

## NEWS

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### Groundwater affected by development, scientists say

By Leah Hoenen

Everything people do on land affects water and groundwater.

That was the theme of a groundwater conference held by the University of Delaware Sea Grant Program earlier this summer.

"The marketplace treats water as a free resource, so we tend to waste it," said Jerry Kauffman, of the University of Delaware Institute for Public Administration/Water Resources Agency. He said clean water is key to the state's economy.

#### Groundwater uses

Groundwater is both the source of drinking water and the method of disposing of wastewater, said Scott Andres, hydrogeologist with the Delaware Geological Society. There is plenty of water to be had, he said, but the challenge is protecting public and environmental health.

As nutrient-pollution limits increase the cost of septic, land-based disposal systems are becoming more economically appealing, said Andres.

Different methods of disposal add different amounts of water to the groundwater system. They also add contaminants, including nutrients, household chemicals and pharmaceuticals. Andres said there is no data yet on the human health effects of those pollutants.

Scott Ator, hydrogeologist with the United States Geological Survey, said chemicals reach groundwater from soils, fertilizer, manure and pesticide applications, urban activities and sewage disposal. The peninsula remains largely agricultural, said Ator, but land use is diversifying with development.

Land use adds pollutants to groundwater, and, when the flow of water changes, so do rates of natural filtration, said Ator. Less natural filtration could mean fewer contaminants are pulled out of the water.

Ator said scientists testing groundwater are finding various chemical compounds, including pesticides and the daughter compounds they morph into as they break down.

They also find nutrients and other material from septic disposal, he said.

#### Groundwater flow

"When you put wastewater in the ground, it changes the composition of the groundwater aquifer," Andres said. Adding lots of water to the ground, or pumping out large amounts, can change the flow of groundwater. Because groundwater feeds streams and other water bodies, if less is flowing, streams can dry up, affecting flora and fauna, he said.

#### Water prices

Andres said water is cheap because the public has paid for most water infrastructure in the state, through private wells.

#### Liquid resources costs per gallon

Drinking water \$0.002

Gasoline \$2.25

Milk \$3.50

Beer \$5.00

Bottled water \$8.00

#### Wastewater applications and groundwater

Natural recharge: 14 inches per year

Septic system: 30 to 40 inches per year

Spray irrigation: 100 inches or more per year

Rapid infiltration bed: 700 to 1,400 inches per year

Source: Scott Andres, hydrogeologist with the Delaware Geological Survey

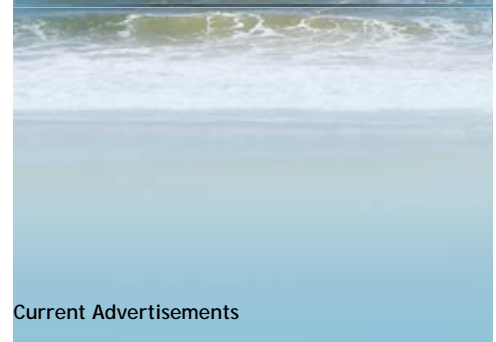
#### Groundwater facts

Of the area's annual average 44 inches of rainfall, 26 inches return to the atmosphere through evaporation or transpiration, 14 inches become groundwater and four inches run into surface water, said Scott Andres, Delaware Geological Survey hydrogeologist.

Based on Department of Natural Resources and Environmental Control records, there are approximately 320 public wells, 17,500 domestic wells, 500 irrigation wells and 1,700 agricultural wells in Delaware, said Andres.

The average Delaware town uses 80 to 90 gallons of water per person per day, said Bill Cocke, manager of the Department of Natural Resources and Environmental Control's Water Allocation Program. Water use per person has increased, he said, despite the use of water-conserving appliances, because homes and lawns grew during the building boom early this

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The downside is that homeowners have to foot the bill for equipment malfunctions and failures. It also means a slower response to problems from state officials, said Andres.

Kauffman said federal environmental officials say water bills must be less than 1.5 percent of median income to be affordable. That would be \$750 a year for a \$50,000 income, he said. Costs to water utilities, such as chemicals to treat water, are going up, he said, meaning water rates are likely to rise.

### Water uses

Bill Cocke, program manager for the Department of Natural Resources and Environmental Control Water Allocation Program, said wells are permitted by the amount of water they will use.

Any well that would use less than 50,000 gallons a day doesn't require a permit, he said, so most homeowners don't need one, even if they are watering lawns and gardens.

Cocke said Delaware has plenty of water to go around. Large water users, such as golf courses and farms, require permits. Home wells do not, he said.

### Keeping water clean

Other states with a lot of water reuse it. Florida, where water pumping was affecting the Everglades, reuses wastewater for lawn and garden irrigation, said Cocke, a former Florida resident.

He said it's important to keep track of water quality as Delaware develops. "We don't have any room to mess up what we have in municipal areas with large wells," he said. There's no place to move wells of that size, he said.

The area's most recent saltwater intrusion event occurred in the 1940s, said Andres, when the population increased to support Fort Miles. Now, he said, saltwater problems are localized and usually seen in wells drilled too close to salt water, or in places where salt water drains out of dredge spoils.

The geological survey is a state agency that participates in the decision-making process, but it has neither financial interest nor regulatory power, Andres said.

The seminar, intended for lawmakers and concerned citizens, said coordinator Joe Farrell, Sea Grant resource management specialist, was hosted by the university, the Delaware Geological Society, the university Institute for Public Administration and Water Resources Agency, and sponsored by the Center for the Inland Bays.

He said the seminar was intended to provide science-based information for government officials and concerned citizens "who will hold our collective feet to the fire."

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