

Global Groundwater Is Threatened by Unsustainable Practices Amid Climate Crisis



A water well is drilled next to an oil well and fracking site in San Joaquin Valley, California, November 1, 2014. Citizens of the Planet / Education Images / Universal Images Group via Getty

By [Daniel Ross](#), [Truthout](#) Published January 26, 2020

As the planet's thermometer continues to inch upwards, one sought-after resource is only going to increase in value: groundwater.

Already, about [one-third](#) of the world's freshwater is derived from aquifers locked away beneath our feet, and they serve more than [2 billion people](#), though rates of use differ drastically from country to country. [Just a decade ago](#), these reserves provided 37 percent of the total public water supply for Americans. In the [European Union](#), groundwater supplies 70 percent of domestic use. In India, it's even

higher, with double the annual usage of either China or the U.S. Groundwater also provides [nearly 40 percent](#) of the water used globally for crop irrigation.

Engines of life they may be, but many important underground aquifers have long been mismanaged through activities like over-pumping and widespread environmental contamination. Just ask hydrologist Tom Gleeson, an associate professor at the University of Victoria, in Canada. Preserving underground aquifers is an "urgent and long-term concern"

that is further complicated by climate change, Gleeson told *Truthout*.

Indeed, aquifers in some parts of the world, like the U.S. High Plains — a subregion of the Great Plains — [could be depleted](#) within the next 30 to 50 years. This is why Gleeson recently co-authored a groundwater [“call to action”](#) and accompanying [statement](#) — the latter of which has garnered the written support of [over 1,000](#) scientists and experts — to help foster better understanding of the current state of the world’s groundwater aquifers, and the “urgent” need to adopt sustainable groundwater practices where the current ones are lacking. Nevertheless, beyond the scope of worried experts with direct ties to the issue, broader awareness and concern about the planet’s groundwater resources has been stubbornly limited, says Thomas Harter, a professor and cooperative extension specialist in the Department of Land, Air and Water Resources at University of California, Davis.

“The point of the initiative is to continue to stir the pot and draw attention to the issue,” Harter told *Truthout*, pointing to a glaring imbalance currently at play. Indeed, our current global groundwater abstraction rate is estimated to be about 3.5 times the actual area of water within underground aquifers, while roughly 1.7 billion people live in areas where groundwater resources or groundwater-reliant ecosystems — or both — are threatened.

“Because we don’t have a tangible perception of how poor groundwater sustainability is, this hidden resource goes by the wayside without the public and policymakers being sufficiently concerned about it,” Harter said.

The Problems With Over-Pumping

Groundwater aquifers are compromised in any number of ways, one primary reason being over-pumping to satisfy human and agricultural needs. This can have all sorts of short- and long-term impacts beyond just drinking water shortages,

however. “It’s also the impact of that overuse on streamflow and critical wildlife habitats,” said Gleeson. In the western Great Plains, for example, decades of groundwater exploitation has had a “serious” effect on [native fish populations](#).

In over-pumped parts of California’s San Joaquin Valley, the land has sunk by as much as 8.5 meters since the 1920s, leading to crumbling roads and bridges.

Land subsidence is another visible impact. The vast [Nubian aquifer](#) — found beneath parts of Egypt, Chad, Libya and Sudan — has experienced a 60-meter drawdown in certain places, due to over-exploitation. In over-pumped parts of California’s [San Joaquin Valley](#), the land has sunk by as much as 8.5 meters since the 1920s, leading to things like crumbling [roads and bridges](#).

Beyond that, there’s the widespread contamination of these resources from an array of pollutants that can become deeply entrenched, making them costly and difficult — [sometimes impossible](#) — to remediate. Hydraulic fracturing (“fracking”) of oil and natural gas reserves is a poster-child of the lax regulatory oversight that only exacerbates the problem.

Groundwater wells found nearer to fracking injection wells are more likely to suffer contamination from spills and well-bore failures than those situated further away. And yet, this problem is too readily ignored when it comes to rubber-stamping permits. [One study](#) found that in 2014, 37 percent of all stimulated fracking wells in 14 U.S. states were found within two kilometers of at least one recently drilled domestic groundwater well.

Another leading source of groundwater pollution is agricultural run-off. [In New Zealand](#), for example, intensive farming practices have led to widespread groundwater contamination from

nitrate, a known carcinogen, in a situation described as “[environmental vandalism](#).”

There’s an environmental justice component to the broader issue, too.

In the Western U.S., the percentage of groundwater wells that ran dry during the 2013-2015 period was concentrated in rural areas with high agricultural productivity — areas more likely to be economically disadvantaged. An estimated 3.5 percent of domestic wells were dry during that time. “People’s wells are running dry, and they might not have the money to drill new ones,” said Debra Perrone, an assistant professor of Environmental Studies at University of California, Santa Barbara, who co-authored [the study](#). “In the richest country in some of the richest states, people don’t have access to drinking water in their homes.”

According to Karen Villholth, a principal researcher focusing on groundwater for the International Water Management Institute, poorer rural communities in South Africa similarly struggle with groundwater issues — a problem exacerbated by the recent [drought](#) that has [stricken the country](#). “There’s so much disparity in terms of access to water and access to reliable and good quality water,” she said.

That’s because while the country’s large cities have had the resources to more readily adapt to the drought, small cash-strapped rural communities, which are typically heavily reliant on groundwater, are being stretched to breaking point as they deal with aging and broken infrastructure, coupled with groundwater compromised through things like poor wastewater management and mining contamination. “Around South Africa there are lots of places that ... don’t really have water at all,” Villholth said.

But it’s not all bad news.

“There’s so much disparity in terms of access to water.”

“The silver lining is that it isn’t everywhere,” said Gleeson about groundwater overuse. His [research shows](#) that the “groundwater footprint” in about 80 percent of the planet’s aquifers is smaller than their actual areas. This means that for the majority of aquifers around the world, according to Gleeson, “we’re either not using much groundwater or we’re using it sustainably.”

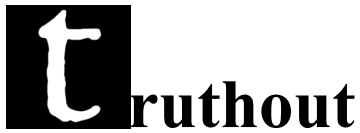
Nevertheless, this still leaves aquifers in various thirsty regions around the world — like Northern China, Northern India and Pakistan, the Middle East, North Africa and California — with aquifers that are seriously overstressed, says Gleeson. Which raises the question: What can we do to fix the problem?

Solutions Aren’t Easy or One-Size-Fits-All

Ultimately, the aim of the global “call to action” is to encourage politicians, policy makers and anyone with a hand in the fix to adopt sustainable management practices to best preserve current groundwater reserves. But there’s no easy solution — not with so many legitimate competing claims to this hidden liquid treasure. “Understanding the intricate interplay between hydrologic response and human activities is essential if groundwater resources are to be produced sustainably,” as [one](#) recent study succinctly puts it.

Some countries are managing this balancing act better than others. Take New Zealand, where Harter says there’s greater “political and regulatory engagement” toward tackling extensive nitrate groundwater pollution compared to other parts of the world bedeviled with the same problem.

“In California, we’re very much engaged in improving the situation over the next couple of decades,” Harter said. But despite a heavy economic reliance upon agriculture, New Zealand has “set the bar much higher” in terms of the standards it has imposed to protect



drinking water and the country's rich natural ecosystems, he says. At the same time, New Zealand's agricultural sector appears to still be [going strong](#).

Not that California has been twiddling its thumbs when it comes to more sustainably managing its groundwater. Five years ago, the state passed the [Sustainable Groundwater Management Act](#), a broad-brush regulatory framework which has "changed the landscape" in California in terms of "actively engaging in, considering, planning and understanding the need of our groundwater systems to keep them from degrading either in quantity or in quality," said Harter.

But as experts point out, there's no one-size-fits-all approach to the problem. Aquifers are complex hydrological and geological things, and this can make practical solutions difficult to nail down. It can also render some of the approaches already being taken as largely ineffective in the long-term.

Take the increased drilling of deeper drinking water wells due to groundwater depletion — an "unsustainable stopgap" limited by resources, hydrogeology and groundwater quality, as a [recent study](#) in *Nature Sustainability* points out. Indeed, the "thin aquifers" beneath an arid New Mexico means that "drilling a deeper well is not

likely to supply fresh water at the quantities needed for household wells," said Perrone.

On top of that is layered a tangled spiderweb of local, regional, state and transboundary water rights. Indeed, Perrone has been working for the past five years on a [dashboard](#) showing the complicated groundwater withdrawal permitting system in the Western 17 states for use by agencies, water managers and interested citizens.

But the global groundwater "call to action" aims to cut a swathe through all these overlapping problems in order to promote practical, sustainable solutions. Another aim, says Villholth, is to maintain this awareness all the way up to the [United Nations' World Water Day](#) in 2022, titled "[Groundwater: Making the Invisible Visible](#)."

"At the end of the day, we need more awareness among the general public — that's how you can then push the politicians and others to take action," Villholth said. And while she admits that there are many competing global problems, like climate change and energy production, the integral role that groundwater plays in many of these issues means that it deserves a similar status of concern. "Let's see if we can make that happen."