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States digging deep to monitor water

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KINGSTON, N.H.—About a quarter mile into dense woods, geologists watch as a drilling rig twists a shaft deep into the granite bedrock of southeastern New Hampshire. They are searching for water—not to drink—but to watch.

State and federal agencies have been watching, or monitoring, lakes and rivers for more than a century, but less attention has gone to vast amounts of water in cracks and rock fissures deep underground, leaving a void in understanding a resource growing in importance as demands for water increase and surface water sources are being used to the fullest in many areas.

New Hampshire is drilling a series of wells to monitor groundwater in cracks in granite hundreds of feet below the surface. The goal is to allow scientists to check for contamination; learn about how long it takes for rainfall or melting snow to make its way into the supply; and keep tabs on how climate change, population growth and development affect the water.

State Geologist David Wunsch would like to share the information as part of a nationwide network.

"In the future, your water may come from hundreds of miles away, so in order to get that national picture of 'Are we depleting some area for the sake of another region?,' you need to have that national picture," said Wunsch, who represented state geologists on a national committee that has developed a national groundwater monitoring plan.

Groundwater provides drinking water for 130 million Americans and 42 percent of the nation's irrigation water, and while many states have monitored groundwater, they have done so for state-specific reasons, using different criteria. So, while groundwater supplies spread beneath large regions, monitoring generally stops at state lines.

"Some states have several hundred wells and sample them four times a year. Others have absolutely nothing," said Wunsch.

The goal of forming a network got a boost this year as Congress approved the SECURE Water Act, directing the U.S. Geologic Survey to work with states to develop a national monitoring program for underground water supplies, known as aquifers.

There is no national big picture on groundwater levels or quality because the information exists only "in bits and pieces," said Christine Reimer of the National Ground Water Association, in Westerville, Ohio.

She emphasized that a national monitoring effort would not put the government in charge of groundwater management, but said information showing trends or changes in groundwater quality or levels could help guide local decisions.

Montana approved groundwater monitoring in 1991 because its water information was inconsistent and not part of any system, said Thomas Patton, the state's groundwater assessment program manager.

"If you are going to relate precipitation to water levels in wells, you've got to collect precipitation over time and water levels over time," Patton said. "If you are going to compare water levels to development, you've got to have the water levels, over time."

Information collected from 900 Montana wells has been valuable, especially in watching how groundwater levels responded to six or seven years of drought and to irrigation or rainfall, he said.

Patton and Wunsch said ideally, states will gain information valuable to their own water planning and share with the federal government, which will share the cost of the monitoring.

Wunsch said monitoring will be a great help in New Hampshire, where more than a third of the state's population gets drinking water from bedrock wells. Before work began on the current network of 10 wells, the state had only one bedrock monitoring well. He hopes for significantly more.

Contamination is a particular concern around the country, he said, because homeowners are not required to test their wells. About 20 percent of New Hampshire's bedrock wells contain arsenic levels above the government standard. Bedrock water also contains uranium and radon, even unsafe levels of fluoride.

Another major concern is just how long it takes for rainfall or melting snow to flow down to, or recharge, the aquifer.

"We don't know how quickly rain gets to bedrock," Wunsch said. "It might take a day, a week, a year for it to migrate down."

Monitoring that process, over time, might show how climate change and development affect levels and quality.

For instance, rainfall that now percolates into the ground gets diverted by the paved surfaces of development and is carried away by storm drains.

And climate change may mean less snow around the country, with more rain, in more severe storms, Wunsch said, which could mean more groundwater, but at different times of the year.