



LAND  
STEWARDSHIP  
PROJECT

LSP

Myth

Buster #33

An ongoing Land  
Stewardship Project  
series on ag myths  
and ways of  
deflating them.

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## Myth: Artificial drainage of agricultural land is a boon to the environment.

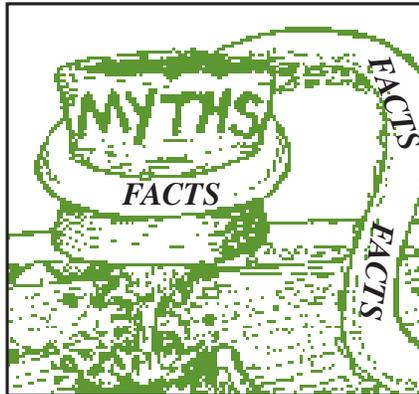
**Fact:** Without artificial, subsurface drainage, millions of acres of farmland would simply be too wet to produce crops. Over the years, farmland drainage has evolved from simply digging open ditches in low spots to a highly sophisticated and effective process for removing water as quickly as possible off the surface of the soil. Today, satellite and laser-guided technology, combined with yield monitors and soil tests, allow farmers to place plastic drainage “tile lines” beneath the soil surface in exactly the spots where they will do the most good.

As a result, yields of row crops such as soybeans and corn have climbed in low-lying areas that previously were considered too soggy to farm. So there’s little dispute that subsurface tile drainage has been a huge benefit to crop farming. But in recent years, some within the agricultural community have tried to justify farmland drainage on environmental grounds as well, arguing that it provides a significant overall benefit to the hydrological health of a watershed. The argument is that drainage actually reduces soil erosion, helps remove chemical contaminants and overall improves water quality.

This claim has become particularly contentious in Minnesota, where the Minnesota River dumps huge amounts of sediment into the Mississippi, which has in turn resulted in Lake Pepin—a wide spot in the Mississippi below the Twin Cities—shrinking by several feet a year. Core samples show that Minnesota River sedimentation has doubled since the 1940s, which dovetails with the period of time when row crop agriculture (and tile drainage) rapidly increased in the basin. It also parallels increased stream flow in

the river—the amount of water flowing past a Minnesota River monitoring station in Jordan, Minn., has doubled during the past several decades.

In 2010, a University of Minnesota study funded by the Minnesota Soybean Research and Promotion Council and the Minnesota Corn Research and Promotion Council concluded that the role of agricultural practices such as tile drainage in sending more sedi-



ment to the Mississippi River was overblown, and much of the sedimentation was caused by “natural” stream bank erosion that humans had little control over.

It is true tile drainage can cut surface erosion on farm fields by preventing them from becoming saturated with moisture. Saturated fields tend to be more prone to overland runoff, which can carry soil away.

But overall, the ability of farmland drainage to shortcut the natural hydrological cycle is considered a major threat to water quality in the Midwest and beyond. This fall, researchers at the University of Minnesota and the Science Museum of Minnesota released 70 years of data on 21 tributaries in the Lake Pepin basin showing how tile drainage has disrupted the water cycle of the region to a major extent.

It turns out that all that water leaving the field produces a fire hose effect when it gets dumped into a creek or river, tearing away vegetation and the sides of stream banks and creating deep gullies. The study found a correlation between increased water flow in the basin and the amount of tile drainage (as well as soybean plantings). The water flow was particularly strong in May and June, when crops are being planted and winter/spring runoff is being rushed off the land.

Research also shows that tile drainage is a major

*Myth Buster #33, see reverse page...*

## LSP Myth Buster #33: Artificial drainage of ag land is a boon to the environment.

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contributor of nitrate-nitrogen pollution to the Mississippi River watershed. Tile drainage can rush water so quickly off the land that soil and vegetation don't have the opportunity to take up pollutants such as nitrate-nitrogen before they reach rivers and streams.

A U.S. Geological Survey study released in August shows nitrogen flowing into the Mississippi from Minnesota and Wisconsin has increased 76 percent since 1980.

In October, the Natural Resources Conservation Service named loss of nitrogen from cultivated cropland through subsurface flow as the single biggest water quality concern in the U.S. portion of the Great Lakes agricultural drainage.

Is the answer to ban farmland drainage? Obviously not—it would mean giving up some of the most productive cropland in the world. But there are options. Farmers have had success experimenting with controlled drainage—a system that slows water runoff enough to return a little of the naturalness to

the hydrological cycle, not only allowing the land to keep more sediment and other contaminants out of waterways, but reducing the fire hose effect at the end of the pipe.

In Iowa, preliminary research shows that using “saturated buffers” to redirect tile lines long enough to allow nitrate-nitrogen to be removed by natural vegetation can be quite effective. In one study, the system removed 100 percent of the nitrate-nitrogen from 60 percent of the field tile flow. “Bioreactors”—buried trenches filled with wood chips that are installed along crop fields—can capture 15 to 60 percent of nitrate in tile-drained water annually.

Finally, as was reported in *Myth Buster #29* ([www.landstewardshipproject.org/pdf/myth\\_buster\\_29.pdf](http://www.landstewardshipproject.org/pdf/myth_buster_29.pdf)), establishing perennial plant systems like prairies and wetlands in key areas on just a small percentage of agricultural watersheds can produce significant water quality benefits without sacrificing large expanses of fertile farmland.

### → More Information

- An abstract of the study examining 70 years of sediment erosion data in the Minnesota River basin is at [http://gsa.confex.com/gsa/2011AM/finalprogram/abstract\\_197265.htm](http://gsa.confex.com/gsa/2011AM/finalprogram/abstract_197265.htm).
- The U.S. Geological Survey study on nitrate-nitrogen pollution in the Mississippi River watershed is at [www.usgs.gov/newsroom/article.asp?ID=2874](http://www.usgs.gov/newsroom/article.asp?ID=2874).
- See [www.landstewardshipproject.org/lsl/lspv29n4.pdf](http://www.landstewardshipproject.org/lsl/lspv29n4.pdf) for more on water quality problems in the Mississippi River basin and how cover crops and perennials can improve soil and water quality.

## Myth Busters on the Internet

You can download pdf versions of Myth Busters at [www.landstewardshipproject.org/resources-myth.htm](http://www.landstewardshipproject.org/resources-myth.htm).



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