

Farmers can use free online system to map fields and reduce soil erosion

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Penn State is one of nearly 50 universities worldwide that have banded together to address the global issue of hunger. Credit: Reidar Jensen

Dean Patches' to-do list has no end.

A dairy farmer in Lebanon, Pennsylvania, Patches sees the sunrise every morning by the time he's milked and fed his more than 90 cows and

checked on the chickens. He spends the rest of the morning and afternoon working alongside his wife and three sons before watching the sun disappear during the day's second milking—a cycle that will start anew the following dawn.

But managing a successful family-farm involves more than manual labor. Like all Pennsylvania farmers, Patches is also responsible for complying with a range of federal and state environmental regulations—from creating digital maps of the fields where he grows food for his dairy cows to formulating detailed manure transportation and soil erosion and sedimentation plans.

But unlike the costly combine he uses for harvesting corn for his dairy cows each season, [PAOneStop](#), the interactive mapping tool he relies on to help meet these requirements, is free.

PAOneStop is an online system created by Penn State Extension with ongoing support from Pennsylvania's Agriculture and Environmental Protection departments and the State Conservation Commission that more than 3,300 farmers and other agriculture community members have used to map nearly 10,300 farms and 71,500 fields across the state.

The interface was created to help Pennsylvania farmers reduce the environmental impact their farms were having on the Chesapeake Bay and other water-based ecosystems, according to Rick Day, creator of PAOneStop and associate professor of [soil science](#) and environmental information systems at Penn State.

Since agriculture is a major source of such pollutants as phosphorous, nitrogen, sediment, fertilizers and pesticides entering waterways, farmers can play a critical role in minimizing [soil loss](#) and protecting water quality.

"The importance of the online system is two-fold," Day says. "One goal is to support the environment through initiatives like the federal Clean Streams Act and Pennsylvania's Clean Streams Law, and the other is to make it easier and less expensive for farmers to meet these complex regulations."

The secure system enables farmers to generate the high-quality farm and field maps they are required to submit to state regulators as components of nutrient balance sheets, nutrient management plans, and soil erosion and sedimentation plans.

Before the advent of PAOneStop, farmers could hand draw these maps or hire a consultant, which could cost hundreds of dollars per map—adding up to millions of dollars for the state's roughly 56,000 farmers, according to Day.



Farmers can also use the interface to map animal-use areas, water sources, buffer zones and more. Credit: Bob Neiderer

"To do the mapping themselves, they would have to find aerial photographs of their farms, calculate field acreage, and identify water sources and the types of soil in each field, which isn't easy," he says. "It was becoming too time consuming to do manually."

Since PAOneStop accesses and automatically imports aerial photography, topographic images and soil information from state and federal databases into the maps, it makes it easier for farmers to create and update their maps each season. The interface also calculates acreage and enables farmers to outline field boundaries and animal-use areas as well as mark streams, ponds, wells, sinkholes and more.

When Patches first started to use PAOneStop to create manure transportation plans (for each time he needed to move manure across his own farm or to a neighbor's), he had a lot to learn about digital mapping.

During this time, Patches' daughter was completing a soil science degree in the Penn State College of Agricultural Sciences and was learning about geographic information systems (GIS). Kelly Patches, now a Penn State alumna and Extension educator, helped her dad learn how to use the interface when she was home from school on holiday breaks.

"When I was in school, computers were something that were mentioned—we didn't use them," Patches says. "But my daughter was able to sit with me at the computer and show me all the ways to draw streams and buffers, for example, and now I can pretty much do it all myself or figure it out."

For farmers who aren't tech-savvy or who don't have GIS experts in the family, there's Bob Neiderer. As the technical support specialist for PAOneStop, Neiderer is the guy to call when you need help drawing a field or pond or just to talk through an issue.

Starting this month, Neiderer will begin a series of regional training workshops to teach farmers how to get started mapping their fields and with other PAOneStop features. He's also planning to do group demonstrations at Ag Progress Days this August.

"We're constantly making improvements and changes to PAOneStop based on feedback from the people who actually use the system," Neiderer says. "Farmers have a special set of needs and we want to keep expanding the system so it's truly a 'one stop' resource for them."



PAOneStop enables farmers to identify their farms and outline and label each field. Credit: Bob Neiderer

For Patches, saving any amount of time helps when there never seems to be enough hours in the day.

"We're like any other family dairy farm: the day's as full as you can make it," Patches says. "PAOneStop is nice because it gives me a complete set of maps and saves me the effort of having to use another computer program or flip back and forth among multiple sets of data—it's been a real help."

Beginning last spring, Patches started to use the system's newest module to save even more time on paperwork.

In addition to creating the maps needed for soil erosion and sedimentation plans, farmers like Patches can now complete the erosion plans themselves in PAOneStop. Because the Environmental Protection Agency and the Department of Environmental Protection expect farmers to keep [soil erosion](#) below a certain level, this feature will automatically calculate how many tons of soil per acre, per year are being eroded in each field.

Calculating soil loss by hand isn't easy (and requires topographic and historic climate data), so by answering a few questions in the system about such conservation practices as row grades and water terraces, farmers can learn if their fields are in compliance. If they're not, the system makes it easy for farmers to adjust their crop rotations, vegetative buffer zones and more to reduce soil loss and protect water.

Though only Pennsylvania farmland can be mapped in PAOneStop, Day would eventually like farmers across the country to be able to use the system. Since the backbone is already built, he says adding state-specific map data and soil information wouldn't be too complicated.

But for now, Neiderer and Day are happy they're having a positive

impact.

"The nice thing is that people are using the software. For a long time, we've done a lot of research and extension projects, which are valuable, but people aren't necessarily able to use that information on a daily basis," Day says. "With PAOneStop, [farmers](#) are using it and they like it. I feel really good about that."

Provided by Pennsylvania State University

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