

Bottled or Tap?

A Controversy for Science, Economics, and Society

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Every year, Americans spend billions of dollars on bottled water.¹ We purchase a bottle from the vending machine or buy a case at the grocery, no longer considering the water that's freely available from our taps. As consumers and as citizens, however, we should pause to study the personal and public consequences of this choice. Should we drink bottled water or tap water? Let's look at the implications for science and social studies.

A Brief History of Municipal Water

The history of tap water begins with a twin desire for public health and for empire. Ancient Romans built 11 major aqueducts between 312 B.C.E. and 226 C.E., the longest being 59 miles, to carry fresh water from hillside streams to Rome. Graceful stone arches carried the water on its final stretch toward the city, but for most of their length, the aqueducts were channels bored through rock underground. Some of the potable water was reserved for the emperor, some was sold to rich Roman citizens for their private villas, but much was available to everyone through a network of public fountains.

In North America, Philadelphia became the first city to provide fresh drinking water as a government service in 1812. Water was pumped from the Schuylkill River (upstream from the city) into a large reservoir atop the "Fair Mount." Gravity then forced the water through pipes to homes and industries.²

Today, there are approximately 155,000 public water systems in the United States. About two-thirds of the

population is served by systems that rely on surface water (such as lakes, rivers, and reservoirs) as their source, and one-third on ground water.³

A Brief History of Bottled Water

The story of bottled water springs from health spas and Yankee entrepreneurship. In 1845, a company began selling bottled water in Poland Spring, Maine, to summer visitors who wanted to take home some of its famed spring water. Deer Park, founded in 1873, was named for a spring in the mountains of western Maryland—a haven for wealthy residents of Washington, D.C., including President Taft, who honeymooned there and "took the waters."⁴ A decade earlier in France, the Perrier company was founded by decree of Napoleon III.

U.S. consumers considered bubbly "mineral water" to be a specialty item until the late 1970s, when sales of non-carbonated bottled water took off due to heavy marketing by large food and beverage corporations. Evian, owned by French food giant Danone and distributed in the U.S. by Coke, was the

first to offer plastic bottles nationwide in 1984. Other major players in the U.S. bottled water market include Dasani (Coke), Aquafina (Pepsi), and imports like Fiji Water. Nestlé bought out many of its major competitors and now owns a dozen brands including Poland Spring, Deer Park, Ice Mountain, Perrier, and S. Pellegrino. Nestlé has the biggest share of the U.S. market today, 26 percent.⁵

Commercial Titans Target Youth

In 2008, U.S. residents were the world's leading consumer of bottled water, drinking 9.4 billion gallons, or approximately one 8-ounce glass per person every day.⁶ We spent \$12.6 billion on bottled water, a rise in profits of 7.4 percent over 2007. Bottled water is the second largest U.S. commercial beverage category, carbonated soft drinks being first (as measured by volume).⁷

The book *2009 Focus Report: The Kids' Beverage Market in the U.S.* "explores the beverages designed especially for youngsters and the dynamics of this special consumer group." The report measures "wholesale dollar sales and provides an overview of the segments that the market contains. It also projects the kids' beverage market five years into the future." You cannot see this report free on the web. Bottled water manufacturers, who are very interested in the youth market, may purchase it for \$1,995.⁸

Los Angeles Public Works removes debris caught by booms in the LA River after a storm.

Photo by Bill Macdonald/Algalita Marine Research Foundation



Personal Finance and Media Literacy

So why do we buy this product? Water in a bottle is convenient, but a thermos of tap water is also handy. Water in a bottle may taste different, but independent taste tests conclude that most people cannot distinguish typical tap water from non-fizzy bottled water. Bottled water is fashionable, but is that a good reason to pay so much for it?

A bottle of water typically costs from \$1 to \$3, so drinking a bottle a day over the summer can easily total almost \$100 or more. In contrast, the cost of a drink of cool water from the kitchen tap costs a few hundredths of a penny.⁹ It's free from a fountain at the public pool or school. So what's so special about this product that we seem willing to pay so much for it?

As an experiment, a student could purchase a thermos or canteen to carry

tap water, and then place money that he or she would spend on bottled water in a piggy bank, day by day. At the end of the summer, what could the student buy with the money saved? That object, maybe a toy or a book, would be a concrete example of the *opportunity cost* of purchasing bottled water.

Advertisers strive to convince us that their manufactured product can best meet our human need. Is that true in this case? Are the benefits derived from bottled water so much greater than those delivered by the tap that they are worth the difference in price? Let's compare the options according to some other criteria.

Health and Safety

Many people assume that bottled water is healthier than tap water, but in many cases it *is* tap water, and that may be a

good thing because tap water is more carefully regulated than bottled water. (A bottle of Dasani or Aquafina, for example, consists of clean tap water that is cleaned again with an energy-intensive, reverse-osmosis filtration process.)

The EPA and local governments regulate tap water and routinely test samples and report the results to the public. Bottled water falls under the Food and Drug Administration, but the FDA does not regulate water that is packaged and sold within the same state. Companies do not publish the results of their own tests of water quality, so consumers are left without an independent advisor. Scientific studies have found small amounts of chemical contaminants in bottled water, some of which "exceeded the voluntary standards established by the bottled water industry."¹⁰ Most of these trace contaminants are the same

as might be found in water coming from the tap (such as disinfection byproducts), while some contaminants (such as Bisphenol A, which comes from plastic) have been detected in specific brands of bottled water.

FDA regulations allow bottled water to contain the same low quantities and types of contaminants as might be found in public water. The FDA does not rigorously monitor or report microbiological contamination (such as mold and bacteria) in bottled water.¹¹ In recent years, FDA warnings about specific problems found with bottled water have not reached the public for weeks or months.¹²

The bottled water industry builds its image on the purity of its product. Independent studies, however, have concluded that while bottled water might be better for your health than sugary soda, it is no better for you than water from the tap.

Oil and Energy

Bringing tap water to your home is a very energy efficient way to deliver water. Energy and materials are used in building a water treatment plant and burying underground pipes, and then to filter and pump the water that's delivered to your home or school. Such a public utility can provide huge volumes of cool water at low cost to many people for decades.

Bottled water represents a very inefficient use of energy and materials. The plastic in the bottle must be manufactured from petroleum or natural gas (which may be imported by ship), filled with water (which may be filtered in an energy-intensive process), packaged with other bottles in cardboard and plastic containers, and then trucked to a store, carried in a car to your home, often cooled by refrigeration, and finally—after use—carried to a recycling station, incinerator, or landfill, if it does not just become litter. Annual U.S. production of bottled water requires an equivalent of about 17 million barrels of oil.¹³ Scaled down, the Pacific Institute estimates

that this means that the total amount of energy consumed in the “life cycle” of one bottle of water is equivalent to approximately ¼ its volume in oil.¹⁴ Thus, like other aspects of our economy, the bottled water industry depends on cheap oil for almost every aspect of its operation.

Conservation and Global Warming

Water bottles contribute to all of the environmental problems that arise from our civilization's use of petroleum-based plastics.

First, there is the problem of litter. Of the 36 billion bottles sold in 2006, only one fifth were recycled. The rest ended up in landfills, incinerators, and as trash on land and in streams, rivers, and oceans.¹⁵ Landfills reach capacity as plastic bottles, which may take 700 years or more to decompose, contribute to the load.¹⁶ Water bottles, and other trash, clog our local creeks and ponds. Even the Pacific Ocean is being fouled: about halfway between Hawaii and California, an area twice the size of Texas is awash in slowly decomposing bits of plastic garbage.¹⁷ Plastic trash strangulates and poisons wildlife on a vast scale.¹⁸

Second, there is the problem of air pollution caused by the manufacture, transport, and disposal of plastic. An estimated 2.5 million tons of carbon dioxide is created annually by the production of plastic for water bottles.¹⁹ As a major greenhouse gas, CO₂ contributes to global warming.

Third, changes wrought by global warming—in turn—threaten the natural sources of freshwater in many parts of the world. Loss of precipitation, melting glaciers, and rising sea levels (which can salinize coastal aquifers) will take a toll.²⁰ Civil engineers in California, for one, have begun to plan for the future impacts of climate change on the state's water resources.²¹

Corporate Responsibility?

Around the world, bottling plants are competing with local populations for

the same water supplies, and beverage companies are striving to control or purchase natural water sources. Some developing nations, burdened by debt, are “privatizing” their water supplies by selling them to corporations.²² Closer to home, local residents are trying to block New Hampshire-based USA Springs from pumping more than 300,000 gallons a day from 100 acres it bought. The company calculates that this draw is sustainable.²³

It requires three bottles of water to manufacture and fill one bottle of water for sale (as a result of rinsing bottles before they are filled; mining, transporting, and filtering the water product itself; etc.). Beverage companies state that it is in their own interest to wisely manage freshwater sources. Evian for example, which gets its water from snows and springs in the French Alps, funds local projects to protect water purity. It created the Evian Water Protection Institute to assist global wetlands conservation efforts.²⁴ Nestlé sponsors Water Education for Teachers (WET), a non-profit organization that promotes “the awareness, appreciation, knowledge, and stewardship of water resources.”²⁵ Ethos Water, which devotes 5 percent of its net profits to drinking water projects in the developing world, helps sponsor the United Nation's World Water Day, observed every March.²⁶

Critics such as the Pacific Institute argue that these charitable activities are merely a public relations Band-Aid on a global-sized wound. They state that while public utilities can also misuse a natural source, there are more “voices at the table” when a resource is managed by a government representing all of the people.²⁷ Companies have been known to use up a resource and move on.

Promote or Protest?

Bottling plants can provide work in a time of recession, but they typically bring relatively few low-paying jobs to a community. In 2006, the nation's 628 water-bottling plants employed fewer than 15,000 people, about 24 employees

per factory. Local residents, who usually make up less than half of the staff, likely earn a low wage.²⁸

In brief, supporters of drinking water bottling plants see them as a vital source of jobs and revenue. Opponents argue—in local meetings, regulatory hearings, and lawsuits—that the plants create few jobs and harm local resources, not to mention other conservation problems. Opponents also state that the drinking water industry is not economically or environmentally sustainable, so its benefits will be fleeting.

In June 2007, the U.S. Conference of Mayors (representing over 1,100 U.S. cities) passed a resolution underlining the importance of using municipal water and calling for studies into environmental impacts of bottled water. The list grows of local executives and legislatures banning the use of public funds on bottled water.²⁹ “Back-to-the-tap initiatives” have inspired counter-lobbying by beverage corporations. This debate is echoing in one form or another in dozens of municipalities all over the globe. Should the use of bottled water be encouraged or discouraged? Should bottling plants be courted or shunned?

An International Issue

More than one billion people around the globe still lack access to clean water, and thousands perish daily for lack of it. Many of our most important aquifers are being over-pumped, and half of the world’s wetlands have been lost to development. Almost every major river system on the planet is shared by two or more nations, making water a source of international conflict and a matter of national security.³⁰

In many parts of the world, tap water is not available or safe to drink. Use of bottled water is very high in Mexico, Brazil, China, and Indonesia, partly due to concern over bad local water quality. The failure of governments to provide basic water services has opened the door to private companies and vendors that fill a critical need, but at a very high cost to consumers. The price of bottled water

is often a thousand times that of a drink from a reliable municipal supply. And, as stated above, corporate ownership of water sources may not be in the public’s best interest.

Are freshwater resources a private commodity or a public trust? Should they be “globalized”—bought and sold by large corporations—or do they belong to the local population? Should citizens and their governments spend money on bottled water, or on conserving their natural sources of freshwater and building safe, sustainable public water systems?

Personal Choice, Public Impact

In Ancient Rome, even slaves could get a free, cool drink of water. Today, in most of the United States, a glass of clean tap water is free, or nearly so, to every resident.

When you get thirsty, think about your choice as a consumer and as a citizen. Tap or bottle? What will be the impact of your choice on a planet that you share with 6.7 billion other human beings? Think about your choice. Then go get that drink of fresh water. You need it. ☘

Notes

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3. “Public Drinking Water Systems,” www.epa.gov/ogwdw/pws/factoids.html.
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5. Emily Arnold and Janet Larsen, “Bottled Water: Pouring Resources Down the Drain,” www.earthpolicy.org/Updates/2006/Update51.htm.
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7. Charles Fishman, “Bottled Water: A River of Money. Fact v. Fiction.” (Fast Company, 2007), search on title at articles.moneycentral.msn.com.
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9. Environmental Working Group, “Bottled Water Quality Investigation: 10 Major Brands, 38 Pollutants” (October 2008), www.ewg.org/reports/bottledwater.
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15. Sources cited in Environmental Working Group.
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20. An “aquifer” is a water-bearing stratum of sand, gravel, or permeable rock.
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