Groundwater study -- the tap could run dry

Doyle Rice, USA Today, 11-16-15

The amount of water above the Earths' surface — in oceans, lakes and rivers — has long been known. But the amount underneath the ground remained a mystery.

Now, for the first time, the amount of water that's stored under the Earth's surface has been determined and mapped – and despite the huge numbers, it's an amount that could run out, according to a new study published Monday in the peer-reviewed British journal *Nature Geoscience*.

The study found that there's about six quintillion (6,000,000,000,000,000,000) gallons of groundwater worldwide, which is enough to cover the global land surface in a layer of water 590 feet deep.

While that seems like a lot, the study notes that the vast majority of groundwater (known as "ancient" groundwater, since it's been there for thousands or millions of years) is too far underground or too stagnant for people to drink. (Though some of it can be used as a water resource for agriculture and industry.)

So only about 6% of groundwater — known as "modern" groundwater — is close to the surface and is thus part of the global water cycle. It's this groundwater that's being tapped for human use and also is the most vulnerable to climate change and other environmental stressors.

Why do we need to know this? "It is important to know how much groundwater there is because more than a third of the population in the USA and the world drink groundwater every day and it is crucial to agriculture and the environment," said study lead author Tom Gleeson of the University of Victoria in an e-mail to USA TODAY.

"The main implication of our study is to show that our youngest groundwater resources — those that are most renewable, yet also most sensitive to human contamination and climate change — are a finite resource," he said.

"Groundwater is being overused and depleted in a few parts of the USA such as California, Kansas and Texas, suggesting that in these areas groundwater supplies are being used unsustainably," he said.

"This has never been known before," Gleeson said. "We already know that water levels in lots of aquifers are dropping. We're using our groundwater resources too fast — faster than they're being renewed."

And while still dwarfed by the amount of water in the oceans, groundwater accounts for most of the fresh water on the planet. Not surprisingly, the researchers found very little groundwater in arid regions and larger amounts in jungle and mountainous areas.

Gleeson and his team combined several data sets, including measurements of the radioactive tritium introduced to groundwater about 50 years ago due to thermonuclear testing with computer models to estimate the volume and distribution of groundwater.

A water expert, Peter Gleick, president of the Pacific Institute, a research organization in Oakland, who was not affiliated with the study, said the study conclusions "seem reasonable."

"Groundwater management and use issues are incredibly important, especially in California's Central Valley and the Ogallala/Great Plains regions," Gleick added.

"This global view of groundwater will, hopefully, raise awareness that our youngest groundwater resources — those that are the most sensitive to anthropogenic (man-made) and natural environmental changes — are finite," noted Ying Fan of Rutgers University, in an article in *Nature Geoscience* that accompanied the groundwater study.

"Since we now know how much groundwater is being depleted and how much there is, we will be able to estimate how long until we run out," Gleeson said.