

**≡ york daily record****Home PA Elections Crime News****Hi, KAREN****SUBSCRIBER EXCLUSIVE****KILLING THE CHESAPEAKE**

# How Amish farming practices, old mill dams harm the Susquehanna & Chesapeake — and how to fix it



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## Chesapeake.

**Mike Argento, York Daily Record**

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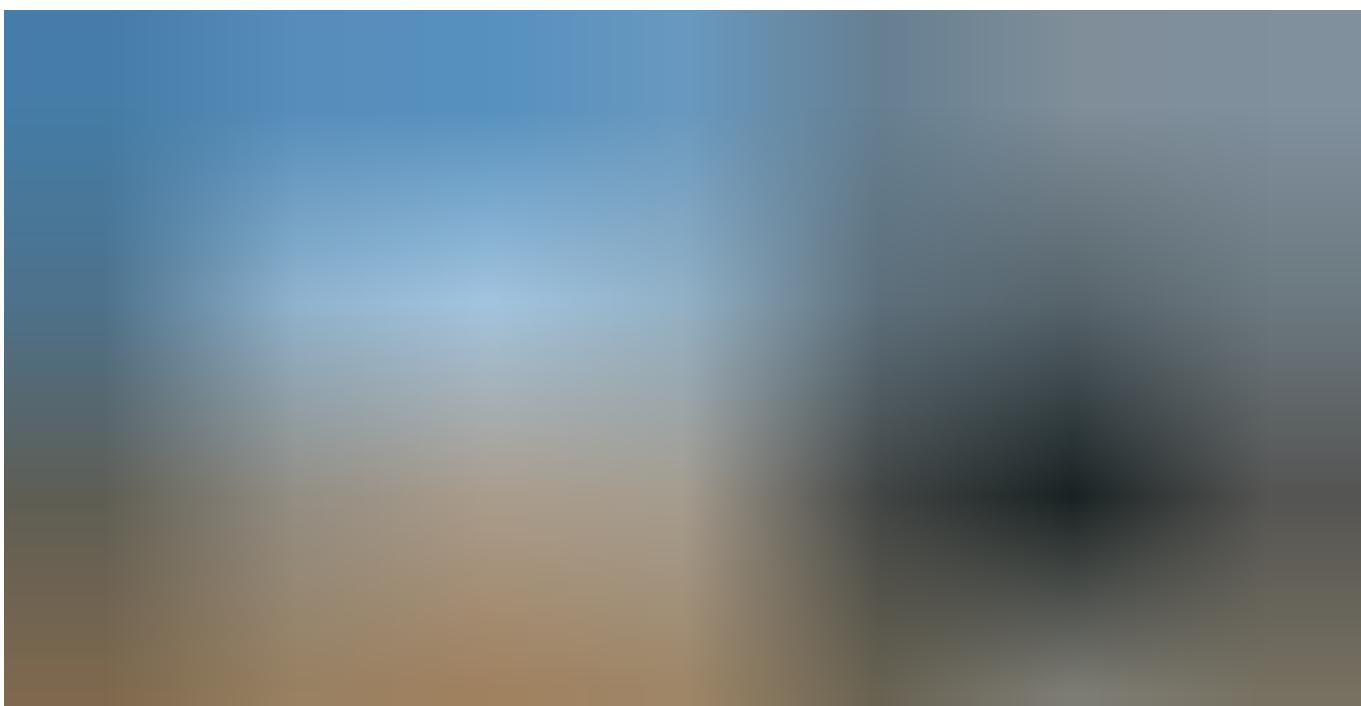
*This USA Today Network special report explores solutions to deep threats that flow through New York, Pennsylvania and Maryland as the Susquehanna River feeds the Chesapeake Bay — with life and death.*

**I**t was New Year's Eve 2008 when Matthew Kirchner drove past a farm on Gypsy Hill Road, southeast of Lancaster, Pennsylvania, and spotted a flock of geese roosting in the field above the old farmhouse.

He is a hunter, specializing in waterfowl — ducks and geese and such — and when he saw the flock, he saw a perfect hunting spot.

He saw a man walking his dogs across the street from the farmhouse — in the pasture that contained a meandering stream called Big Spring Run — and stopped to ask him whether he could hunt on the property. It turned out that the man, Joe Sweeney, knew some of Kirchner's hunting buddies, and he told Kirchner to come back on New Year's Day to hunt.

The hunting was good, and every year after that Kirchner would call Sweeney to renew permission to hunt on the farm.





Joe Sweeney, executive director of the Water Science Institute in Lancaster, stands next to a post that reveals (at the faded orange tape) how much...

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Then, in January 2011, when Kirchner called to ask permission to hunt, Sweeney told him that it might be the last year he could hunt on the farm. He was selling the place and couldn't guarantee that the new owners would permit hunting.

Kirchner, lamenting the loss of a prime hunting ground, thought maybe he could buy the farm. At the time, he was 31 years old and had a family and was uncertain that he could handle it — financially, or the prospect running an 80-acre farm. What did he know about managing a farm? He works in his family's wholesale beverage distributorship in Lancaster. His wife, though, had grown up on a 100-acre farm and was eager to get back to that lifestyle.

Kirchner went to the auction, accompanied by his father, and was able to outbid the two others who were interested in acquiring the farm — a couple of Amish neighbors seeking to expand their acreage.

The property included the pasture across the street, leased out to a neighbor to graze cattle. The pasture was bisected by Big Spring Run.

The creek cut into the earth. Its banks were high, and when the spring floods came, it gushed with water the color of chocolate milk.

In May 2011, shortly after he bought the property, a couple of professors from Franklin & Marshall College, Dorothy Merritts and Rob Walters, came calling. The professors had been working with Sweeney, who serves as the executive director of the Water Science Institute in Lancaster, to restore the creek, which, over decades, or maybe centuries, had been dammed to power mills to grind grain into flour or cut timber into lumber.

They told him they had an idea, a theory, that would restore the creek to its original condition, one

**A lot of people questioned whether it would work or not. There's no question that it's working.**

If it would improve water quality, Kirchner didn't want to stand in the way, so he gave the go-ahead for the project, even though he didn't really know a lot about it. "Next thing I knew, they were in here with a backhoe," he said.

It didn't take long before Kirchner saw the results.

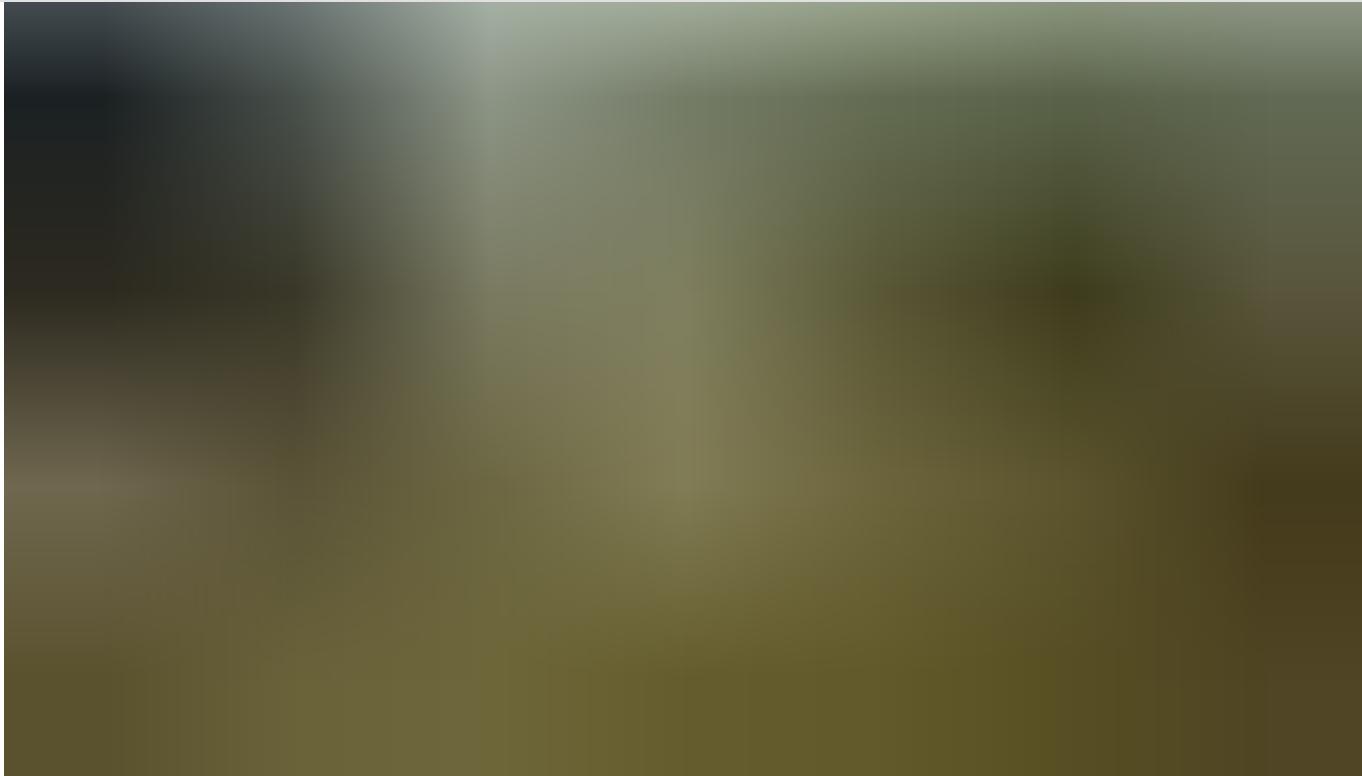
"It turned out great," Kirchner said. "A lot of people questioned whether it would work or not. There's no question that it's working."



## **The wrong dam**

The restoration of Big Spring Run is considered a milestone in the effort to restore creeks choked with sediment that, when it washes downstream, wreaks havoc on the quality of the Susquehanna and the Chesapeake.

The sediment suffocates aquatic plant life — plants that filter toxins from the water and provide habitat for fish and other critters. It contains toxins that wash into the thousands of miles of creeks and streams that crisscross the watershed and flow into the river. It is, according to the U.S. Environmental Protection Agency, the most common pollutant in streams, rivers and reservoirs, causing an estimated \$16 billion in damage to the environment every year.



Matt Kirchner, looks at a clear running Big Spring Run on a restored area of the stream running through his farm southeast of Lancaster.

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There are thousands of old mill dams in the Susquehanna watershed. Each dam can contribute thousands of tons of sediment to the watershed, much of it eventually settling in the impoundment behind the Conowingo hydroelectric dam, impairing the quality of the water flowing into the Chesapeake just a few miles downstream.

And while the stockpile of sediment at the Conowingo continues to be a problem, attracting a large share of the attention of those concerned about the Susquehanna's damaging contributions to the bay, Sweeney said, "You're looking at the wrong dam, guys."

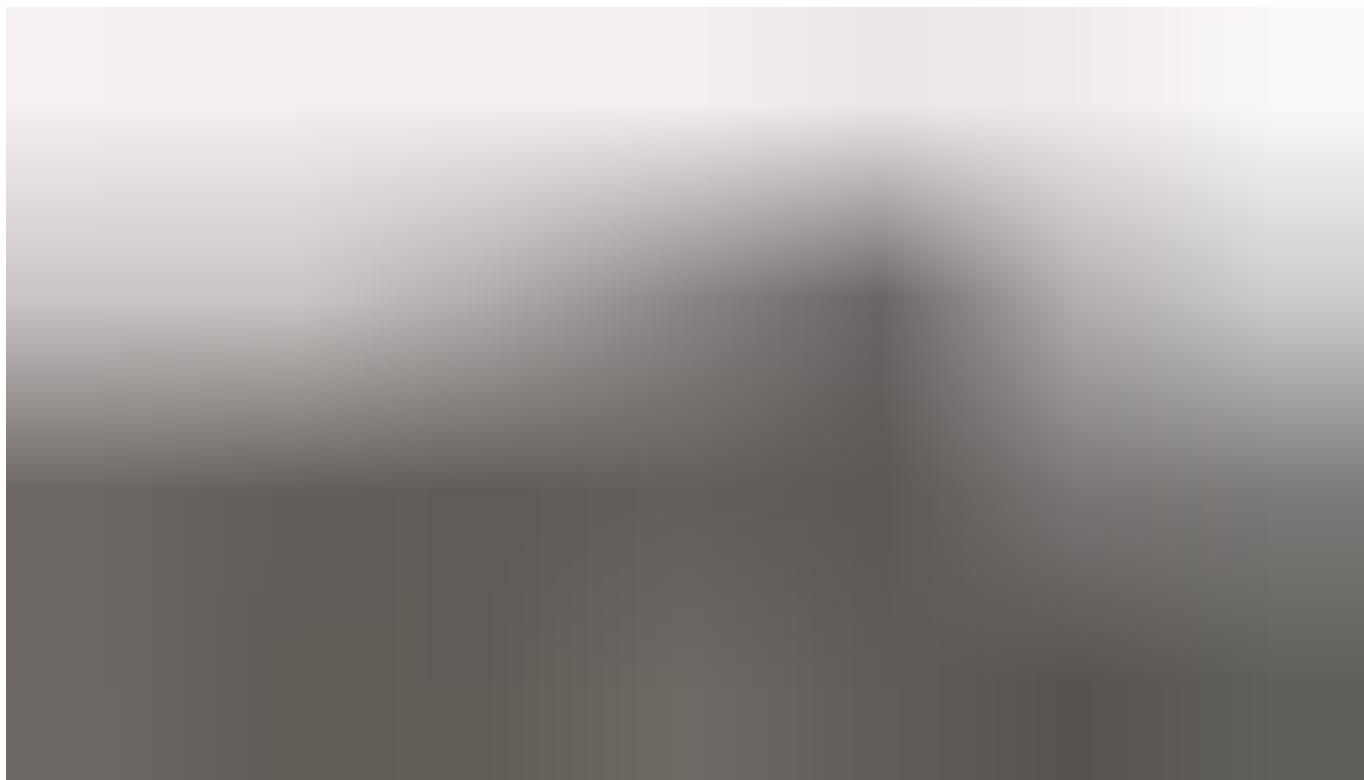
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**Amish farmers resist change**

Stormwater runoff from suburban developments washes fertilizer and other compounds into streams, raising the levels of nitrogen and phosphorus, two of the more damaging pollutants in the watershed, to hazardous levels. Runoff from farmland is also a large contributor, particularly, according to environmentalists, from farmland in Lancaster County. “Lancaster County has more cows than the entire state of Maryland,” said state Sen. Gene Yaw, a Williamsport Republican who serves as chair of the Chesapeake Bay Commission.

“Polluted runoff is one of the greatest threats to clean water in the U.S.,” according to the EPA.



Of the 5,100 farms in Lancaster County, about half are owned by plain-sect farmers - who have been resistant to instituting land use best practices that can prevent nutrient runoff.

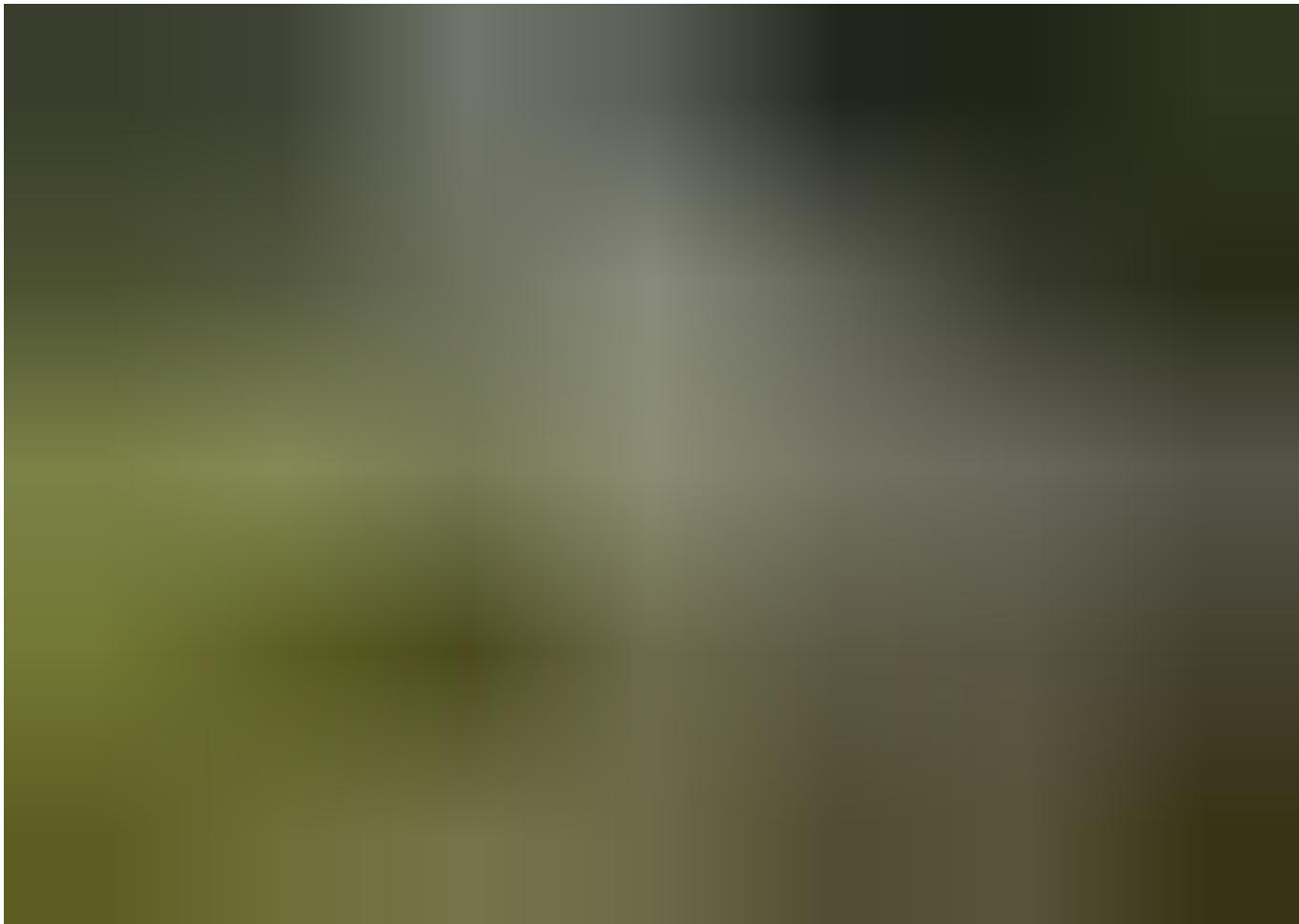
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Runoff, either from development or from farmland, can be controlled. Stormwater systems can be designed to filter water naturally before it flows into streams. Agricultural runoff containing fertilizer, pesticides and animal waste can be reduced through some easily adopted farming techniques, environmentalists say.

Yet, in Lancaster County, which has a sizable community of Amish and Mennonite farmers, those

Dennis Eby, a retired farmer who now works for the county conservation district, works with plain-sect farmers he has known since childhood to educate them about the environmental impact of their practices.

"They just don't accept any change, or very little," Eby said. "They still hang on to a lot of old traditions."



The Roller Mill dam is on Chiques Creek, a tributary to the Susquehanna River in Lancaster County and one of the most impaired streams in the watershed.

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And, of course, it also comes down to money. The economics of farming, said conservation district manager Chris Thompson, doesn't leave much cash to rebuild barns to manage animals and their waste or to buy new equipment to change how fields are tilled to reduce runoff into streams and creeks. (The state of Pennsylvania provides some money to assist farmers in adopting

**To date, we've only had seven farms go to that full enforcement level. It's the economy. They're dairy farmers. They're so far underwater that they couldn't get it done.**

In 2016, as pressure mounted for Pennsylvania to do its share to clean up its watersheds and the Chesapeake, the state started to take a hard line on compliance. But even that has had little impact.

"To date, we've only had seven farms go to that full enforcement level," Thompson said. "It's the economy. They're dairy farmers. They're so far underwater that they couldn't get it done."

That runoff from farms and development wind up in the watershed, embedded in the sediment that flows downstream, sediment that has been stockpiled for decades, if not centuries, behind the thousands of mill dams on streams and creeks in throughout Pennsylvania.



## Nitrogen, phosphorus and sediment runoff

Chiques Creek originates near Mount Gretna, a quaint village nestled in the mountains in southern Lebanon County. From there, it meanders through rural and mostly agricultural northwestern Lancaster County for 31.6 miles before spilling into the Susquehanna River near Marietta.

It is also, according to the Pennsylvania Department of Environmental Protection, among the most impaired streams in Lancaster County — and the Susquehanna watershed.





This is the site of the former Krady Mill, where a dam had been removed in 2018 on Chiques Creek. Once a dam and sediment...

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The stream contains high levels of nitrogen and phosphorus, mostly from agricultural runoff, and it is plagued by sediment impounded by the 54 mills that had been erected on the stream since 1720.

Among those is Roller Mill Dam, a grist and sawmill that was built in 1729 or 1730, according to records archived at the Lancaster County Historical Society. The 10-foot-tall, 130-foot-wide dam impounds as much as 100,000 tons of sediment — sediment containing pollutants — in the few miles upstream, according to the Water Quality Institute.

“This is one of the feeder dams,” Sweeney said.

When the water runs high during heavy storms, that sediment flows downstream, where it can wreak havoc on the water quality. Plans for restoration are on the drawing board, but what those plans entail, and when it may happen, is not known, Sweeney said.



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## Photos: Lancaster County mill dams, Susquehanna River

Photos: Lancaster County mill dams and how they impact the Susquehanna River

Downstream is the site of the former dam at Krady Mill, which was removed in 2018. The dam was removed, and the creek now flows freely. It was considered the best practice.

It hasn't necessarily worked out that way, Sweeney said. It has removed the thousands of tons of sediment that had resided behind the dam. But it has caused other problems.

Sweeney points to the opposite bank upstream, where the creek has cut into the bank and trees and other growth slump into the stream. The soil that is scoured into the creek by high waters adds to sediment and pollution levels.

**You can see those tree roots exposed, and that's just going to continue. That continues upstream the whole way. It's a consequence of not doing it in a holistic way.**

A landing on the bank, just upstream from the mill house, had been built up using cobblestones and concrete from the former dam. It had been covered up with soil to create a smooth approach to the creek. Now, though, that soil has washed away, and the stones make for an ankle-breaking experience as you approach the creek.

"You can see those tree roots exposed, and that's just going to continue," Sweeney said.  
"That continues upstream the whole way. It's a consequence of not doing it in a holistic way."

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## It was just a matter of digging

Big Spring Run was done in a holistic way.

When it began, the restoration was an experiment. Rob Walters and Dorothy Merritts, professors at Franklin & Marshall's Hackman Physical Science Laboratories, studied the site and found that removal of the dam and trying to control erosion by lining the creek with rocks and trees wasn't working.

Merritts and Walters have been researching mill dams and their effect on the environment for 18 years. They began with the history of the mills. They were centers of communities and economic engines in the 18th and 19th centuries, a source of free energy once they were in operation. At the time, though, the environmental impact of so many dams in a watershed was not known. As the industrial revolution took hold and the mills closed down, the dams fell into disrepair. Storms would blow them out, sending tons and tons of sediment downstream.

### **A creek restoration success story in Lancaster County (1:52)**

See three mill creeks in Lancaster County in various stages of restoration and how new thinking restored one stream.

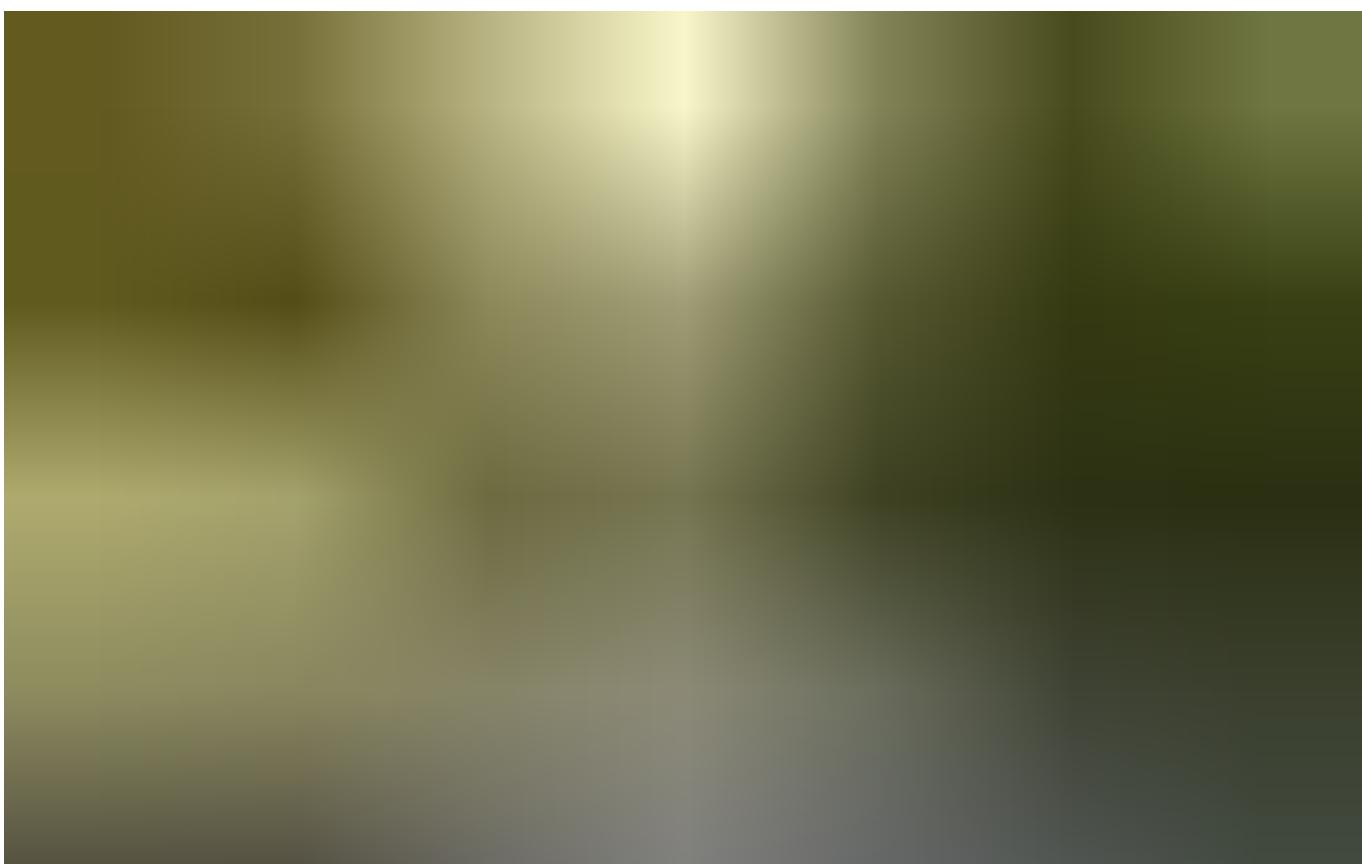
Over the years, they said, Pennsylvania had led the way in removing the dams. They noted, though, that removal of the dams did very little to restore streams and creeks to their original state.

They puzzled over it, questioning the conventional wisdom and came up with what was considered, in 2008, when they published their findings in the journal *Science*, a radical solution.

Instead of removing dams and trying to bolster the banks with boulders and saplings — “armoring the banks” is how Sweeney described it — they thought it made more sense to remove the sediment that had built up over the centuries.

They explained it this way: Think of the stream as Pompeii. To restore the city after it was buried under volcanic ash, would it make more sense to build on top of the buried site or remove the ash to restore it?

“It was a paradigm shift,” Walters said. In an interview with *F&M Magazine*, Walters said, “Imagine that you have this beautiful wetland, and we proposed to go in and dump 20,000 tons of sediment in it. You would think we were nuts, right? What we’ve done is actually reverse-engineer this. We’ve recognized that underneath the legacy sediment that shouldn’t be there, is an ancient, buried wetland, and what we’re trying to do is revive it.”



Joe Sweeney, executive director of the Water Science Institute in Lancaster, points across the site of the former Krady Mill dam on Chiques Creek, where...

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And that's what they did at Big Spring Run in 2001.

They did some initial excavations and found the level of the original stream bed and with it a layer of organic material that gave indications of the kind of plant life that had thrived in the wetlands.

From there, it was just matter of digging.

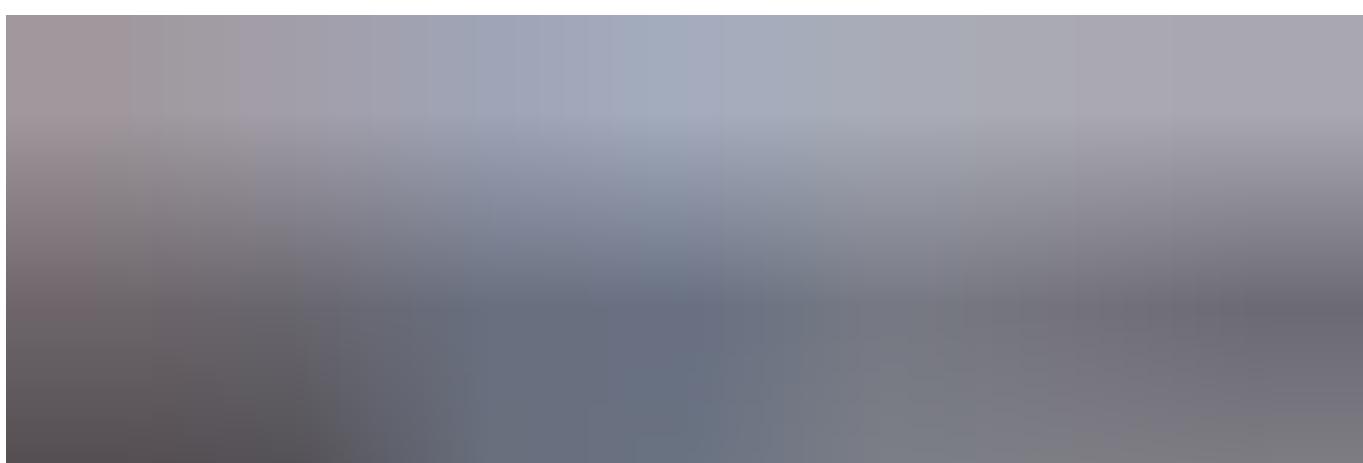
They removed 22,000 tons of legacy sediment. A black-and-white striped pole by the stream gives an indication of how much soil was removed. The entire pasture was lowered by nearly five feet. (Interestingly, the soil was then sold to a contractor who used it to restore a brownfield on the F&M campus.)

And the result was astonishing.

The stream now meanders through the wetland, covered with cattails and grasses and other fauna. And the biggest difference can be seen when heavy rains flood the ravine.

"I can stand on the porch on the second floor of my house and watch it," Kirchner said. "The wetland fills up and it's like a big retention pond. And then, it slowly drains."

And as it slowly drains, the water is filtered by the vegetation. Water that was the color of chocolate milk when it entered his stretch of the stream leaves clear. It's a huge natural water treatment plant.





Looking north into Lancaster County, where the rich farmland is a major source of sediment and nutrient pollution in the Susquehanna and Chesapeake.

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With the restoration, wildlife has come back, Kirchner said. Blue heron, wood ducks and Canada geese; muskrats and mink and deer; salamanders, minnows and crayfish; and frogs and turtles make the habitat home. Kirchner said he was recently walking through the wetland with his son when they were startled by some rustling. It was a coyote, and they watched as it bolted from the creek and ran over the hill at a neighboring farm.

Sweeney said, "It's really quite a difference. When I was here, it was pretty much a dead zone."

Kirchner hopes that the idea spreads.

"When it was started," he said. "I didn't know anything about this stuff. I didn't even know it was called Big Spring Run."

Now, though, he's sold on it and is an advocate for wetland restoration.

"You can see the erosion in the streams around here and you know it's polluting the bay," he said.

"You wonder what can we do? We benefited from it. The bay benefited from it. Everybody benefits from it."

*Columnist/reporter Mike Argento has been a Daily Record staffer since 1982. Reach him at 717-771-2046 or at [mike@ydr.com](mailto:mike@ydr.com).*

## *My grandpa told me back before the dams*

- "Barrel of Eels" written and performed by poet Michael Garrigan



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