How Do Water Levels in Wells Affect Groundwater Quality and Quantity?

Many variables influence groundwater quality, such as:

- An aquifer's rock type
- Soluble minerals and their concentration
- Groundwater flow path
- How long the water stays in the aquifer, or "residence time"
- Recharge rates
- Well depth
- How often the well is used
- Well construction

Most changes in water level have only a small effect on groundwater quality, but if the change is large enough it will influence the water quality. An example is when saltwater enters a coastal aquifer. This happens in areas where pumping reverses the hydraulic gradient, and the concentration of dissolved minerals increases causing salinity to rise above drinking standards.

Groundwater recharge and discharge are the driving forces changing the level of water in an aquifer. Water levels decline because of increased pumping or withdrawals and in a drought when aquifer recharge is reduced. The water level rises with a decrease in groundwater withdrawals or an increase in recharge.

Unconfined (water-table) aquifers

The water level in wells located in an unconfined aquifer show the amount of groundwater stored in the aquifer at a given time. Well water levels are constantly changing, and they fluctuate in response to changes in the quantity of water stored in the aquifer. When the quantity of groundwater in an aquifer increases, water levels in wells rise; and when the quantity of groundwater in an aquifer decreases, water levels in wells decline.

Confined aquifers

Changes in water levels in confined aquifers are not necessarily correlated to changes in aquifer storage. This is because confined aquifers respond to pumping in a different way from unconfined aquifers. In unconfined aquifers, dewatering of the formerly saturated space between grains or in cracks results in significant volumes of water being released. But pumping in confined aquifers causes a decrease in water pressure in the aquifer near the pumping well – as opposed to a drop in water volume that is

seen in unconfined aquifers. Within a confined aquifer, as pressure is reduced, the aquifer material compresses, porosity decreases, and the amount of water stored declines. The water levels in wells will drop somewhat but the entire thickness of the aquifer will remain saturated during pumping.

Resources and Useful Links

For more information on changes in your water well level, contact your local Groundwater Conservation District (GCD) representative at:

- Texas Alliance of Groundwater Districts website, https://texasgroundwater.org/
- Groundwater Conservation District contact list on the TCEQ website, https://www.tceq.texas.gov/downloads/groundwater/gcd/gcd-contact-list.pdf

Other Frequently Asked Questions (FAQs)

To find additional FAQs visit the Texas Groundwater Protection Committee's FAQ webpage at https://tgpc.texas.gov/frequently-asked-questions-faqs.