Industrial Water Use

This EnviroAtlas national map estimates the water used for industrial purposes in millions of gallons per day in each 12-digit hydrologic unit (HUC) in the contiguous United States. For this map, industrial water demand includes the amount of water used for manufacturing and production of commodities, including chemical, food, paper, wood, and metal production. Industrial water comes from self-supplied (e.g., private wells or reservoirs) surface and groundwater.

Why is industrial water use important?

Industrial use is a major economic consumer of water resources. The United States Geological Survey (USGS) estimates that in 2005 industrial water use accounted for 4 percent of all water withdrawals within the U.S.[1] Based on USGS data, an average of 18,200 million (18.2 billion) gallons of water is used each day in the U.S. to support manufacturing and the production of commodities.

USGS estimates that industrial water withdrawals declined by eight percent from 2000 to 2005. This decline may be a result of shifts in industrial practices and technology. Usage varies throughout the year and across the country depending on factors such as climate, population density, evolving technologies and practices, conservation efforts, cost, and cultural preferences. The EPA WaterSense Partnership states that moving products, maintaining temperature, and cleaning of equipment are some of the most common uses of water in industry.

The overuse of water resources within a watershed can lead to unintended consequences, such as water shortages, the need for additional treatment, and higher costs from storage and distribution. Overuse can also impact ecosystems, such as forests and wetlands, and the ecosystem services, or natural benefits that they provide. Maintaining appropriate natural resource usage can help ensure the availability of a stable water supply. Natural ecosystems such as wetlands, trees and forests, and water bodies help protect the supply and quality of water resources. By storing and filtering rainwater, regulating the speed and volume of water flows, and preventing sediment and contaminants from entering the waterway, natural land cover ensures that clean and plentiful water is available for drinking, recreation, and aquatic habitat. Understanding the demand placed on these ecosystems will help ensure their continued ability to provide such services.

How can I use this information?

The map, Industrial Water Use, can be used to help evaluate the demand for clean and plentiful water within a 12-digit HUC. Understanding water uses is a critical step to identifying potential imbalances and trends in supply and demand. Within EnviroAtlas, this map can be used with maps on agricultural water use, thermoelectric water use, and domestic water use to visualize which HUCs have relatively high demands on their water resources.

These data can also be used in conjunction with the maps that illustrate water availability, such as the "water supply in reservoirs" map and precipitation 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.

This map can be used to complement the maps showing stream length, density, and impairments for metals, nutrients, and temperature. By comparing thermoelectric use to stream impairments, users can better assess the extent of stresses to local watersheds.

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How were the data for this map created?

This map was created by combining water use estimation data from the United States Geological Survey (USGS) and the location of industrial facilities from Dun and Bradstreet. The 2005 USGS estimated water use tables summarize the daily water withdrawals for industrial use by county throughout the US. The withdrawals for industrial use were then evenly distributed among the industrial facilities within the county.

Where there was no county level water use data available for facilities, estimated water use was determined using an inverse distance-weighted grid derived from points with water use. For the purposes of EnviroAtlas, the estimated water use for each facility was summarized by 12-digit HUC.

What are the limitations of these data?

The data that are reported for water usage in the United States are complex and have limitations. The calculations are based on the available data, which may not accurately represent water usage. For example, available data on public supply for industrial use is not included and therefore the total use for industry may be underestimated. Additionally, there were a number of facilities without county self-supplied water use data. For these points, water demand had to be extrapolated from the nearest available data points. As a result, these points are likely to be under- or overestimated.

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 national water use.

How can I access these data?

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

Where can I get more information?

There are numerous resources on industrial 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 website or see the USGS publications below. For additional information on how the data were created, access the metadata for the data layer from the drop down menu on the interactive map table of contents and click again on metadata at the bottom of the metadata summary page for more details. To ask specific questions about this map contact the EnviroAtlas Team.

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Selected Publications

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