, et al., 2004; Brender et al.,2013). These studies found that chronic exposure to even 5 mg/L—half the federal drinking water standard for nitrate--was sufficient to increase the rate of these cancers and birth defects. More recent research has also found that babies consuming water with even 5 mg/L of nitrate have five times the odds of getting methemiglobinemia (VanDerslice, 2008). It is now evident that nitrate threatens the entire population, not just infants, and that the 10 mg/L standard is not strong enough to protect us from drinking dangerous levels of nitrate.

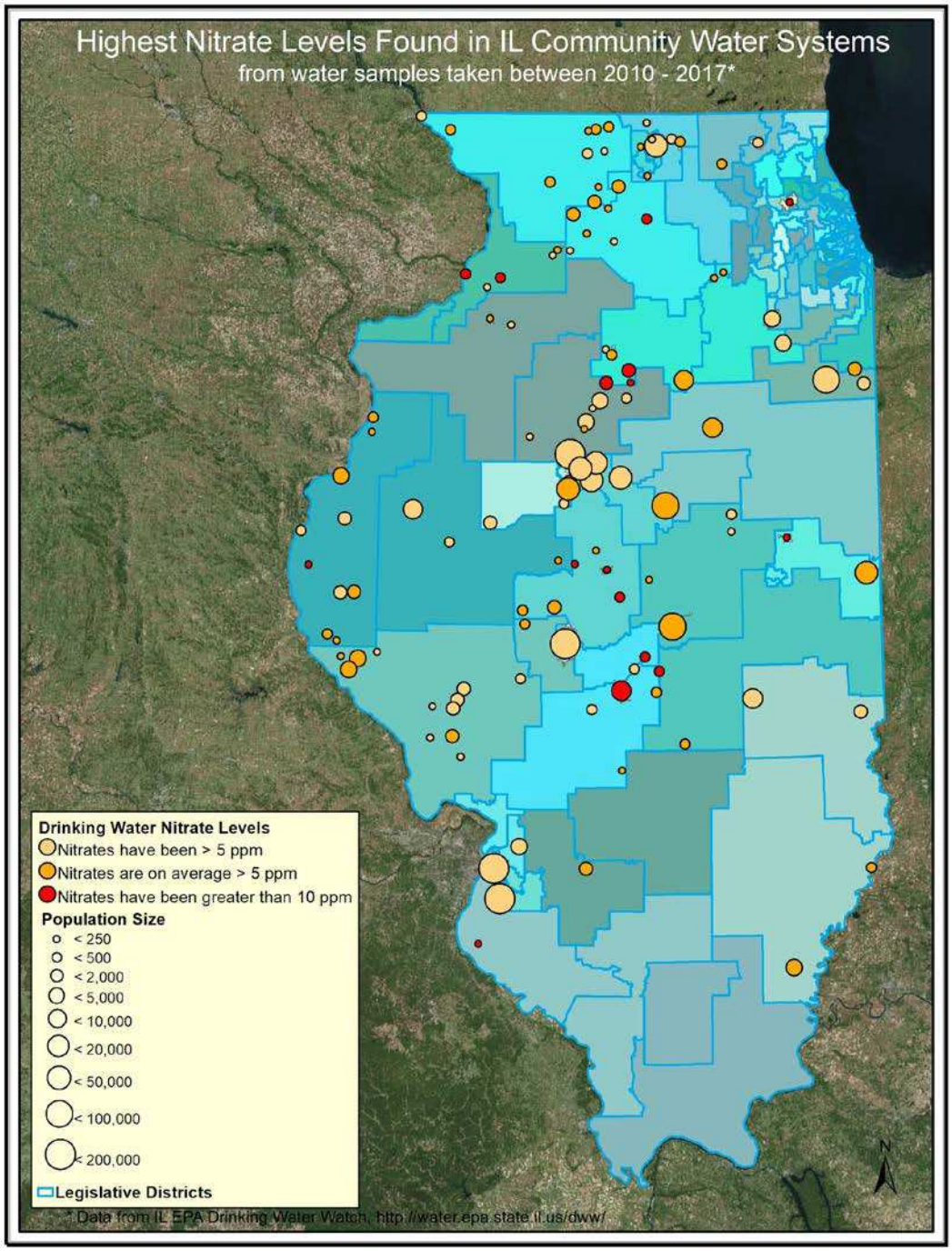
Areas Most Affected

There are a total of 5,438 public water systems in Illinois. Keeping these systems free of nitrates and other pollutants is essential because this is where the majority (97%) of Illinoisans get their drinking water (IEPA, 2016b). Public water systems are only tested for nitrates and other contaminants four times per year and some are only tested once per year (U.S. EPA, 2008). This means that a water source, particularly those depending on surface water, could very well be above the standard at several points throughout the year that are not revealed in periodic testing.

Since 1980, Illinois EPA monitoring has found 172 public water systems to have exceeded the safe drinking standard for nitrate of 10 mg/L at least one time (U.S. EPA 2017b). This is approximately 3% of Illinois' public water systems and currently affects about 322,373 people. The most affected county, Macon County, has had 77.6% of its residents exposed at least once to elevated nitrate levels. Many affected public water systems have had multiple violations because the source of the problem has not been addressed.

Private well owners who may not have access to public water systems are left with the responsibility to educate and protect themselves. Unlike public water systems, private wells are recommended but not required to be tested for nitrate (IEPA, 2015). Limited public awareness about the extent of nitrate contamination of drinking water puts this population at even greater risk.

Communities with deeper wells may think they are at less risk for nitrate contamination. As expected, shallow wells are being affected first. However, while it may take longer for nitrate to reach deep groundwater, once it's there, it also takes longer for the water to become clean again (Dubrovsky et al., 2010). If Illinois waits until our deep groundwater is contaminated before addressing nitrate pollution, many across the state may face decades of undrinkable water.



Economic Impact

The primary strategy currently used for reducing nitrate in drinking water, namely treating water after it reaches a water treatment plant or private well, is neither efficient nor cost effective. For example, it cost the City of Decatur almost $7.6 million to build a nitrate removal facility (City of Decatur, IL, 2002) in addition to an average of $67,000 per year for operation and maintenance costs (City of Decatur, IL, 2002; K. Alexander, personal communication, March, 1, 2018).

On a per capita basis, water treatment is often more expensive for small communities or private well owners. Communities that cannot afford a treatment facility must buy bottled water when nitrate levels are high, and rural families must buy personal filters for their wells. These options are more expensive per person than a nitrate treatment facility (Lewandowski et al., 2008). The greatest cost is the health impact to families who are unaware that they are being exposed to high levels of nitrates.

Treating water after it has been contaminated is an expensive system that only treats a symptom. It does not address the root of the problem. It leads to Illinoisans frequently being exposed to high levels of nitrate and the continued damage to downstream ecosystems. We need a solution that will protect all Illinoisans and treat the problem before it reaches our tap water. As it turns out, we have solutions to this crisis that are far cheaper in the long term if the State of Illinois will take action.

More Cost Effective Solutions

Nitrate in Illinois drinking water is an issue that needs to be addressed now. While in the past the only option has been to build expensive treatment facilities, today we have the Illinois Nutrient Loss Reduction Strategy (NLRS) which outlines how conservation agriculture practices can substantially reduce the amount of nitrates that enter our water from agricultural fields.

Many of the practices in the strategy involve returning perennial plants to the land, or at least keeping the land covered with live plants for most of the year. Prioritizing the application of these practices to tile drained land is a cost effective way of reducing nitrate runoff. Some of these solutions include nitrogen management, cover crops, perennial crops, buffer strips, and wetlands.

- **Nitrogen management** through precision nutrient application ensures that nitrogen is applied to increase nitrogen use efficiency and maximize the return to the crop. Using the 4R's of nutrient stewardship—right source, right rate, right time, right place—nitrogen is applied exactly when and how much the crop needs it given other conditions. This approach and technology to support it, should optimize fertilizer use efficiency to rates as high as 75%. However, this approach is most effective in combination with other practices such as cover crops and buffer strips. Reducing N rate from background to maximum return to nitrogen (MRTN) on 10 percent of acres is estimated to reduce nitrate runoff by 10% per acre (IEPA & IDOA, 2015).
- **Cover Crops** are an in-field management practice that keeps the ground protected when the main crop is not growing. These plants provide a number of benefits to the soil,

notably they decrease soil erosion, increase soil fertility, protect biodiversity, and slow the flow of nutrients off the field. Cover crops are estimated to reduce nitrate runoff by 30% per acre (IEPA & IDOA, 2015).

- **Perennial Crops,** such as Kernza, are another effective land-use change strategy for reducing nitrate runoff. Like cover crops, perennial crops keep the ground covered and a living root in the soil throughout the year. They can reduce nitrate runoff by 90% (IEPA & IDOA, 2015).
- **Buffer Strips** are non-agricultural grasses that are planted within 100 feet of an agricultural ditch or stream. They reduce nitrate loss by taking up nitrogen from water that flows through them. They also can reduce nitrate runoff by 90% (IEPA & IDOA, 2015). The Illinois Nutrient Loss Reduction Strategy (2015) determined that 64% of agricultural stream miles in Illinois do not have a buffer strip (IEPA & IDOA, 2015).
- **Constructed Wetlands** are built at the end of tile drainage lines to treat the water that flows through them. Approximately, 25% of tile-drained land in the state is believed to be suitable for the construction of a wetland (IEPA & IDOA, 2015). A conservative nitrate reduction estimate of 40% of nitrate per acre that drains into the wetland would be removed (IEPA & IDOA, 2015).

These practices provide a number of other ecological benefits beyond improving water quality. They improve soil health, habitat restoration, and increased capacity for carbon sequestration. Perennial plants and cover crops improve soil health by feeding the soil biota that cycle nutrients and improve soil structure for plants. Healthy soils help farmers manage water and nutrients better during both wet and dry times (Kennedy and Papendick, 1996). Perennial plants' extensive root structures also increases the soil's organic matter.

Investing in land use changes costs less and provides more benefits than treating the problem after the fact. Using conservation agriculture practices can prevent nitrate from getting into our water for 1/4 the price of removing it with a nitrate treatment facility (IEPA & IDOA, 2015, The Nature Conservancy, 2012).

Funding Local Infrastructure

Using conservation farming practices to address nutrient pollution will require the participation of farmers across Illinois. Right now only a small percentage of farmers are using conservation practices. Changing agricultural norms takes time and requires a concerted effort across agencies and communities. Illinois' Soil and Water Conservation Districts are already well positioned in farming communities to lead the effort to educate and assist our farmers in making these changes. They have offices in almost every county in Illinois and have developed long standing, trusted relationships with the farming community.

Due to recent funding cuts, however, our Soil and Water Conservation Districts have lost almost half of their staff and much of their program funding. SWCD staffs' knowledge and community relationships are an irreplaceable asset for getting conservation practices on the ground. Decreased project funding has created a backlog of conservation projects ready for

implementation. Fully funding our Soil and Water Conservation Districts is essential if we are going to gain control of our nutrient pollution problem.

Maximizing Federal Funding

In addition to underfunding our state programs, Illinois has also been opting out of hundreds of millions of dollars of federal funding. The Conservation Reserve Enhancement Program (CREP) offers hundreds of millions of dollars of federal funding for retiring sensitive farmland. Illinois is already considered a 'donor state' by paying more in federal taxes then we receive in federal funds. By forgoing these resources, Illinois stands to lose 342,121 acres from the CREP program that will expire between 2018 and 2022—the term of the next Farm Bill (D.Hovorka, personal communication, April 24, 2018). Ensuring Illinois fully participates in the CREP cost share program, which under the 2014 Farm Bill requires Illinois to pay 20% of the cost of the land payment and project installation, is a way to get some of that money back and invest it in something as critical as our drinking water. It is important to note that should the CREP program terms change, requiring a greater contribution from the state, many farmers will simply opt not to move sensitive lands into conservation where they would alleviate further nitrogen losses.

Committing to a Long Term Solution

Conservation agricultural practices provide a long-term solution to our state's nitrate problem. Although these practices will not immediately solve the entire problem, extensive adoption can reduce the number of communities that have to buy nitrate treatment facilities and also decrease how often those who already have a facility have to run them, which can be very expensive in and of itself. This is the path that will provide the greatest protection for Illinoisans at the lowest cost. However, it will not happen without Illinois committing to support its infrastructure and programs. Full funding for our Soil and Water Conservation Districts and the programs they manage including CREP is more cost effective than removing nitrate through treatment, protects people both on public water systems and using private wells, and provides numerous benefits for wildlife, soil health, and carbon sequestration. Investing in Illinois conservation programs is the clear way to protect our drinking water while building a healthy and vibrant future for farming and for communities in Illinois.

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