Farming in America's Breadbasket

A Paradigm SHIFT


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Our Great Lakes, Our Great Providers

Covering more than 94,000 square miles, the Great Lakes are one of the world's most important freshwater resources and the great provider for those living in the region. They supply drinking water to 40 million people, they support the $4 billion dollar fishing industry, and they are directly connected to 1.5 million jobs. They provide essential habitat for native plants, fish and wildlife, and the scenic beauty that draws 60 million tourists to the area every year.

The Great Lakes are also home to one of the country's most productive and diverse agricultural regions. Corn, soybeans and hay are all grown in the area, as well as 15% of the country's dairy products. Between the production of crops and livestock, the region produces $14.5 billion in annual agricultural sales.

But the productive use of the land has taken its toll. Some land has been drained for agricultural use, changing the way water flows and causing sediment to wash into our rivers and lakes. In other areas, nutrients used to fertilize crops drain into tributaries that feed the Great Lakes, causing harmful side effects such as algal blooms. The combination of changes to the landscape, increased sediment runoff, and the drainage of excess nutrients into the Great Lakes threaten not only local plant, fish and wildlife populations, but this precious natural resource that drives many of the region's businesses and industries.

Leading the Charge for Change

The agricultural community has seen first-hand the environmental stressors threatening our Great Lakes and today they are the ones leading the charge for change. Many have already taken the first step to implement conservation practices: they use cover crops to help keep soil on the land during the off-season, buffer strips of native plants along waterways that catch sediment runoff before it reaches the water, and conservation tillage farming, which allows farmers to grow crops without significantly disrupting the soil. All of these methods can reduce agriculture's impact on our streams, rivers and lakes. But to protect the world's largest freshwater system, they recognize that more needs to be done.

To improve water quality across the Great Lakes, the agricultural community is working towards a new paradigm. In the past, conservation practices have not been implemented with specific water quality goals or benchmarks in mind. Farmers and others realize the necessity for concrete environmental outcomes that will unify region-wide conservation practices to make a tangible difference in water quality and the health of wildlife, fish and plant communities. They also know that to achieve these goals, they'll need new tools to measure successes and failures, as well as the most efficient and cost effective ways to reach environmental outcomes. The final piece of this shift is a movement to scale: not only raising the acreage of conservation practices, but increasing the number and breadth of stakeholders involved in the process, so that the entire agricultural supply chain can play a role in setting and reaching these new water quality standards.

When you consider the size of the entire Great Lakes basin, which covers about 174,000 square miles in the U.S. alone, the potential reach of this change is staggering. Approximately 37% of this land is devoted to agriculture. By simultaneously setting environmental outcomes, creating measurement systems, and engaging a new array of stakeholders, there's potential to redefine the performance standards and effect real, system-wide change across not only agricultural lands, but throughout the rest of the watershed.

So how much conservation is enough and how can it be achieved in the most efficient and cost-effective way? To answer these questions, farmers, agricultural suppliers, retailers, crop advisors and other community stakeholders are collaborating with The Nature Conservancy, Michigan State University, and Limnotech to develop much-needed conservation goals and outcomes. Each member of this collaborative brings its unique expertise to create the tools needed to reach those goals, so that the right conservation practices can be implemented at the right place for maximum ecological impact and minimum economic impact on farmers. Strategies are also being explored that bring additional members of the supply chain into the fold and that can provide new financial incentives to amplify the number of stakeholders implementing conservation practices. Together, each piece of this collaborative project adds up to a holistic approach to improving water quality at a system-wide level.


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In each of the three watersheds shown above, the team is testing and developing key conservation strategies that can be implemented across the Great Lakes.

Watershed Sustainability Projects in the Great lakes

The Great Lakes Protection Fund sees the potential for developing a watershed strategy to reach across the basin and generate out-sized returns for the Lakes. The Fund financed a team comprised of agricultural stakeholders and project partners to demonstrate innovative new methods in three Great Lakes watersheds and to define outcome-based goals for conservation that are also compatible with crop production.

Reducing the Effects of Extensive Drainage

Two of the biggest environmental stressors, excess sediment and nutrients, enter the waterways from agricultural lands in the same way: through a vast network of underground tile drainage systems and man-made surface ditches throughout agricultural watersheds. If the agricultural community can find a way to reduce runoff, they can manage the amount of excess sediment and nutrients entering our streams, rivers and our Great Lakes.

There are already a variety of conservation practices designed to keep soil and fertilizer on the field but until recently, there was no way to easily measure the effectiveness of these methods. More importantly: there were no target goals in place for the entire watershed or understanding of how conservation efforts on individual farms became part of a bigger, region-wide picture.

To provide an answer to these unknowns, the project partners are collaborating with the agricultural community and county drain managers in the Paw Paw River watershed located in Van Buren County, Michigan. The team is developing ecologically relevant implementation goals for the entire watershed, along with user-friendly technologies and online resources to manage and account for the amount of nutrients and sediment that are reduced when different conservation practices are implemented and the cumulative benefits of that reduction on ecological endpoints such as algal blooms in the lakes.

One of these tools, for example, is an online calculator that allows users to estimate how much groundwater can be recharged when cover crops are used in a certain kind of soil, or how much sediment erosion is reduced from implementing buffer strips or no till farming systems.

Having the right tools will allow the agricultural community to set conservation goals and model the results from those practices. The more they learn, the more they can reduce the amount of sediment and fertilizer entering the Great Lakes.

Understanding How Much is Enough

While limiting soil and nutrients on the farm and keeping them out of our lakes and rivers is important, it's only one step in this process. An important first step is to understand how much conservation is needed to start making a positive change both for people and for nature.

A comprehensive way to gauge improvements in water quality is by measuring the health of the local fish communities. If fish are thriving, that means that the aquatic food chain is healthy, there's plenty of oxygen in the water, and soils and nutrients are staying where they belong: on the field.

The next question is: When do conservation practices hit critical mass and make a tangible difference to improve water quality?

To understand this dynamic, the project partners are developing scientific computer models to link conservation practices to ecological indicators, such as the health of local fish, in order to set realistic conservation goals. These scientific models allow the agricultural community and project partners to figure out what "dose" of conservation is needed to measurably improve our water quality resources.

To help implement these watershed scale goals, project partners are collaborating with Michigan State University's Institute of Water Research to develop online decision tools that enable land managers to strategically target conservation practices to areas that offer the greatest return on conservation investment. The tools allow stakeholders throughout the region to track progress towards implementation goals over time.

Nutrient Certification Programs

To fully address the threats to water quality in the Great Lakes, the project team needs other sustainability strategies that complement the conservation practices farmers have put into place. That's why collaborating with fertilizer retailers and crop advisors to support more efficient fertilizer application processes can minimize the amount of phosphorus and nitrogen leaving farm fields and entering our watersheds.

This phase of the project is being developed in the Western Lake Erie basin, where algal blooms caused by nutrient runoff are harming water quality. Project partners are working with agricultural fertilizer retailers and crop advisors to implement a nutrient certification program. This voluntary program certifies for the 4Rs of nutrient stewardship, which were developed and defined by the agricultural community as:

- using the **Right Source** of fertilizer
- at the **Right Rate**
- at the **Right Time** and
- in the **Right Place**.

The 4R Nutrient Stewardship Certification Program has already launched, enabling famers and landowners to select 4R Nutrient Certified suppliers and advisors who understand and adhere to 4R principles, thereby ensuring nutrients are staying on the land, and not entering lakes and rivers.

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Scaling Across the Great Lakes

Focusing on these three strategies—reducing the effects of extensive drainage, setting ecologically relevant implementation goals, and promoting precise and conservative nutrient application practices—has allowed the project partners to set goals for these regional watersheds and create new delivery and incentive mechanisms to meet them.

Now the question is: How do we reach and engage with the other sectors in agriculture? How do we move the concepts forward across the entire Great Lakes basin and beyond?

To answer these questions, the project team is testing conservation transactions in other sectors to develop and deliver solutions at scale:

- **Public drains and ditches:** Millions of acres of farmland in the Great Lakes and across the U.S. are drained by a vast network of drainage systems administered to optimize farm production. We are testing ways to use this infrastructure to optimize both agronomic and environmental outcomes while lowering economic costs for farmers and the public.
- **Paying for performance:** Implementing new conservation practices on a farm can require new equipment or new management techniques. By rewarding farmers directly for the outcomes of their conservation practices (sediment and nutrient reduction), we can achieve ecological goals faster and provide economic incentives to encourage farmers to start participating in conservation efforts on their land.
- **Certification programs:** Using existing voluntary programs like the Michigan Agriculture Environmental Assurance Program can be another way to reward the farming community for attaining watershed-scale environmental outcomes.

The Midwest is often referred to as America's breadbasket because of the bountiful agricultural yields produced in the region. The agricultural community has long recognized the relationship between the Great Lakes and crop production; that's why farmers are among the original conservationists and land stewards in the region. With the results and lessons learned from these initiatives, there is the potential for us to not only protect the entire Great Lakes watershed, but to transform farming practices across the entire country. Together, we can conserve and protect the precious waters of the Great Lakes, and ensure the region lives up to its namesake for years to come.

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