

WATER EFFICIENCY

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How Excessive Water Use Degrades Water Quality

The demand for water in the United States creates the need to withdraw from our natural water bodies, dig wells, and build dams. Using too much water can lead to a dwindling water supply and degraded water quality by:

- Altering stream flows that diminish habitats and wetlands.
- Increasing nonpoint pollution, caused by water flowing across land, washing away the soil, and collecting pollutants from various sources. Nonpoint pollution carries sediments, nutrients, salts and other pollutants into water bodies and is largely caused by over-irrigating farm fields and urban landscapes. Nutrients from fertilizers such as nitrogen, phosphorus, and potassium are naturally occurring, but habitats can be destroyed when excess amounts of any one nutrient, especially phosphorus, is concentrated in the soil or water.
- Creating the need to build additional dams. Dams generate nonpoint source pollution by trapping sediment and other pollutants, affecting water quality both upstream and downstream. This concentrates pollutants, causes sediment in the river to pile up, decreases dissolved oxygen, and alters water temperatures.
- Leaking on-site disposal systems: A leaky toilet caused by a faulty flush valve can waste ten gallons an hour.

US Water Use

Total Withdrawals: The US withdraws about 408 billion gallons a day from its streams and groundwater aquifers.

US Use of Withdrawn Water:

- 47% for thermoelectric generation. The water is used for cooling then returned to the stream. About 4% of the withdrawn water is lost as steam.
- 34% for irrigation. 81% of this water does not return to the water source as most of it evaporates, remains in the soil, or waters plants.
- 9% for public water supply.
- 6% for industrial use.
- 4% for other - mining, livestock, individual supply, commercial uses.

Residential Water Use

According to a 1999 study, residential end use of water in the United States is equivalent to more than one billion glasses of tap water daily. 58% of water is used outdoors (gardening, swimming pools) and 42% indoors. A typical US household uses an average of 87,000 gallons of water per year.

Daily indoor per capita water use in a typical single family home is 69.3 gallons. Overall use falls into the following categories:

- body cleanliness - 45.2%: toilets - 26.7% baths - 1.7% showers - 16.8%
- washing- 23.1% clothes washers - 21.7% dishwashers - 1.4%

- faucets - 15.7%
- leaks - 12.7%
- other domestic uses - 2.2%

Benefits of Water Efficiency

The average household spends as much as \$500 per year on its water and sewer bill. By making just a few simple changes to use water more efficiently, households could save about \$170 per year. If all US households installed water-efficient appliances, the country would save more than three trillion gallons of water and more than \$18 billion per year. Also, when we use water more efficiently, we reduce the need for costly water supply infrastructure investments and new wastewater treatment facilities.

Save Water, Save Energy

Water Use and Energy: American public water supply and treatment facilities consume about 56 billion kilowatt-hours (kWh) per year—enough electricity to power more than five million homes for an entire year. Energy is used to extract and convey water from its source, to treat and distribute it, to use it by its end user, then to collect and treat it before releasing the water back into the stream or other water body. The cost of the energy used to run drinking water and wastewater systems can represent as much as one-third of a municipality's energy bill and 3% of the total US annual electricity consumption.

Efficient Water Use: Efficient water use can reduce the amount of energy needed to treat wastewater, resulting in less energy demand and fewer harmful byproducts from power plants. By reducing household water use, we cannot only help reduce the energy required to supply and treat public water supplies, but we also can help address climate change.

- If one out of every 100 American homes were retrofitted with water-efficient fixtures, we could save about 100 million kWh of electricity per year - avoiding 80,000 tons of greenhouse gas emissions. That is equivalent to removing nearly 15,000 automobiles from the road for one year.
- If 1 percent of American homes replaced an older toilet with a high-efficiency toilet, the country would save more than 38 million kWh of electricity - enough to supply more than 43,000 households electricity for one month.
- Running your faucet for five minutes uses as much energy as running a 60W incandescent bulb for 14 hours.

Water Efficiency, Human Health, and the Environment

Depleting reservoirs and groundwater aquifers can put water supplies, human health, and the environment at serious risk. Lower water levels can lead to higher concentrations of natural contaminants, such as radon and arsenic, or human pollutants, such as agricultural and chemical wastes. Using water more efficiently helps maintain supplies at safe levels, protecting human health and the environment.

Environmental Benefits of Water Efficiency

Water efficiency, together with reducing pollutants such as pesticides, can be an effective way to reduce pollution caused by excessive watering and water use. Some of the environmental benefits that are aided by water efficiency include:

- Fewer sewage system failures caused from excess water overwhelming the system.

- Healthy, rather than depleted and dried up, natural pollution filters such as downstream wetlands.
- Reduced water contamination caused by polluted runoff due to over-irrigating agricultural and urban lands.
- Reduced need to construct additional dams and reservoirs or otherwise regulate the natural flow of streams, thus preserving their free flow and retaining the value of stream and river systems as wildlife habitats and recreational areas.
- Reduced need to construct additional water and wastewater treatment facilities.
- Elimination of excessive surface water withdrawals that degrade habitat both in streams and on land adjacent to streams and lakes.

Residential Water Conservation

Residential Demand accounts for about three-quarters of the total urban water demand. Indoor use consumes about 42% of all residential use. Many homes built before 1994 are equipped with inefficient plumbing fixtures and appliances that use 30%-40% more water than modern, efficient units

Efficient Plumbing: . People can substantially reduce their water use without altering their behavior simply by installing efficient fixtures and appliances. Payback time for these efficiency upgrades is typically less than five years. An average three-member household can reduce its water use by 54,000 gallons and low water bills by \$60 a year if water efficient plumbing fixtures are used.

Leaky faucets that drip at the rate of one drip per second can waste more than 3,000 gallons of water each year. If you're unsure whether you have a leak, read your water meter before and after a two-hour period when no water is being used. If the meter does not read exactly the same, you probably have a leak.

Turn Off the Faucet: The average bathroom faucet flows at a rate of two gallons per minute. Turning off the tap while brushing your teeth can save up to 8 gallons of water per day, which equals 240 gallons a month.

Faucet Aerators break the flowing water into fine droplets and entrain air while maintaining wetting effectiveness. These inexpensive devices are easily installed and can reduce the water use at a faucet by as much as 60% while still maintaining a strong flow.

Leaky toilets can waste about 200 gallons of water every day. To tell if your toilet has a leak, place a drop of food coloring in the tank; if the color shows in the bowl without flushing, you have a leak.

Efficient Toilets: If your toilet is from 1992 or earlier, you probably have an inefficient model that uses between 3.5 and 7 gallons per flush. 3.5 gallons per flush toilets use nearly 40% of indoor residential use. The average American uses 9000 gallons of water to flush 230 gallons of waste down the toilet per year. New and improved high-efficiency models use less than 1.3 gallons per flush—that's at least 60 percent less than their older, less efficient counterparts. Retrofitting your house with high-efficiency toilets can save a family of four roughly \$1,000 over

the next 10 years without compromising performance. The payback on replacing older toilets with low flush toilets is about six years.

Shower Power: A full bath tub requires about 70 gallons of water, while taking a five-minute shower uses 10 to 25 gallons. If you take a bath, stopper the drain immediately and adjust the temperature as you fill the tub.

Low-Flow Showerheads: Showers account for about 20% of total indoor water use. By replacing standard 4.5 gallon / minute showerheads with those that flow at 2.5 gallons / minute, a family of four can save approximately 20,000 gallons per year.

Make It a Full Load: The average washing machine uses about 41 gallons of water per load. High-efficiency washing machines use less than 28 gallons of water per load. To achieve even greater savings, wash only full loads of laundry or use the appropriate load size selection on the washing machine.

Outdoor Residential Use

Watering Landscape: The typical single-family suburban household uses at least 30 percent of their water outdoors for irrigation. Some experts estimate that more than 50 percent of landscape water use goes to waste due to evaporation or runoff caused by over-watering. Nationally, 32% of outdoor water use goes toward lawn care.

Drip irrigation systems use between 20 and 50 percent less water than conventional in-ground sprinkler systems. They are also much more efficient than conventional sprinklers because no water is lost to wind, runoff, and evaporation. If your in-ground system uses 100,000 gallons annually, you could potentially save more than 200,000 gallons over the lifetime of a drip irrigation system if installed - that's a savings of at least \$1,150.

Xeriscape Landscaping: The term *xeriscape* is derived from the Greek word *xeros* meaning dry. The goal of a xeriscape is to create a visually attractive landscape that uses plants selected for their water efficiency. Properly maintained, a xeriscape can easily use less than one-half the water of a traditional landscape. Once established, a xeriscape should require less maintenance than turf landscape. By applying xeriscape principles to your landscape, you will not only save water, but you will also enjoy the beauty and diversity of native and other water-wise (drought-tolerant) plants. Many delightful varieties of native trees, shrubs, flowers, and grasses do very well in a drier climate.

Resources: HOME Water/Energy: www.homeenergy.org; EPA - How We Use Water in These United States; EPA - How to Conserve Water and Use It Effectively.

Louise Gorenflo prepared this fact sheet, the 19th in a series to encourage civic involvement in community problem-solving. Contributions made to The Learning Community are tax deductible. You may send your contributions to or request information from The Learning Community at 184 Hood Drive, Crossville TN 38555 (484-2633.)