

**Bottled Water Session Summary - 2008 Ground Water Summit**  
**National Ground Water Association**  
by  
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No other food on the planet directly displays the significance of ground water than bottled water. Over 3,000 brands are marketed worldwide<sup>1</sup>, but prior to the birth of the modern-day pharmaceutical industry, spring waters were some of the earliest prescriptions to a wide assortment of ailments. In *Wellsprings, A Natural History of Bottled Spring Waters*, Dr. Francis Chapelle describes waters from Saratoga Springs, New York with elevated concentrations of iodine fetching upwards to \$80 per gallon. And then in the late 1970s Perrier emerged as the trendy drink of the “yuppie” and the growth of the bottled water industry has not slowed since.

A global industry estimated to have 2007 revenues ranging from \$46B to 100B, with U.S. consumers spending \$16.8B on bottled water in 2007, coupled with annual growth hovering about 10 percent, the importance of groundwater resources to the bottled water industry is readily apparent. The Beverage Marketing Corporation monitors the global consumption of nearly all beverages and reports that Americans drank about 8.8 billion gallons of bottled water in 2007. Per capita consumption of bottled water in the U.S. is up to 29 gallons per year compared to 2002 consumption of about 20 gallons. But Italy is the leader on a per capita basis it ranks far behind Italy consuming nearly twice as much as the American consumer. Bottled water is an important part of the culture in Europe, and there have been suggestions for creating “Hydrogeological Nature Reserves” to protect the bottled water sources<sup>2</sup>. But with the increased growth in the worldwide demand for bottled water come the inevitable concerns and conflicts over the perceived impacts of groundwater withdrawals on shallow groundwater resources, surface water resources and groundwater dependent ecosystems, along with the social concerns of large bottling plants increasingly being located in rural settings.

### **How Much Water Does it Take to “Make” Water?**

According to the International Bottled Water Association, the annual production of ground water to service the bottled water industry accounts for less than 2/100 of a percent (0.02%) of the total ground water withdrawn in the United States each year<sup>3</sup>. Yet with reported sales of bottled water hovering around 11 billion gallons per year in the United States, coupled with the reported quantity of ground water extracted by

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<sup>1</sup> Does taste-testing hold any bottled water? <http://today.msnbc.msn.com/id/25607964/from/ET/>

<sup>2</sup> De Marsily, G. 1994. Hydrogeological nature reserves? *Future Groundwater Resources at Risk*. IAHS Publication No. 22. pp. 403-407.

<sup>3</sup> “Bottlemania’s” Focus on Bottled Water Dilutes the Real Environmental and Drinking Water Challenges and Opportunities – International Bottled Water Association  
[http://www.bottledwater.org/public/2008\\_releases/bottlemania.htm](http://www.bottledwater.org/public/2008_releases/bottlemania.htm)

the USGS in 2000 of 68.9 billion gallons per day<sup>4</sup>, perhaps a more accurate figure is about 0.04% of the total ground water withdrawn in the U.S. But the Pacific Institute estimates that up to twice as much water can be used in the production process<sup>5</sup>. As a consequence, every liter sold represents three liters of water. But the bottled water industry recognizes that it must increase water efficiency and in some instances this “waste” has been reduced by up to 27% since 2001<sup>6</sup>. Consideration of the water needed to produce the product yields 0.09% of the total quantity of ground water withdrawn in the United States that is dedicated to the bottled water industry.

But what about the water “embedded” in the plastic bottles? Factor in that 24 gallons of water are needed to make one pound of plastic and that 1.5 to 2.7 million tons of plastic used per year to make bottles for bottled water adds an additional 75 billion gallons of water to the bottled water “water” footprint<sup>7</sup>. Considering all of the above “inputs” to bottled water, it appears that nearly 1.3 gallons of water are “virtually embedded” in each liter of bottled water.

### **The Spring Water Conundrum**

Chappelle’s *Wellsprings* chronicles the love affair humans have with spring water due to legends of healing and health associated with drinking or bathing in spring water. The bottled water industry continues to capitalize on the connection to health by bottling and marketing “spring” water. The U.S. Food and Drug Administration have established a bottled water Standard of Identity to define the several different types of bottled water based on specific characteristics of the product. Bottled water products meeting the Standard of Identity may be labeled as bottled water, drinking water, well water, or spring water<sup>8</sup>:

Spring Water - Bottled water derived from an underground formation from which water flows naturally to the surface of the earth. Spring water must be collected only at the spring *or through a borehole tapping the underground formation feeding the spring* (emphasis added). Spring water collected with the use of an external force (such as a pump) must be from the same underground stratum as the spring and must have all the physical properties before treatment, and be of the same composition and quality as the water that flows naturally to the surface of the earth.

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<sup>4</sup> U.S. Geological Survey - Ground water use in the United States  
<http://ga.water.usgs.gov/edu/wugw.html>

<sup>5</sup> Bottled Water and Energy: A Fact Sheet - The Pacific Institute  
[http://www.pacinst.org/topics/water\\_and\\_sustainability/bottled\\_water/bottled\\_water\\_and\\_energy.htm](http://www.pacinst.org/topics/water_and_sustainability/bottled_water/bottled_water_and_energy.htm)

<sup>6</sup> Improving Water Efficiency – Nestle Water Report  
<http://www.nestle.com/SharedValueCSR/Environment/Water/Report/Operations/ImprovingWaterEfficiency.htm>

<sup>7</sup> Bottled Water Vs. Tap Water – Readers Digest <http://www.rd.com/your-america-inspiring-people-and-stories/rethink-what-you-drink/article51807-1.html>

<sup>8</sup> Frequently Asked Questions – International Bottled Water Association  
<http://www.bottledwater.org/public/faqs.htm> (For complete regulatory definitions, see also 21 CFR 165.110(a) (2).)

And this nomenclature is probably the largest point of contention with practitioners in the ground water industry. Wells change the chemistry of ground water by (1) placing well casing and screens in contact with the ground water stored in the aquifer, and (2) serving as conduits of oxygen to aquifers. Pumping also changes the composition of dissolved gases in aquifers by lowering the hydraulic head in the vicinity of a well tapping an aquifer, or as the ground water moves through the pumping equipment bowls and impellers. But pumping wells also permit capturing more water stored in the aquifer than would otherwise discharge freely as springs. And with the U.S. spending billions on restoring habitat for fish, it appears odd that society tries to balance developing “spring” water for the sake of economic development while at the same time promoting in-stream flows for fisheries.

### **Bottled Water and Society**

The development of springs and wells by bottlers, use of bottled water by municipalities, and the debate between the veracity of “safer” water quality between tap water versus bottled water has received much attention in the popular press. In June 2008, the U.S. Conference of Mayors passed a resolution calling for the reduction of bottled water use by municipalities and promotion of the importance of public water supplies<sup>9</sup>. North American cities that have already acted include San Francisco, Salt Lake City, Chicago, Vancouver, BC and St. Johns, NL among many others. While these actions reveal a growing movement opposing regular use of bottled water because of its plastic waste and energy costs to transport drinking supplies<sup>10</sup>, there is also concern that if the wealthy opt out of tap water, there will be less political support for maintaining the excellent municipal drinking-water supplies in the U.S. which are essential for good health. (see the *New York Times* Editorial In Praise of Tap Water published August 1, 2007<sup>11</sup>).

Much of the debate on the development of springs and wells for bottling focuses on whether or not water is part of the “public trust” and can or cannot be sold for profit. One non-governmental organization, H2O for ME located in Maine, decided it was necessary to protect the resource and the environment as a first step. H2O for ME, the bottlers and their stakeholders launched into a statewide debate and added to the national debate on ground water issues. After nearly four years of debate and discussion H2O for ME found legislators who agreed. They also found a willingness among the bottlers and other stakeholders to be constructive and negotiated the passage of a law by the Maine Legislature in June 2007 that did the following:

- It places all large volume wells under the Natural Resource Protection Act (NRPA);

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<sup>9</sup> Bottled water debate hits a boiling point

[http://afp.google.com/article/ALeqM5ggZMEMAVmdIHHB\\_EYUx-ITocvkqA](http://afp.google.com/article/ALeqM5ggZMEMAVmdIHHB_EYUx-ITocvkqA)

<sup>10</sup>Message in a Bottle – FastCompany.com - <http://www.fastcompany.com/magazine/117/features-message-in-a-bottle.html>

<sup>11</sup> Waterwired Blog [http://aquadoc.typepad.com/waterwired/bottled\\_water/index.html](http://aquadoc.typepad.com/waterwired/bottled_water/index.html)

- It provides for an open and transparent citizen process;
- It only grandfathers 2 wells; all others are covered by NRPA;
- It requires perpetual monitoring of all high volume extraction wells;
- It requires the applicant to pay for expert independent consultants to review, evaluate and make recommendations to the State;
- It establishes a freshwater resource committee within the State Planning Office to investigate all freshwater uses within watersheds; and
- It places environmental management and review responsibility for groundwater in two departments, Departments of Environmental Protection and Conservation.

According to former state legislator Jim Wilfong, the Maine law is a start. The newly passed law does not establish a public trust for groundwater. However, it does erode absolute dominion. Each state must review its situation and adjust its water statutes to meet the new realities of the freshwater demands of the bottled water industry. For those states with weak and outdated groundwater law, the new Maine law could be a first step model. Vermont followed Maine's lead on June 11, 2008 when Governor Jim Douglas signed into law legislation declaring Vermont's ground water a public trust and establishing a permit system.

### **Bottled Water Economics**

Economic consultant Kristin Lee describes the economic effects of bottled water facilities on small communities as exemplified by the ongoing efforts by Nestlé Waters North America (NwNA) to operate one of the largest spring-water bottling plants in the U.S. in McCloud, California. Much of the debate over the proposed water-bottling facility has focused on the potential for the community of McCloud to derive economic benefits from its endowment of groundwater and spring water through jobs created at the facility, property taxes paid to the county, and other payments related to the water purchase.

Lee and her colleagues studied the projected economic effects of the facility, drawing upon research of the economic effects of large facilities in other places, and gathering information about the effects of other bottling facilities across the country.<sup>12</sup> The research found that there are economic tradeoffs with such facilities and that economic impact studies frequently emphasize the potential positive effects and fail to account for potential offsetting negative effects. That is, promises of new jobs and local revenues frequently come at the expense of other jobs and other revenues, meaning that the net economic effect may be smaller than projected. Lee identified a number of costs that bottling facilities may impose on local residents and taxpayers but that narrowly focused economic studies fail to capture.

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<sup>12</sup> Lee, K., C. Neculae, E. Niemi, and S. Reich. 2007. "The Potential Economic Effects of the Proposed Water Bottling Facility in McCloud." ECONorthwest. [www.econw.com](http://www.econw.com).

Finally, Lee described that an evaluation of the economic consequences of the NWNA proposal, which included a contract and a fixed formula for water rates for a period of 50 to 100 years, must take into account trends that are shaping economic conditions in California and across the globe. One such trend is the evolving economic value of natural resources, including water. Today economists recognize that water resources, and the natural systems they support, provide many economically valuable goods and services. Therefore, water extraction has an opportunity cost that is usually overlooked in outdated economic models.

Lee's work concluded that NWNA's proposed facility would consume one of the area's most economically valuable assets—water—in a manner unlikely to maximize the economic contribution of that asset to local residents or others downstream, now and over the next 50-100 years, that also value the goods and services it provides.

Journalist Chris Fishman's comprehensive analysis of bottled water reveals that it is difficult to accurately assess the economics of bottled water because the bottled water market is fairly centralized by larger companies. But Fishman reports that industry insiders estimate that half the price of a typical 16 ounce bottle costing \$1.29 goes to the retailer and up to another third shared with the distributor and transport. With the cost of the water, bottle and cap approaching 12 to 15 cents the profit margin is about 10 cents. The profit on multipacks is about 2 cents a bottle<sup>13</sup>. Assuming that only about one third of the water from the McCloud springs actually makes it to a typical bottle that is sold because of water efficiency yields between 2.2 and 4.8 million bottles per day depending on whether the product is sold in 16 ounce or one liter bottles or a profit of ranging between \$225,000 to \$480,000 or approximately \$100 million per year.

### **Bottled Water and Disasters**

Yet with all of the discrepancies and conflicts associated with the bottled water regulations and industry, there is no dispute of the role bottled water plays in disaster relief (tsunamis, earthquakes, floods). The "good story" is that the bottled water companies respond with efficiency and speed with regard to provide bottled water in coordination with emergency relief operations. The bottled water industry provides millions of bottled water servings in response to natural and man-made disasters each year<sup>14</sup>.

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<sup>13</sup> Message in a Bottle – FastCompany.com - <http://www.fastcompany.com/magazine/117/features-message-in-a-bottle.html>

<sup>14</sup> "Bottlemania's" Focus on Bottled Water Dilutes the Real Environmental and Drinking Water Challenges and Opportunities – International Bottled Water Association  
[http://www.bottledwater.org/public/2008\\_releases/bottlemania.htm](http://www.bottledwater.org/public/2008_releases/bottlemania.htm)