Fiji Water

A Sustainability Report:

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Fiji Water developed a simple product that has come to be a symbol of high class and support for the environment. Bottled water is a luxury product which the Fiji company claims is made with 'sustainable practices'. When one takes a closer look at the company and its product though, it is hard to come to the conclusion that they are indeed ahead of the curve on sustainability. Bottled water is surrounded by controversy, its sustainability firmly in question. Fresh water is an increasingly scarce resource that may become a growing source of conflict in the future, and there is likely no way to make bottled water of any kind sustainable. Tap water is more practical, efficient, and in many cases healthier than its bottled counterpart; and this is certainly true for the United States.

We will examine the Fiji Water as a case study of one bottled water brand. We were inspired to asses Fiji Water, because of the Vermont State Legislature's recommendation that stores stop carrying Fiji Water due to health concerns, as well as the current campaign to ban bottled water entirely form the UVM campus due to sustainability concerns. We will look at the sustainability of the production and transportation of Fiji water; of its health concerns; and of its impacts on the Fijian environment, society and politics. We will then compare this to the alternative practice of drinking tap water, as well as the production and health effects of Klean Kanteens (stainless steel reusable water bottles) in conjunction with tap water.

Sustainability of Production, Packaging and Transportation

Fiji Water, understandably from a marketing perspective, yet ironically for a bottled water company, designates a large portion of its website to making claims about the 'sustainable

practices' they make as a company. They separate the sustainable practices into six categories; packaging, logistics, energy, waste and recycling, sourcing locally, and water management.

Fiji's bottling plant is an ISO 14001 certified facility, which is part of what allowed them to 'increase bottle-making and filling efficiency by 15% in 2009' (Fiji Water, 2010). Fiji Water is bottled in exclusively in PET plastic, a quality that the company defines as 'rare' in the bottled water industry. Fiji claims on their website that this decision was made for the benefit of the environment, as according to them PET bottles require '24% less energy to produce, generate 40% less solid waste, and emit 46% less carbon during shipping than glass bottles' (Fiji Water, 2010). In addition, they note that PET is easily recyclable, in fact even in demand, and has many important post-consumer uses. The ability of PET to be recycled is important in Fiji Water's life cycle analysis. Indeed, there are a variety of post-consumer uses for PET, ranging from uses in carpeting to fibers in clothing. This plastic has potential after its initial use, but one problem certainly remains: in order for PET to be recycled, people have to recycle it. Currently, PET bottles still account for 11% of plastic based materials that ultimately end up in landfills (Saquing et al, 2010). Fiji also mentions that using PET bottles protects the 'safety and quality' of their product and Fiji's plant makes 50,000 of these bottles per hour on site in two factories (Lenzer, 2009), certainly contributing to the 1.5 million gallons of oil used to make plastic water bottles each year (Green Gazette).

Although Fiji says they reduced their plastic content used for bottles in 2009 by an average of 10%, this should have been fairly easy as Fiji bottles weigh more than twice (>4 oz) the average (2 oz) of most other plastic water bottles (Philips, 2009). Fiji have converted to 100% recycled material for their shipping cartons, and are 'investigating' use of recycled PET for bottles. Fiji Water's website claims that by producing 95% of their packaging on site or

getting it from local vendors it is benefiting the local economy and reducing "emissions associated with transport of raw materials and work-in-process packaging" (Fiji Water, 2010). This would be of massive importance to the sustainable aspect of Fiji Water, as shipping the packaging to Fiji from another location would add considerably to the ecological impact of the product. However, this is misleading, because the raw materials are still shipped in from outside sources and some are works-in-process when they reach the Fiji plant. The main example is that their plastic comes from a plant in China, which gets materials from other places to create the plastic (Lenzer, 2009). While it is true that the Fiji plant fabricates the plastic into their signature bottles on site, providing jobs for Fijians, they have not reduced transportation related emissions.

Aside from simply becoming more efficient, 95% of Fiji's on-site waste is recyclable, and the remaining 5% is mostly 'biodegradable'. The word biodegradable must be taken with a grain of salt though, as nothing will biodegrade in a landfill. The time that a product takes to biodegrade must also be considered, because many composting facilities can only compost 'biodegradables' that can decompose over a short time period. Their efforts towards recycling, however, are widespread, from ensuring their own waste is recycled to encouraging local programs in Fiji and even pushing recycling-oriented legislation in the United States. Fiji Water, of course, has vested interest in assuring that bottled waters continue to be used extensively in the United States.

In terms of shipping, Fiji promotes their square bottle design as allowing them to use 10% less trucks when transporting their bottles, although it is believed that the initial incentive for this design was purely economical (Lenzer, 2009). Also, their decision to ship their products to New York via the Panama Canal instead of shipping to L.A. and trucking across the United States means 55% less greenhouse gas emissions. Although shipping is still a massive obstacle

standing in the way of sustainability for Fiji Water, this cut is an important reduction in the life cycle impact. This data does however only compares two paths of shipping to New York, and not an overall assessment of the impact their transportation has on greenhouse gas emissions. Fiji Water still ships to L.A. and then by truck to markets in the Midwest and uses trucks to get its product to many other destinations around the globe.

Environmental, social and political impacts of Fiji Water's operations in Fiji

Fiji Water was created when founder David Gilmour heard of a study in the early 1990s that indicated the existence of the huge, 17 mile long aquifer located on Fiji's main island Viti Levu. He then obtained a 99-year lease that has allowed Fiji Water to tap the resource. Fiji's corrupt government has not been able to build the infrastructure or front the funds needed to tap into the aquifer for use by its own people, and so Fiji Water has nearly exclusive access to this crucial source of fresh water (Lenzer, 2009).

Fiji Water asserts that without them Fiji would be in much worse shape than they are today. Without them, a chunk of the economy would disappear, school projects would collapse, and so would water access projects (Lenzer, 2009). Fiji Water reports that it accounts for 20% of Fiji's exports and thus 3% of its GDP, but is overshadowed by tourism and sugar as the major industries (Lenzer, 2009). They claim to also fund sanitation projects in Fiji, to underwrite kindergartners and in January 2009 they donated $500,000 to the military regime to help deal with flood relief and a subsequent $450,000 that summer for remediation projects (Lenzer, 2009). Fiji Water has managed to make water available to 40,000 Fijians through access projects (Fiji Water, 2010). Fijians do not however have access to the Fiji Water aquifer.

Currently the government does not tax the company, and when taxes have been proposed the company has shut down its operations in protest (Lenzer, 2009). The government now seems

to have little will to confront the company, so the country receives little benefit from the exploitation of a major natural resource. Fiji Water has even been successful in keeping other local bottling companies from using the word "Fiji" in their product name (Lenzer, 2009). This prevents local people form benefiting from the name recognition that Fiji Water has built for the resource, and yet they boast on their website that they have benefited local economic development by advertising the country around the world. It is hard to believe that they have opened up doors for Fijians when Fiji Water has copyrighted the word "FIJI" in many nations including the U.S. (Lenzer, 2010).

In response to threats from local villages during times of political unrest Fiji Water decided to donate in the neighborhood of $100,000 a year to help local communities. This is meager in comparison to the company's massive marketing budget, which clocked in at $10 million in 2008. They also paid $250,000 to be part founders of the SLC soccer stadium (Lenzer, 2009).

Fiji Water's response to the Mother Jones article that Anna Lenzer wrote exposing controversies surrounding the company, does not point by point refute claims that she made about their operations or the state of water access in Fiji. Instead their rebuttal simply regurgitates the charitable efforts they list on other parts of their website. While, as any business would, they have invested more in local communities since violence erupted in 2000 when their plant was taken over by angry locals (Lenzer, 2009), they still don't offer the support they could. In the Mother Jones article Lenzer talks about the village Rakiraki near the Fiji plant, which experiences the many water problems that the rest of the country does. Fiji Water has clearly not heavily invested in improving the lives of people right next to their plant, despite boasting about their philanthropic efforts in the region.

The aquifer that Fiji Water draws from is an incredible resource that should be used to benefit the people of Fiji, a nation where water issues abound. Water supply for locals is unreliable and outbreaks of typhoid and parasitic infections have occurred as a result (Lenzer, 2009). At present their problems include: "crumbling pipes, a lack of adequate wells, dysfunctional or flooded water treatment plants, and droughts" (Lenzer, 2009). Reliance on emergency water supplies is common, with families being rationed as little as four gallons a week (Lenzer, 2009). It has been reported that even patients at hospitals have to cart in their own water (Lenzer, 2009). The pipes in schools are reported to spew leaves, shells, and even frogs (Lenzer, 2009). In order to supplement their meager water supplies some Fijians will bust open fire hydrants or bribe water truck drivers (Lenzer, 2009). This dire water situation will only be exacerbated by climate change.

The one way in which Fiji Water's operations in Fiji is sustainable, compared to other water extraction efforts in places as close to home as Maine, is that they do not draw on the aquifer in the Yaqara Valley faster that it is replenished (Fiji Water, 2010). The reforestation projects they fund in the valley also help preserve the quality of the water in the aquifer. However, if there is more water that can be drawn from the aquifer than they can bottle, as their website claims, why don't they make the extra water available to surrounding villages like Rakiraki?

When Fiji Water brags about the naturally occurring geological protection that its aquifer provides Fiji Water a few interesting thoughts come to mind. First, if the rock surrounding the aquifer is impermeable, then how does rainfall permeate through it to replenish it at speeds greater than the company extracts water? If it is indeed impermeable is their extraction really sustainable? If it is permeable, then it is worth considering that the aquifer is downstream from

the tailings of a gold mine. Also, how is getting water from an artesian source any different than from a municipal facility strictly regulated under the Safe Drinking Water Act in terms of quality? The answer is there is very little difference and drinking tap water is much more sustainable on many levels.

Fiji Water planned to begin conservation and energy projects in 2008 to offset their carbon emissions by 120% (Lenzer, 2009). One problem with this goal is what they consider their current carbon emissions to be. They likely will use only the 2% increase in fuel usage by shipping vessels they claim to result from hiring them to ship their product in calculating their carbon emissions. As a large corporation they probably do effect the movement of shippers in some way, which could mean that they should account for more carbon emissions by the ships carrying their product. Another question worth asking is whether they include the carbon emissions of the Chinese diesel plant that makes the plastic they use. Their website reports the Chinese plant in the full carbon life cycle, but does not say that their offsetting efforts cover that plant and does not say anything of the transport of raw materials to the Chinese plant.

The location of their conservation projects should also be considered. Are these projects going to occur in Fiji, where their water extraction harms an already degraded water system, or will Fiji Water carry out conservation projects in any other part of the world in search of the cheapest project that results in the most carbon offsetting qualities? Business interests may lead them to choose the later.

The goals that they say will help fight climate change are based off of a model called 'forward crediting', as reported by online trade journal ClimateBiz. The ad campaigns that say that their consumers are contributing to preventing climate change are therefore based on actions that have not yet happened, but will over the course of a few decades (Lenzer, 2009). According

to their website Fiji Water has saved the Sovi Basin rainforest. This 50,000-acre rainforest protection effort, also mentioned on Fiji Water Bottles, has not yet obtained a lease (Lenzer, 2009). So, while Fiji Water spokespersons are talking about their "green' efforts as though they have already occurred or are presently being carried out, they have not in reality. They are, in fact, future goals that have yet to be achieved, or in most cases, even begun.

In addition to falling short of their supposed efforts to benefit the Fijian people and their environment, Fiji Water also has influence on the government in Fiji. Beyond the fact that due to their economic power, Fiji Water has forced the Fijian government to abandon efforts to tax and impose any sort of regulation on their plant, there are also claims that Fiji Water's operations legitimize the corrupt military junta. Fiji Water obviously refutes this, saying they have never offered the government support of any kind. They don't actually have to do so to legitimize the junta. Simply by working with the Fijian embassies in places like Japan and the U.S. to market their product they legitimize it (Lenzer, 2009).

Anna Lenzer's experience with the police in Fiji also indicates the company's effect on Fijian politics. The police questioned her, making accusations that she was working for another water company and trying to tarnish Fiji's name. Fijians in the government, military, and police force seem to support the company's operations and don't want problems for Fiji Water, because of the economic importance of the company to the country. This attitude makes the people in power in Fiji unlikely to challenge and regulate Fiji Water for the benefit of its people and environment.

PET Health Concerns

Fiji's website stresses the importance of water to the human body. They point out that, astonishingly, after oxygen, water is the second most important substance to our body, even

noting that approximately fifty to sixty percent of our bodies are made of water. “It (water) helps regulate body temperature, carry nutrients and oxygen to cells, remove waste, dissolve minerals and other nutrients, cushion joints, and protect organs, as well as a host of other critical physiological processes” (Fiji Water, 2010). Next, the website speaks on the especial benefits of Fiji Water that make it stand out from other forms of the liquid. They note the inclusion of silica, bicarbonate, PH, fluoride, and electrolytes. ‘Our water gathers silica (also known as silicon), an important mineral that some believe may improve skin and make joints more flexible. Generally helpful in managing the effects of aging, silica may also help strengthen the skeletal system and support bone health’ (Fiji Water, 2010). Bicarbonate, they say, prevents our blood from becoming too acidic or alkaline, and helps prevent the lactic acid buildup that leads to muscular fatigue. When mentioning the PH of Fiji Water they point out that the water has a normal for our body PH of 7.8 and that it contributes to our overall health. For fluoride Fiji says this: ‘many brands of purified bottled water undergo reverse osmosis or distillation treatments that remove most, or even all, of the fluoride from the water. FIJI Water contains 0.26mg of naturally occurring fluoride per liter, contributing to your daily intake of this tooth-strengthening element’ (Fiji Water, 2010). Lastly, Fiji remarks on the need for replenishing charged ions (electrolytes) after a workout. All seem completely reasonable reasons to quench one’s thirst with a bottle of Fiji Water.

Despite Fiji’s pro-plastic claims, there are plenty of issues surrounding plastic, and particularly plastic used to package food and drinks. Materials from the plastic not only leach into the drinks and end up in the human body, possibly causing harmful effects, but also ultimately end up in the environment. PET, used by Fiji, is desirable in the industry because of

its clear characteristic, which emphasizes the cleanliness of the bottled water (Westerhoff et al, 2008).

One common material that leaches into water from plastic bottles is the element antimony. Antimony is quite toxic and can lead to short term effects such as nausea and dizziness if levels are over the maximum contaminant level (MCL) (Westerhoff et al, 2008). Long-term exposure to antimony can lead to increased blood cholesterol and lower blood sugar. Although it is not specifically classified as a carcinogen due to lack of studies, it is similar to arsenic, a known carcinogen. Antimony-based catalysts produce more than 90% of PET products worldwide, as it is the cheapest, easiest catalyst (Westerhoff et al, 2009). A study of bottled water showed that antimony levels were 0.195 ppb at the beginning of the study and 0.226 ppb after 3 months indoors at 22 C. The initial value is just below the maximum contaminant level for antimony in drinking water in Japan, 2 ppb, while the final value is above. In comparison, local (Southwestern United States) tap water contained .146 ppb. The study showed that time, temperature, and UV radiation all played a role in increasing antimony levels in the bottled water, although temperature was the most influential variable. This is of concern, because Fiji Water is shipped unrefrigerated on shipping vessels through tropical temperatures that exceed 22 C.

When comparing the quality of plastic water bottles an examination of the plastics toxicity is critical. This is a clear benefit to not using plastic water bottles in comparison to stainless steel alternatives. The EPA has listed the terephthalate plastic used in Fiji water bottles as toxic. "Recent reports suggest that endocrine disruptors may leach into the contents of bottles made from polyethylene terephthalate (PET)" (Wagner & Oehlmann, 2009). These endocrine disruptors are a growing concern associated with many different types of plastics. Endocrine

disruptors interfere with natural hormone production and regulation and can therefore have very serious effects (Wagner & Oehlmann, 2009). There are concerns that even fairly low-level exposure can cause adverse effects in humans.

Phthalates are highly controversial material associated with plastic bottles. It is widely claimed that PET 1, the plastic that Fiji uses, does not contain phthalates. That said, studies have shown that phthalates are present in PET 1 bottles that have been left storing water for 10 weeks (Wagner & Oehlmann, 2009). What isn't controversial about phthalates are the health concerns associated with them. They are a known xenoestrogen, and studies indicate that they can cause a variety of problems, such as male reproduction system deformation (Wagner & Oehlmann, 2009).

Acetaldehyde is another leaching contaminate that is found in PET bottles (Choodum et al, 2007). Acetaldehyde is fairly harmless when exposed to humans on short-term, lower levels. However, when applied for long periods acetaldehyde is certainly a carcinogen, as specified by the International Agency for Research on Cancer. It is the material that is at fault for liver cancer being so common in alcoholics. It is also believed to be damaging to DNA and muscle development.

All in all, materials leaching into water from plastic containers are largely dependant on storage conditions. Generally, the longer the bottle is stored, and the higher temperatures it is stored at, the more likely that undesirable material will leach into the bottle (Reimann et al, 2010). Since bottled water is often stored for an indeterminable amount of time as Fiji is far from its markets, this is not particularly reassuring.

Fiji Water Quality in Vermont

Fiji Water comes from Yaqara Valley of Viti Levu (one of Fiji's two principal islands). It claims to be entirely untouched by man and the most pure of waters. This, however, is highly controversial. Everything Fiji Water claims about their purity can and should be contested and questioned, as it is only advertisement licensed by © 2010 FIJI WATER COMPANY LLC.

Anita Kelman is a former professor of Environmental Science at Champlain College and every year she taught there she would conduct a water purity study with her students. They tested bottle water brands with tap water and well water to examine the qualities against each other. Professor Kelman said that along with her students, she tested all sorts of bottled water brands including Evian, Dasani, Aquafina, and thankfully Fiji. And after doing some basic color metric tests and other water purity tests they discovered that Fiji Water had high levels of bacteria. She also found that Evian was the only other brand that ever had an instance with contaminated water. All other bottled water brands tested as clean as filtered tap water.

Year after year Professor Kelman saved her lab reports. Looking back she said, "I found, year after year sky-high levels of bacteria well above standard plate count (SPC)." This may be the result of the product's long voyage in unrefigerated containers to reach Vermont, so it may not contain bacteria when sold in, say Californian stores that are closer to the factory.

So Professor Kelman took her research to the Vermont Department of Health. After listing her as a credible resource they conducted a study themselves buying up bottles of Fiji Water from across the state. They found just as high levels of bacteria however, unlike Professor Kelman, they did not find any E. Coli so the product was not taken off Vermont shelves, and is even still available at the University Marché.

So the question arises, how can Fiji Water get away with selling such contaminated water while still marketing it as healthy, pure, and sustainable? The answer is because of U.S. Food

and Drug Administration Standards. The FDA hasn't seen the need to really monitor water bottle brands very closely. If they really wished to regulate water quality then Fiji would not be sold in a country where the actual need for bottled water is so insignificant. The fact is Fiji Water is an American company doing business on a third-world island, so how good do we really expect the water to be? And even if the water is clean and safe when it is bottled in Fiji, then it shouldn't be shipped for months allowing such bacteria to grow and materials to leach from the plastic bottles.

Although public opinion tends to favor bottled water for safety and health, tap water is actually better regulated than bottled water and must follow incredibly strict guidelines and standards of filtration, contaminant detection and purification (EPA, 2009). While tap water is maintained by the cleaner standards of the Environmental Protection Agency, bottled water is not subject to much regulation by the Food and Drug Administration (Mclendon, 2010). The EPA requires utility companies to test municipal water hundreds of times per month, while the Food and Drug Administration requires bottling companies to test their supply only once per week (EPA, 2009).

Some Key Differences Between EPA Tap Water and FDA Bottled Water Rules

Water Type	**Disinfection Required?**	**Confirmed *E. Coli* & Fecal Coliform Banned?**	**Testing Frequency for Bacteria**	**Must Filter to Remove Pathogens, or Have Strictly Protected Source?**	**Must Test for *Cryptosporidium, Giardia,* Viruses?**	**Testing Frequency for Most Synthetic Organic Chemicals**
Bottled Water	No	No	1/week	No	No	1/year
Carbonated or Seltzer Water	No	No	None	No	No	None
Big City Tap Water (using surface water)	Yes	Yes	Hundreds/ month	Yes	Yes	1/quarter (limited waivers available if clean source)

Tap Water Quality

Ground water is generally cleaner than surface water, because it is filtered through rocks and soil, but most cities in the US tend to rely on the surface water. This makes the filtering system essential for providing safe drinking water (EPA, 2009). Water suppliers use a variety of treatment processes to remove contaminants from drinking water. According to the EPA, a typical water-treatment plant uses the following five steps to clean up "raw water" before delivering it to customers.

Coagulation: removes dirt and other particles suspended in water. Alum and other chemicals are added to water to form tiny sticky particles called “floc” which attract the dirt particles. The combined weight of the dirt and the alum (floc) become heavy enough to sink to the bottom during sedimentation.

Sedimentation: The heavy particles (floc) settle to the bottom and the clear water moves to filtration.

Filtration: The water passes through filters, some made of layers of sand, gravel, and charcoal that help remove even smaller particles.

Disinfection: A small amount of chlorine is added or some other disinfection method is used to kill any bacteria or microorganisms that may be in the water.

Storage: Water is placed in a closed tank or reservoir for disinfection to take place. The water then flows through pipes to homes and businesses in the community. (EPA, 2009)

Most contaminants are filtered out or killed with disinfectants. However, Mclendon states that while water supplies in the United States are safer than they used to be, plenty of old and new dangers still lurk beneath the surface. (Mclendon, 2010) More than 20 percent of the nation's water treatment systems have violated key provisions of the Safe Drinking Water Act. (Duhigg, 2009) According to Duhigg, since 2004 the water provided in the US contained illegal concentration of chemicals like arsenic or radioactive substances like uranium, as well as dangerous bacteria often found in sewage. (Duhigg, 2009) Even though the EPA has enforced strict standards of drinking water quality, many Americans still aren't drinking entirely safe tap water. Fiji Water themselves have also responded to the quality of tap water. The company has gone after its alternative competitor (tap water) by saying it is "not a real or viable alternative" and can contain "4,000 contaminants." In her last book, Rubies in the Orchard, Fiji's co-owner Lynda Resnick wrote, "You can no longer trust public or private water supplies."

Duhigg introduces a specific case of illegal contamination. The water system in Ramsey, N.J., has illegal concentrations of arsenic and the solvent tetrachloroethylene. In New York State, 205 water systems have broken the law by delivering tap water that contained illegal amounts of bacteria since 2004 (Duhigg, 2009). The EPA states that if the water system is not meeting the requirements, consumers can work with local and state officials and the water supplier to make sure the required monitoring and reporting occurs (EPA, 2009). However, hardly any of those water systems in violation were ever punished. Ramsey was not fined for its water violations, though a Ramsey official said that filtration systems have been installed since then. In New York, only three water systems were penalized for bacteria violations, according to federal data (Duhigg, 2009). Duhigg explains, the problem is that 'current and former government officials have not made enforcing the Safe Drinking Water Act a federal priority'. David Uhlmann, who

headed the environmental crimes division at the Justice Department until 2007 said, "There is significant reluctance within the E.P.A. and Justice Department to bring actions against municipalities, because there's a view that they are often cash-strapped, and fines would ultimately be paid by local taxpayers" (Duhigg, 2009).

The EPA has reported that more than three million Americans have been exposed since 2005 to drinking water with illegal concentrations of arsenic and radioactive elements, both of which have been linked to cancer at small doses (EPA, 2009). In some areas, the amount of radium detected in drinking water was 2,000 percent higher than the legal limit (EPA, 2009). What is needed, then, is a stronger policy to provide safe water quality. According to Mclendon, The EPA Administrator Lisa Jackson is tightening drinking water standards to impose stricter limits on four contaminants: tetrachloroethylene, trichloroethylene, acrylamide and epichlorohydrin; all of which carcinogenic (Mclendon, 2010). The problem of the aging infrastructure of water systems in the U.S. must also be addressed for safer tap water quality. According to the EPA, much of the existing water infrastructure (underground pipes, treatment plants, and other facilities) was built many years ago and the clean water and drinking water industries face a significant challenge to sustain and advance their achievements in protecting public health (EPA, 2009). The EPA stated that improved drinking water systems would need to invest $150 billion over a 20-year period to ensure clean and safe drinking water (EPA, 2009).

Although there are threats to the safety of tap water this does not mean bottled water is better for drinking water in terms of health concerns. In terms of sustainability, it is obvious that tap water is more efficient than bottled water. Preferring tap water over bottled water still conserves massive amounts of oil, used to create containers filled in faraway lands, which are shipped overseas, transported across countries in trucks, and then stored in shop refrigerators

(Baskind, 2010). Regulations on tap water in the U.S. are much stricter and more stringently tested than that of bottled water from private companies such as Fiji Water.

Stainless Steel, the Alternative Water Bottle?

Stainless steel water bottles are widely heralded as a great alternative to bottled water because they are environmentally friendly and because they lack most of the health concerns associated with plastic bottles. While it is true that stainless steel water bottles are more environmentally friendly then the consumption of plastic water bottles, it is only conditionally true. The condition is that the stainless steel water bottle replaces at least 50 plastic disposable water bottles. If it replaces less than this number, then the environmental impacts that result from the creation of the stainless steel water bottle overwhelm its' environmental benefits. It is a long and environmentally costly process to create stainless steel water bottles, a fact that is often overlooked when these bottles are proclaimed as environmentally friendly.

The biggest problem with stainless steel water bottles is, perhaps ironically, the fact that they're made from stainless steel. Stainless steel is desirable because it is durable and does not rust. Also, unlike most plastic bottles, it does not affect the taste of the water within and doesn't have the health risks of plastics that contaminate the water with the aforementioned materials. Some companies promote that they use extra stainless steel, like Klean Kanteen, which boasts extra thick (and thus durable) bottles. Klean Kanteen's website boasts all sorts of environmental benefits that come with choosing their version of the stainless steel water bottle over plastic bottles. They boast of their fair labor practices, charitable donations, quality control, recyclable products, health benefits of products, efficiency of production and distribution, etc. All of these things are of course highly commendable if they are accurate. It is hard to verify just how much

Klean Kanteen backs up many of these claims. There is nothing mentioned on the Klean Kanteen website about how environmentally detrimental it is to create stainless steel. This is a huge omission as there are many ways in which stainless steel is actually horrible for the environment.

Each of the some 1400 steps required to produce stainless steel bottles have their own individual environmental impact. Resources must be extracted from the ground to start the process. The often horrific environmental impacts of mining are well documented including: the release of fossil fuels into the atmosphere, groundwater contamination, mountaintop removal, release of toxins, etc. Stainless steel requires quite a few different metals including: nickel, chromium ore, and iron for its creation. The creation of stainless steel results in roughly ten times more pollution then the creation of regular steel (Goleman & Norris, 2009).

Once created, stainless steel bottles impact the environment in other ways. Transportation can be a big factor as most of these bottles will travel hundreds if not thousands of miles before reaching the consumers who will purchase and use them. This however is an environmental cost shared by plastic water bottles so it is hard to be too critical of this aspect of stainless steel bottles. Unlike disposable plastic bottles however, stainless steel water bottles need to be cleaned regularly as bacteria can otherwise form and be costly to one's health. Various forms of cleaning take different environmental tolls, but all can be costly. "If you wash your stainless steel water bottle in a dishwasher that uses half a liter of electrically heated water, 50 to 100 washes can result in the same amount of pollution that was caused by making the bottle in the first place. Washing it in cold water still demands electricity to pump the water and chemicals to treat it – but the impact is tiny by comparison" (Goleman & Norris, 2009).

When it comes to disposal, there are two options for stainless steel water bottles: throw them out or recycle them. It is extremely wasteful when these stainless steel bottles are thrown in the trash. Stainless steel doesn't decompose, so if these bottles end up in landfills, they will sit there for centuries. On the other hand, if plastic water bottles like Fiji's end up in a landfill they also won't decompose. Like plastic, if properly recycled, the valuable metals in the stainless steel can be reused and still hold value. Research done out of Yale University has effectively proven that stainless steel made from recycled materials requires less than a third of the energy needed to create stainless steel from freshly mined minerals. This study is hopeful that in the future stainless steel can be made entirely from recycled sources 20 to 30 years down the road, when the abundant stainless steel in circulation today makes its way to the recycling centers as the products they make up become obsolete or are replaced. This makes it that much more important that stainless steel water bottles be recyclable and that they are recycled today (Heffernan, 2007).

Despite the heavy environmental costs of mining the materials for and creating stainless steel water bottles, these water bottles are in fact far more environmentally friendly than disposable plastic water bottles provided that they replace the use of at least a few dozen water bottles and are properly recycled. Provided the water source that these bottles are filled up from is clean and safe, these stainless steel bottles are also far healthier than disposable plastic water bottles that have issues with material leaked into the water from the plastic of the bottle. Many bottled waters, Fiji Water included, are far from pristine in water quality and labor practices.

Recommendations

Our sustainability assessment of Fiji Water reveals the extensive, and quite unnecessary impact it has. Bottled water is a luxury good that many people, especially Americans, simply do

not need. Legislators should require the FDA to actually regulate the quality of bottled water. This will, however, only address related health concerns and not address the sustainability issues surrounding bottled water. A nation wide ban on the practice of bottled water, except for the creation of reserves for emergency situations, would be preferable, but may not be plausible. We therefore recommend that consumers, particularly ones in Vermont, should refrain from drinking Fiji Water due to health and sustainability issues. Drinking tap water and using refillable bottles when needed is much safer and more practical. We commend the efforts on our own campus here at UVM to institute a ban on all bottled waters, regardless of health concerns. We recommend that other institutions stop carrying bottled water as well.

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