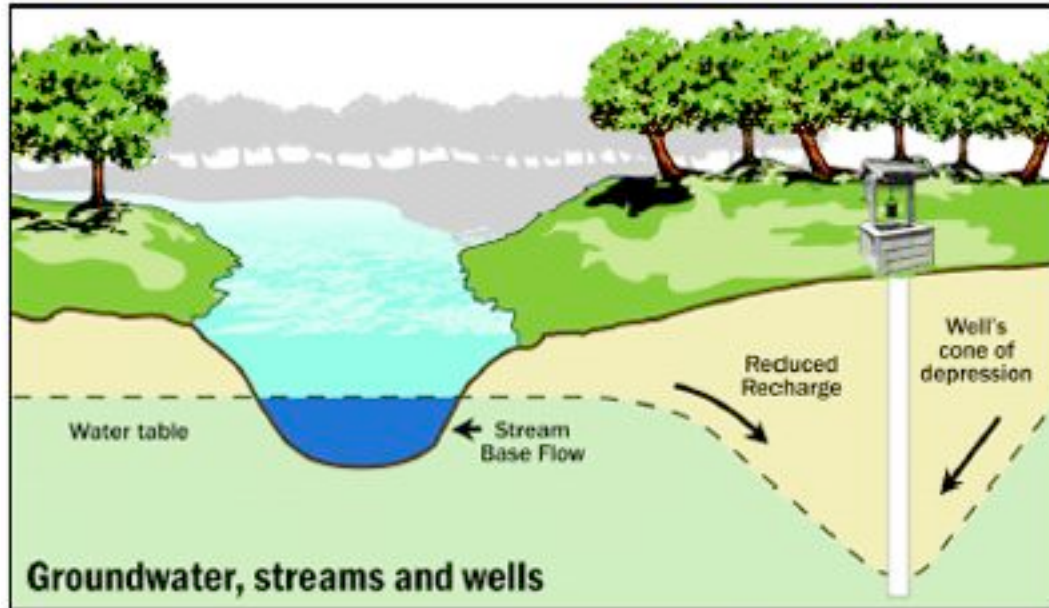


Taking more, giving less: Underground aquifers stressed by sprawl

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Scientists are trying to better understand the relationship between groundwater and surface water. This illustration shows how a stream's base flow, crucial in times of drought, is fed by the water table, and can be affected by wells.

EARL — The water that is the least understood is the water that's never seen — the kind that lies under the ground.

There is no reliable way to measure the size or depth of an aquifer except by the measurements that matter to homeowners — how much water comes up when we drill a well and how deep does that well have to be?

These days, the wells John Reed is drilling are going deeper and deeper.

Well department manager for C.S. Garber & Sons on Route 562, Reed said drilling wells is “the only job I've ever had.”

And in the 33 years he has overseen the drilling of wells in Berks, Chester and Montgomery counties it has been hard to miss the fact that “we're gradually going to greater and greater depths to reach water.”

The company — which drills about 250 wells a year and employs 50 or so people — is getting a

lot of calls from older homes where shallower wells are drying up.

“We’re started to see the hand-dug wells and shallow wells being depleted, and we know that the deeper straws you put in the ground, the less you have,” said Reed. “Sure, it’s a concern.” He’s not the only one worried.

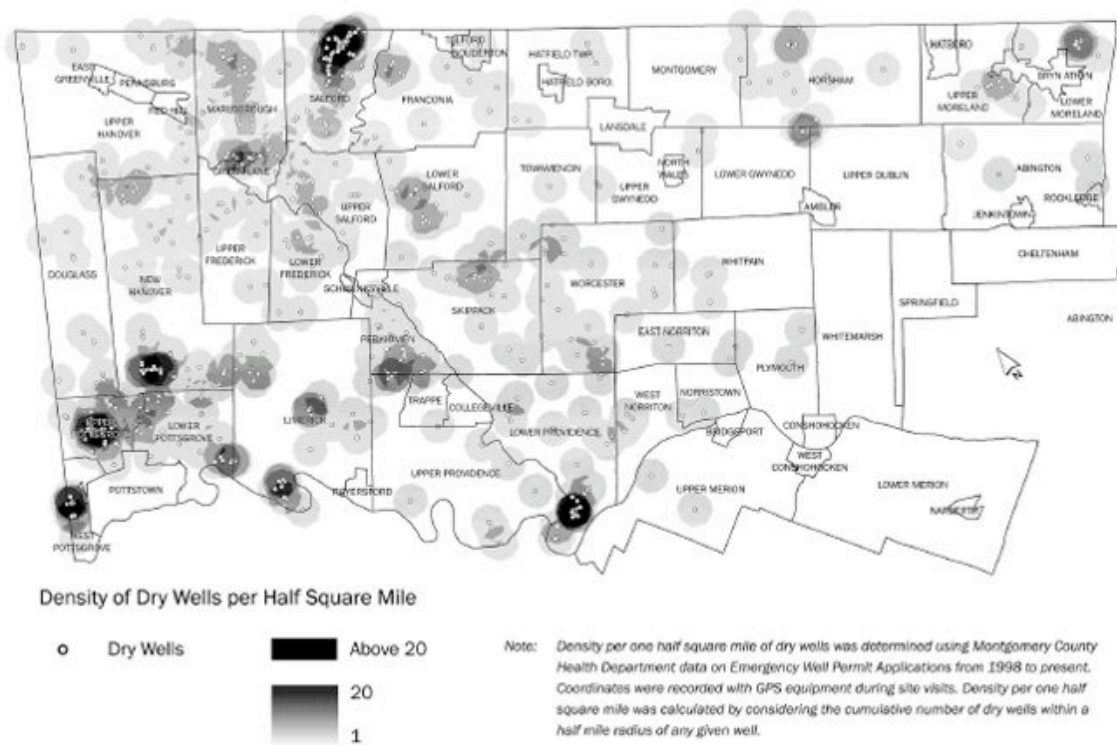
According to the Pennsylvania Water Resources Education Network, groundwater sources are being developed at a rate three times that of surface water.

“How many straws are too many?” asks John Hoekstra, director of watershed advocacy for Green Valleys Association.

Pennsylvania, with 978,200 households depending on wells for water, is second only to Michigan in the number of wells in use, according to the National Groundwater Association.

And the U.S., with 15.9 million wells, is second to none. India comes in second with 12.3 million and China a distant third with 3.4 million.

Montgomery County Well Failure: 1998 to Present



SOURCE: Montgomery County Health Department and U.S. Geological Survey

How much is enough?

Estimates of ground water reserves in the U.S. are as high as 33,000 trillion gallons, equal to all the water discharged by the Mississippi into the Gulf of Mexico over the past 200 years.

But while that sounds like a lot, Green Valleys is part of the growing chorus arguing poorly-planned development and bad storm water management are choking off the recharge of Pennsylvania's underground aquifers.

According to a study done by the American Water Works Association and the Trust for Public Land, a watershed with natural cover infiltrates about 50 percent of its rainfall into the ground, losing only about 10 percent flowing over the surface as run-off.

But in a highly developed watershed, only 15- to 20-percent infiltrates, and 45- to 55-percent becomes run-off, according to the study, issued in 2001 and titled "Protecting the Source."

"Failing to capture and infiltrate storm water is short-sighted," said Hoekstra. "It's a total loss of the resource; you're throwing it away."

A recent report by American Rivers found that the increase in the amount of pavement in Atlanta over 15 years resulted in the loss of enough water — through run-off and evaporation — to supply the annual daily household needs of 1.5 million to 3.6 million Americans.

The idea of storm water as a valuable resource that should be captured and contained is slowly replacing the old school of thought — that the only good storm water is the kind being shunted into a pipe off your property before it floods your basement.

Noticing what's beneath the surface

Planners in Montgomery and Chester counties have begun to take notice of water concerns.

In their respective master plans, water resources are closely examined, and both have highlighted storm water management, and getting that water back into the ground, as a priority.

In northern Chester County, 60 to 70 percent of the homes use wells. In Montgomery County, about one in eight households gets its water from a well.

Unfortunately, "the soils in Montgomery County stink for infiltration," said Drew Shaw, section chief of environmental planning for the county planning department.

Worse yet, the majority of Montgomery County's wells are in the western section where the geology is poorest for ground-water production.

That was the warning the county gave to the developers of Regal Oaks in Upper Pottsgrove when the subdivision was built in the early 1980s.

But lacking the legal authority to do anything other than advise, the planners could not stop its construction and the dozens of individual wells that went with it.

Plagued by water shortages ever since, particularly during the droughts of 2001 and 2002, it's a subdivision Reed and his drilling crew know well.

"In Regal Oaks, we might go 400 to 500 feet to reach water, whereas just up the road in Gilbertsville, you go to 200 feet and get all the water you want," he said.

Keeping the streams flowing

But getting “all the water you want” out of the ground is a mindset with dangerous consequences, say many scientists.

It’s not just wells that need groundwater.

According to the United States Geologic Survey, an average of 52 percent of stream flow comes from groundwater. This is called “base flow,” or what keeps a stream or river flowing during a drought.

“The baseline quality of water in a stream is, in many ways, set by the groundwater that feeds it,” said Bern Sweeney, senior research scientist and director of the Stroud Water Research Center in Avondale, Chester County.

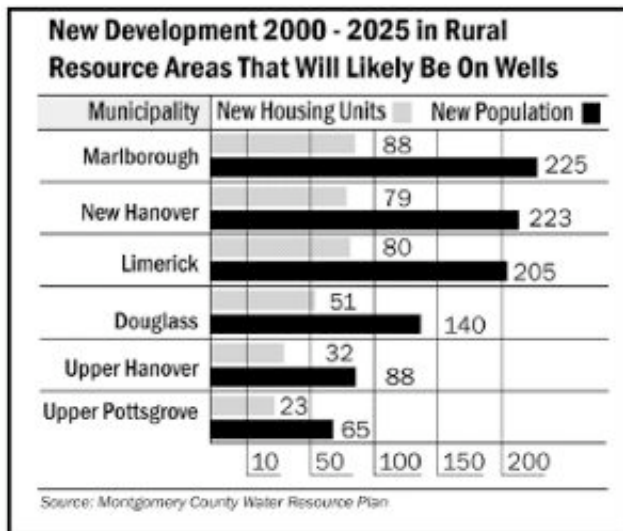
“A stream is merely the visual representation of ground water,” says Hoekstra.

So draining aquifers also means draining streams.

And that’s a concern to organizations like the Delaware River Basin Commission, the quasi-federal agency that governs water use in the four-state watershed that feeds the longest undammed river east of the Mississippi.

Alarmed by the amount of water being drawn out of the ground in its sprawling southeastern region, Pennsylvania asked the DRBC to establish a “groundwater protected area” in 1980.

It governs the withdrawal of groundwater anywhere above 10,000 gallons per day.



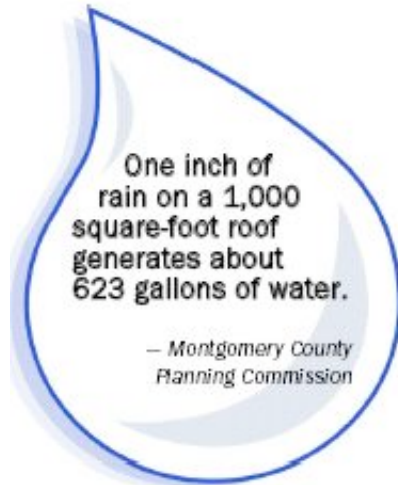
“All water has a perfect memory and is forever trying to get back to where it was.”

— Toni Morrison, author “From a geology perspective, southeast Pennsylvania is not a high-yielding geology,” said DRBC Director Carol Collier.

“And the development pressure in southeast Pennsylvania is an escalating scale, so you have a static resource and growing demand, and we have to deal with that,” she said.

The DRBC, as well as the statewide water plan enacted under Act 220 and whose Delaware basin working group is headed by Collier, are trying to get a handle on the actual capacity of water in the region.

“We’re trying to develop models for how much water we can take from each watershed, how many straws we can before we have an impact on flow,” said Collier.



When Perrier came calling

That was exactly the fight Green Valleys had in the mid-1990s when Perrier Group of North America wanted to boost the amount of water it was taking out of the Pigeon Creek Watershed in South Coventry by drilling a well to take an additional 95,000 gallons per day. The request was rebuffed by Green Valleys, which presented models showing the well would cause Pigeon Creek, currently under consideration to be declared an “exceptional value stream,” to run dry.

After court fights, public hearings that drew 700 concerned citizens to Owen J. Roberts High School and five years of negotiations that went all the way to the Switzerland-based CEO of Nestlé, the company dropped the request and even increased its monitoring.

The threat to groundwater now is not so much big withdrawals by big companies with big bankrolls, but the little guy—you and me.

Big suburban houses consume as much as 16 times more water than homes on a more traditional urban grid with smaller lots, and that stresses the system.

The same suburban development also overloads streams and prevents the recharge of groundwater systems.

“In 1995, when we had a bad drought, the only water flowing in Neshaminy Creek was sewer discharge,” Hoekstra recalled. “There are just too many straws in the ground.”

During the more recent droughts of 2001 and 2002, Hoekstra said water providers actually found use going up at the same time conservation was being urged.

“People were using 400 gallons per day instead of the usual 350 gallons,” Hoekstra said.

“Water use went up because everyone was worried about their expensive landscaping at their McMansions and they were going to water to save it.”

The EPA estimates that about 32 percent of all residential water consumption is for outside uses.

The key word in all this, is “cumulative,” Hoekstra said. “Nobody likes to use the ‘C’ word.”

Michael Stokes, assistant director of the Montgomery County Planning Commission and a

partner with Hoekstra on the Delaware team crafting the state's water plan, agreed.

"Part of the problem is the whole planning process, even with the DRBC, is each well is looked at in isolation and it doesn't get to the cumulative impact," Stokes said.

"Every piece of property that is doing something creates a small insult to the system," said Cathleen Curran Myers, DEP's deputy secretary for the Office of Water Management. "It's nobody's fault, and it's everybody's fault."