How proliferating data centers affect water supply in the United States

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Netflix. Amazon Prime Video. Disney+. Hulu. The choices for streaming services are wide ranging, and during the COVID-19 pandemic, more people are subscribing to these sources of at-home entertainment. The increase in users of streaming services results in an immense amount of data used by data centers worldwide, and some

experts estimate that this data volume is expected to grow sixfold by 2025. However, there is more to these services than just a click of a button, as these data centers require a tremendous amount of energy to operate.

According to Civil and Environmental Engineering Assistant Professor Landon Marston, electricity generation is the second-largest [water](#) consumer in the United States. Enormous amounts of water are required to generate and dissipate the amount of heat coming from these servers and equipment.

Moreover, the United States is home to many of the world's data centers.

"About 30 percent of the world's data center servers are located in the United States," said Marston. "It takes a massive amount of water to produce the electricity needed, which means that data centers indirectly use a lot of water through their large electricity demand."

In the U.S., most of these data centers are along the east and west coasts near large population centers. Many of these areas are in water-starved regions because the hot, dry climates increase the availability of solar and wind energy. In fact, Marston estimates that one-fifth of data centers draw water from moderately to highly stressed watersheds in the western U.S.

Since water is relatively cheap, it's not usually a consideration when building a new data center. However, in some communities where data centers are being built, the significant water use places pressure on the water supply and infrastructure.

Water use has broad impacts on local water supplies by affecting the quality and availability of water to local residents. When data centers, which use billions of gallons of water per year, are built in areas already

asking their residents to conserve their water usage, this puts a strain on the environmental resources. With climate change expected to increase temperatures, prolong droughts, and affect rainfall, this would add additional stress to these water-starved areas.

That stress, in addition to the upward trend of data usage, creates a challenge that is important to alleviate moving forward.

In 2021, Marston led a study that represents the first-ever effort to calculate the spatially detailed carbon and water footprint of data centers operating in the U.S. by using detailed records of data centers, electricity generation, greenhouse gas emissions, and water consumption. Their results showed that the data centers rely heavily on water-scarce basins to supply their direct and indirect water requirements, which can expose potential risk in water-stressed areas.

"For these reasons, environmental considerations should be included in the discussion alongside infrastructure, regulatory, workforce, client proximity, and tax considerations when locating new data centers," said Marston.

He noted three main ways to alleviate the issue of water strain in communities near data centers. First, the industry can continue to seek energy-efficient improvements to lower energy requirements, which in turn lowers water usage. Secondly, he recommended investment in solar and wind energy, which require significantly less water than other forms of electricity generation. Finally, new data centers can be placed in areas where water is abundant and temperatures are cooler to reduce their impact on water resources in the surrounding area.

As more people sit down daily to binge watch the next popular show, Marston warns that it comes at a cost of sufficient water supplies for many communities throughout the country.