Domestic Water Use

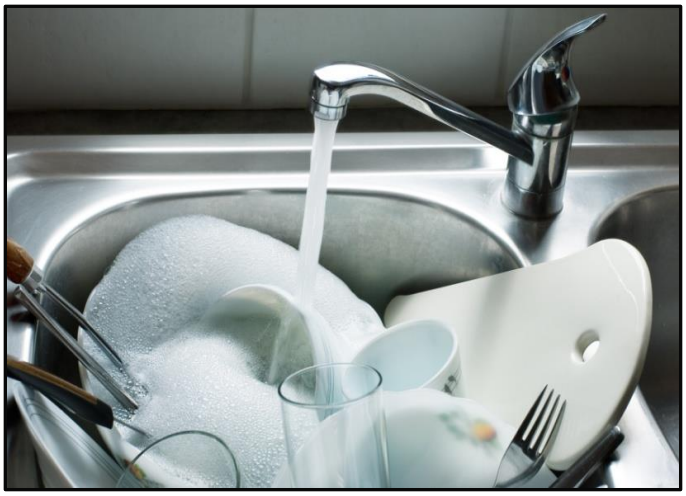
This EnviroAtlas national map estimates the total water used each day in millions of gallons for domestic or residential purposes for each 12-digit hydrologic unit (HUC) in the contiguous U.S. For this map, domestic or residential water demand includes all indoor and outdoor uses, such as for drinking, bathing, cleaning, landscaping, and pools for primary residences. It includes the demand on both public water distribution systems and self-supplied water from either ground water or surface water sources. It does not include water use in second homes and vacation rentals.

Why is domestic water use important?

Individuals and communities depend on water resources for drinking, household use, recreation, agriculture, industry, power generation, and transportation, among other uses. Evaluating demand can provide insight into the delicate balance between water availability and use. Though water appears to be everywhere, it is a finite resource. Overuse within a watershed, from all uses, not just domestic, can lead to unintended consequences, such as water shortages, more treatment, and higher costs from storage and distribution. In addition to the economic impacts of treating or delivering water, overuse of water resources can impact ecosystems, such as forests and wetlands, and the ecosystem services, or natural benefits, which they provide.

Domestic use is among the most fundamental uses of water resources. Based on the data used for this map, the average person in the contiguous U.S. uses approximately 101 gallons of water a day.[1] Usage varies throughout the year and depends on many factors, such as climate, population density, evolving technologies and practices, conservation efforts, cost, and cultural preferences (e.g., landscaping). The EPA WaterSense Partnership estimates that over 70 percent of daily water usage comes from indoor activities such as flushing the toilet, washing clothes, and bathing.[2]

Natural ecosystems such as wetlands, trees and forests, and water bodies protect the supply and quality of water resources. They ensure that clean and plentiful water is available for drinking, recreation, and aquatic habitat by providing ecosystem services. These services include storing and filtering rainwater, and preventing sediment and contaminants from entering waterways. Natural ecosystems also regulate the flow of water throughout the water systems, by storing rainwater and slowly releasing into ground or to waterways.



Regulating flows in streams helps protect water quality, aquatic habitat, and water supply in downstream areas. Understanding the demand placed on these systems will help safeguard their ability to continue providing such services.

How can I use this information?

Recognizing the demand for clean and plentiful water within a subwatershed is a critical step in identifying potential imbalances and trends of supply and demand. Within EnviroAtlas, this map can be used with maps on agricultural water use, thermoelectric water use, and industrial water use to visualize which areas have relatively high demands on their water resources.

This data can also be used in conjunction with the maps that illustrate water availability, such as the “water supply in reservoirs” map, within the 12-digit HUCs, in order to demonstrate where demand may outpace availability at the watershed scale. It also highlights where the ecosystems that protect water resources may experience strain, require protection, or benefit from restoration. In areas with significant imbalances or detrimental trends, measures to further understand and alleviate pressure on the water supply could be implemented.

EnviroAtlas also includes domestic water use data for each community area. The domestic water use community maps estimate the water used in thousands of gallons per day for domestic purposes within census block groups for EnviroAtlas community.

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How were the data for this map created?

The U. S. Geological Survey (USGS) 2010 Water Use data was used to calculate the number of gallons used per person per day in each county in the contiguous United States. These values were used to calculate a median per capita use for each state to account for variation between counties.

These median values were then applied to a distributed population map, known as dasymetric population data. With dasymetric mapping, population could be more accurately distributed within census block groups using 2010 Census data and 2011 National Land Cover Data (NLCD). This technique estimates the number of people in any given area and their estimated domestic water usage. Finally, the applied water use values were summarized by 12-digit HUC boundaries taken from the NHDPlusV2 Watershed Boundary Dataset (WBD Snapshot).

What are the limitations of these data?

The data that is reported for water usage in the United States is complex and has limitations. The calculations are based on the available data, which may not accurately represent water usage. For example, available data, such as that from public suppliers, is used to provide estimates for areas in which there might be less data available, such as areas with a lot of self-supplied wells. Additionally, people are transient, and routinely cross reporting boundaries for activities such as work or vacation, which may influence results.

In addition to these complexities, another limitation in estimating water use is the location of the withdrawal and the distance for delivery. Self-supplied withdrawals (e.g., private wells) are calculated in the county in which the withdrawals occur, but publicly-supplied deliveries (e.g., from a municipality) may cross county, multiple county, or municipal borders. For example, surrounding or upstream counties may supply urban counties, such as New York, N.Y., or Washington, D.C., that have limited access to local natural resources. When delivery systems cross boundaries, it becomes difficult to determine where and how many people use the water. Considerable efforts have been made by USGS to standardize, acquire, estimate, and report the most accurate available data. Despite the challenges, these data are the best available for water use for the nation.

How can I access these data?

EnviroAtlas data can be viewed in the interactive map, accessed through web services, or downloaded. The 2010 USGS water use data is available for download.

Where can I get more information?

There are numerous resources on domestic water use and demand; a small selection of these resources is listed below. EPA and USGS have additional resources on their respective websites. For specific questions about the USGS Water Use data, please visit the USGS water use website or the USGS Guidelines listed below. For additional information on how the data were created, access the metadata for the data layer from the layer list drop down menu on the interactive map. To ask specific questions about this map contact the EnviroAtlas Team.

Acknowledgments

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Selected Publications

1. U.S. Geological Survey. 2010. Estimated use of water in the United States in 2010. USGS Circular 1405. Accessed March 2021.

2. Environmental Protection Agency. 2008. Indoor water use in the United States. Accessed March 2021.

Brekke, L.D., J.E. Kiang, J.R. Olsen, R.S. Pulwarty, D.A. Raff, D.P. Turnipseed, R.S. Webb, and K.D. White. 2009. Climate change and water resources management: A federal perspective. U.S. Geological Survey, Circular 1331, U.S. Geological Survey, Reston, Virginia.

Hanak, E. 2007. Finding water for growth: New sources, new tools, new challenges. *Journal of the American Water Resources Association* 43(4):1024–1035.

House-Peters, L., B. Pratt, and H. Chang. 2010. Effects of urban spatial structure, socio-demographics, and climate on residential water consumption in Hillsboro, Oregon. *Journal of the American Water Resources Association* 46(3):461–472.

Hutson, S. (compiler). 2007. Guidelines for preparation of state water-use estimates for 2005. U.S. Geological Survey Techniques and Methods Book 4, Chapter E1. Accessed April 2020.

Kenney, D., R. Klein, and M. Clark. 2004. Use and effectiveness of municipal water restrictions during drought in Colorado. *Journal of the American Water Resources Association* 40(1):77–87.