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Climate change threatens groundwater supplies in Greater Boston, study says



Jake Ryan, a field engineer with the Boston Groundwater Trust, takes a measurement of the groundwater level at a test well in the Fenway on Aug. 29, 2022. The drought is leading to lower groundwater levels in the city, threatening buildings that have wood pilings.

Jessica Rinaldi / The Boston Globe via Getty Images

By **Craig LeMoult**

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Boston.

While the study notes that groundwater levels in Greater Boston have been increasing in recent years, its authors say hotter temperatures and changes in precipitation are likely to reduce the replenishment of groundwater moving forward. And those depleted levels could have profound impacts on drinking water, plants, wildlife and infrastructure.

Nearly 70% of the Greater Boston region relies on local surface water like town reservoirs and groundwater sources like wells for their drinking water. Groundwater is also essential for healthy streams, plants and wildlife. In some places, the demand for groundwater during droughts is already straining the supply of this natural resource, said Samantha Woods, executive director for the North and South Rivers Watershed Association.

"The groundwater is the bank," Woods said. "If we were going to speak about it in financial terms, those would be are really good savings that you live off of when it's not raining."

The UMass Boston report most impacted areas would be more rural communities outside Boston, which could see a reduction in the annual recharge of groundwater of between 18 and 28% by the end of the century. The change is expected to be less in cities, where the replenishment of groundwater is already limited by impervious paved areas.

The study comes from an ongoing research partnership based at UMass Boston called the Greater Boston Research Advisory Group, which has been studying the effects of climate change on the 101 cities and towns in the Metropolitan Area Planning Council. The research is funded by the Barr Foundation. The group issued another [report](#) earlier this year focused on other impacts of climate change to Greater Boston.

The authors note that the effect of climate change on groundwater hasn't gotten the same attention as other environmental impacts, like severe storms and glacial melt.

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"When we talk about climate change, especially in this area of Boston, we talk about sea level rise, we talk about temperature increases, we talk about changes in precipitation because these are things that you can see. They're quite dramatic," said Dr. Jane Knott, an environmental consultant and groundwater expert, who was one of the paper's authors.

Groundwater, however, is largely invisible, Knott said.

"The effect of climate change on groundwater can be just as important over the long term," she continued. "But the reason that it hasn't really been discussed is because it's not front center."

Over the last 50 years, groundwater levels have actually been going up in Massachusetts.

"I think mostly that's attributed to the fact that we have more intense and more frequent rainstorm events," said UMass Boston hydrology professor and associate dean Ellen Douglas, who was also one of the study's authors.

But as temperatures rise, that trend is expected to change. Douglas said by 2030, the amount of water evaporating from the ground and plants will notably increase.

"Trees are going to need more water to to stay alive," Douglas said.

Climate change will also shorten the period in which Boston experiences winter weather, which will affect groundwater because of less snow and a longer growing season. Knott said snow is "perfect" for replenishing groundwater storage because it melts slowly and can be thoroughly absorbed in the ground, as opposed to a heavy rainfall where a lot of water runs off. And a longer growing season means trees and plants will absorb more water, instead of that water passing by plants' roots and replenishing groundwater storage.

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supported by wooden pilings, said Christian Simonelli, executive director of the Boston Groundwater Trust, which monitors groundwater in more than 800 testing wells around the city.

"If the water elevation, the water table, drops, the pilings become exposed to air," he said. "And what can happen is ultimately a pile can deteriorate, the series of piles can deteriorate and rot, and the buildings could start to settle and essentially become unsafe."

Perversely, the study suggests Boston's pilings could be protected by a sinister force: sea level rise. Rising coastal water levels can prevent groundwater from running into the ocean, Douglas explained.

"So it's just like a flood hitting a dam," Douglas said. "Once it hits that dam, It can't go anywhere else. It has to back up, so it floods further upstream."

Even so, while sea level rise might protect the pilings that Simonelli's group is focused on preserving, he's hardly celebrating it.

"What's the value of that building now that it has to have its its basement level or its first level inundated twice daily with sea level rise?" he asked. "You know, the pilings at that point are going to be the least of our issues."

The new study doesn't focus on making policy recommendations, but its authors say their research highlights a need to rethink how we address the state's water issues.

"We have to think about how we manage water use and demand and how we improve efficiency and basically treat water as not the endless resource that we have always thought it is, but as a precious resource that really needs to be carefully monitored and carefully managed and carefully used," said Douglas. "Because we only have a finite amount of water, even though it seems like there's a lot. It's finite. "

**Craig LeMoult** @clemoult

Craig reports on a wide range of topics, including environmental and public health issues. He's covered the impacts of the COVID-19 pandemic and the 2018 gas explosions in the Merrimack Valley. Craig's stories have brought listeners flying over the Arctic Ocean and up

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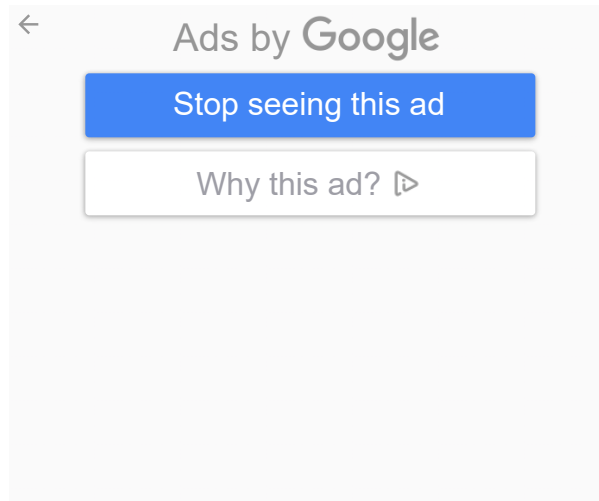
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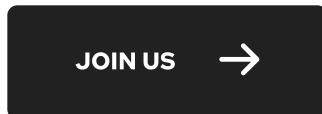


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