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MUDDY WATERS: THE PUBLIC HEALTH RISKS AND SUSTAINABILITY OF BOTTLED WATER IN CHINA

Abi Barnes* and Wei Cao**

INTRODUCTION

The men took their positions in front of their lanes, elastic caps tightly gripping their heads and silver diaphanous bulbs shielding their eyes. As the Olympian swimmers geared up for the 400-meter freestyle in London last year, China's Sun Yang cracked open a bottle of water and doused himself.[1] His Hungarian competition took the more

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traditional approach, splashing himself with handfuls of pool water. Last year at the London Olympics, a striking number of Chinese swimmers emptied bottles of water over their bodies before the start of each race.[2] This public spectacle not only reflects China's vibrant consumer culture, but also carries a note of irony given that more than half of China's cities are affected by water shortages.[3] One can't help but wonder whether these acts were inconsequential, or whether they reflect broader Chinese perceptions about water and the nexus between resource conservation and consumerism.

Urbanization and rising energy demand have put China's fresh water resources in dire straits.[4] Approximately 70% of China's fresh water supplies are polluted to some degree, and the water pipes in many urban areas are outdated, often leeching impurities into the city's public drinking water.[5] The country's economic growth is outpacing fresh water supplies. National water demand is projected to rise 63% by 2030, which is, "gallon for gallon, more than anywhere else on earth."[6] In response, Chinese authorities are pursuing a series of ambitious projects that include greater investment in desalination

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*Abi Barnes is a J.D. Candidate at Vermont Law School and M.E.M. Candidate at the Yale School of Forestry and Environmental Studies.
**Wei Cao is a PhD Candidate at Renmin University.
[1] *Men's 400-Meter Freestyle: London Olympics*, YOUTUBE (2012), http://www.youtube.com/watch?v=nIlHQWPdBec&feature=relmfu (last visited May 13, 2013).
[2] *Men's 400-meter freestyle*, *supra* note 1; *Women's 100-meter back*, London Olympics (2012).
[3] Peter Gleick, *China and Water*, *in* THE WORLD'S WATER 2008–2009, 79, 85 (2009), *available at* http://www.worldwater.org/data20082009/ch05.pdf; *Safe Drinking Water*, CHINA-WIRE (Apr. 27, 2012) (noting that 242 million rural villagers and 33 million rural students do not have access to safe drinking water).
[4] Elizabeth Economy, *China's Growing Water Crisis*, The Global Public Square Blog, CNN (Aug. 10, 2011), http://globalpublicsquare.blogs.cnn.com/2011/08/10/chinas-growing-water-crisis/.
[5] *China's Rivers: Frontlines for Chemical Waste*, WORLDWATCH INST., http://www.worldwatch.org/chinas-rivers-frontlines-chemical-wastes (last updated Sept. 22, 2013); Gong Jing & Liu Hongqiao, *Half of China's Urban Drinking Water Fails to Meet Standards*, CHINADIALOGUE (June 6, 2013), https://www.chinadialogue.net/article/show/single/en/6074-Half-of-China-s-urban-drinking-water-fails-to-meet-standards.
[6] Michael Wines, *China Takes a Loss to Get Ahead in the Business of Fresh Water*, N.Y. TIMES (Oct. 25, 2011), http://www.nytimes.com/2011/10/26/world/asia/china-takes-loss-to-get-ahead-in-desalination-industry.html?pagewanted=all&_r=0.

technologies and a $62 billion dollar overhaul of the nation's waterways to divert water to more arid regions.[7]

This brings us to bottled water: the ostensibly pure, healthy water source that offers safety and abundance in the face of contamination and scarcity.[8] A once ridiculed novelty from the 1960s is now a multi-billion dollar industry with distribution stretching to the farthest reaches of the world. Bottled water requires significant quantities of water and energy to produce, while leaving a growing trail of waste in its wake. As a result, the product's environmental drawbacks are coming to the fore, particularly in China where water and waste issues are especially grim. Public health risks also accompany bottled water consumption. Yet few call into question the fundamental underpinnings of the industry's success—one contaminated sip and the bottled water myth could crumble. Bottled water in China is particularly susceptible to contamination given the industry's antiquated and lax regulations and the financial hardships that can accompany proper water filtration. It stands to reason that a high-profile public health scare on par with China's melamine scandal may not be too far off. In fact a high-profile bottled water scandal involving Nongfu Spring occurred in April 2013.[9]

In a country like China—where water pollution is pervasive and tap water notoriously risky—bottled water is presumably a safer alternative to tap water because the bottler's reputation is on the line. But the industry's lack of transparency makes this

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[7] *Id; South-North Water Transfer Project*, INT'L RIVERS, http://www.internationalrivers.org/campaigns/south-north-water-transfer-project (last visited Sept. 22, 2013).

[8] Yong Jiang, *China's Water Scarcity*, 90 JOURNAL OF ENVTL. MGMT 3185, 3187 (2009), *available at* https://www.uni-hohenheim.de/fileadmin/einrichtungen/hebrew-university/Literature/Jiang-JEM2009.pdf (noting that China's total water deficit could reach 400 billion m^3 by 2050, which is roughly 80% of the current annual capacity of approximately 500 billion m^3).

[9] Chris Marquis & Zoe Yang, *Nongfu Spring Water: How Food Safety Scandals Affect A Company's Image*, DANWEI (Sept. 5 2013), http://www.danwei.com/nongfu-spring-water-how-food-safety-scandals-affect-a-companys-image/.

hard to know. Besides, China's notoriously poor tap water quality makes purchasing bottled water in China easier to justify than in many developed countries, where tap water quality concerns are relatively less severe. But simply because bottled water is relatively safer than tap water does not mean that it is a safe drinking source for Chinese consumers. Skepticism surrounding the quality of bottled water is mounting in the wake of recent bottled water contamination scandals, which have compromised consumer perceptions of China's bottled water safety and undermined its perceived superiority.[10]

For decades, bottled water has fueled an international industry saturated in secrecy. This is particularly true in China, where data and information concerning business operations can be difficult for "ordinary citizens" to obtain.[11] Despite the existence of commercial market research on Chinese bottled water, industry reports are also generally expensive and thus difficult for the public to access.[12] Moreover, although this research reveals consumption rates, sales, and key market shareholders, it does not reveal much on the quality of bottled water, which has gone largely untested. Only recently has the media begun seriously investigating the issue: In May of this year, the *Beijing News* published a report that criticized the nation's bottled water laws and questioned the quality of bottled water in China.[13] Indeed, a fair amount of literature on water in China glosses over the topic of bottled water altogether. For example, a 143-

[10] *Beijing Halts Sales of Tainted Bottled Water*, AGENCE-FRANCE PRESS (Jul. 7, 2011), http://www.google.com/hostednews/afp/article/ALeqM5jo0Ane6dUaakAxgJ0yFsoA0CIyDw?docId=CNG.9df3894d3c61df966b0d7c129418e270.8e1; Wu Wencong, *Questions Remain Over Safety of Bottled Water*, CHINADAILY (Aug. 16, 2011), http://www.chinadaily.com.cn/business/2011-08/16/content_13120656.htm.
[11] David Barboza, *Obtaining Financial Records in China*, N.Y. TIMES (Oct. 26, 2012), http://www.nytimes.com/2012/10/27/business/global/obtaining-financial-records-in-china.html?_r=0; Marquis & Yang *supra* note 9.
[12] *Purchase Options*, IBISWORLD, http://www.ibisworld.com/cartv2/purchaseoptions.aspx (last visited May 13, 2013) (noting that the market report for IBISWorld's *Bottled Water Production in China* report costs $1,595); *Bottled Water in China*, EUROMONITOR (Apr. 2013), http://www.euromonitor.com/bottled-water-in-china/report (pricing its market report on bottled water in China at $900).
[13] Wang Xiaodong, *Unified Standards for Bottled Water in the Pipeline*, CHINA DAILY (May 4, 2013), http://www.chinadaily.com.cn/china/2013-05/04/content_16474580.htm.

page report on water in China published in 2009 includes only a single reference to bottled water.[14] Likewise, a book titled *Water and Development in China* (2006) dedicates an entire chapter to water privatization in China, but makes no reference to bottled water.[15]

Perhaps the enigmatic nature of the bottled water industry in developed countries like the United States—where industry information is presumably easier to access—discourages an inquiry into China's industry. The bottled water business in the United States has long faced criticism for its lack of transparency. As water expert Peter Gleick points out, the United States bottled water industry is rife with "complicated and contradictory [rules], full of loopholes and ambiguity."[16] Of course, in the United States (and many other developed countries), freedom of the press and investigatory journalism often keep industry in check by exposing corrupt businesses dealings. In China, however, there is no *60 Minutes* equivalent and investigative journalists are often closely monitored.[17] News sources are heavily patrolled by the state, and information that portrays China in a negative light is often classified as a "state secret," lending legitimacy to government decisions that bar disclosure.[18] Because of these Orwellian censorship policies, businesses and commercial activities often escape media scrutiny.[19] This

[14] JIAN XIE ET AL., THE WORLD BANK, ADDRESSING CHINA'S WATER SCARCITY: RECOMMENDATIONS FOR SELECTED WATER MANAGEMENT ISSUES (2009), *available at* http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/01/14/000333037_20090114011126/Rendered/PDF/471110PUB0CHA0101OFFICIAL0USE0ONLY1.pdf.
[15] SEUNGHO LEE, WATER AND DEVELOPMENT IN CHINA 181–225 (2009).
[16] PETER GLEICK, BOTTLED AND SOLD 33 (2010).
[17] Xiao Shu, *Dim Hopes for a Free Press in China*, N.Y. TIMES (Jan. 15, 3013), http://www.nytimes.com/2013/01/15/opinion/dim-hopes-for-a-free-press-in-china.html ("In the last few years, amid rising social unrest, the government has intensified its efforts at 'preserving stability' . . . [resulting in] a dramatic increase in control of the media"); Sharon LaFraniere, *China Moves to Tighten Data Controls*, N.Y. TIMES (Apr. 28, 2010), http://www.nytimes.com/2010/04/28/world/asia/28china.html.
[18] LaFraniere, *China Moves to Tighten Data Controls*, *supra* note 17.
[19] Christopher Buckley, *NY Times Reporter Forced to Leave China Over Visa*, ASSOCIATED PRESS (Dec. 31, 2012), http://bigstory.ap.org/article/ny-times-reporter-forced-leave-china; Raymond Li, *Chinese Media*

absence of free press necessarily limits the amount of information available on China's bottled water industry—and specifically, the quality and safety of the water inside the bottle.

This paper relies on the information available surrounding China's bottled water industry to piece together a glimpse of a well-guarded water world. Part I provides a sketch of the global and Chinese bottled water markets and their origins and explores the sustainability of Chinese bottled water through the lens of energy, water, and waste. Part II looks at bottled water contamination scares and examines public health and quality control concerns. Part III examines the different laws, regulations, agencies, standards, and rules regulating bottled water in China. Part V offers law and policy recommendations for improving China's bottled water regulation and for protecting public health and the environment.

1. The Bottled Water Industry

A. The Global Bottled Water Market

When the pilgrims landed at Plymouth Rock in 1620, the idea of drinking water to quench their thirst was as foreign as the land underfoot.[20] The barreled water stored below the ship decks held little appeal for the thirsty pilgrims disembarking from the Mayflower. Beer was the beverage of choice at that time as drinking water was generally associated with poverty, destitution, and disease.[21]

Censorship: All-Pervading, Increasingly Challenged, BBC (Jan. 21, 2013), http://www.bbc.co.uk/blogs/blogcollegeofjournalism/posts/Chinese-media-censorship-all-pervading-increasingly-challenged.

[20] FRANCIS H. CHAPELLE, WELLSPRINGS: A NATURAL HISTORY OF BOTTLED SPRING WATERS 104-05 (2005).

[21] *Id.*

Bottled water—or mineral water, historically— was treated differently. Traditionally, mineral water has been sourced from natural spas and underground aquifers. Revered as a gift from the gods at one time, mineral water has historically been understood to provide health benefits and cure disease.[22] These perceived health and medicinal benefits fueled bottled water's early appeal.[23] Bottling mineral water dates back to the Roman times, when mineral waters were transported in amphoras—Roman-style jugs—to treat medical ailments throughout the Empire.[24] Although Europeans have long recognized the health properties of mineral water, it did not gain global appeal until the early 18th century, when drinking mineral water became fashionable in the Americas.[25] In the mid-1800s, as diseases like cholera and typhoid spread throughout Europe and the United States, bottled water was not only considered a healthier and safer alternative to municipal water, but was also perceived as a sign of refinement.[26]

The bottled water market has its origins in Western Europe,[27] but the bottled water industry that we know today emerged in the United States during the mid-1800s.[28] The industry took root when a preacher from New York began bottling the spring waters of Saratoga Springs.[29] Around this same time, a Maine innkeeper, extolling the

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[22] *Bottled Water Facts: History of Bottled Water*, EUROPEAN FED'N OF BOTTLED WATERS, http://www.efbw.eu/bwf.php?classement=01 (last visited May 7, 2013).
[23] *Id.*
[24] *Bottled Water Facts: History of Bottled Water*, *supra* note 22; CHAPELLE, *supra* note 20, at 73.
[25] CHAPELLE, *supra* note 20, at 105.
[26] *Id.* at 110–111.
[27] Europe's oldest mineral water brand, San Pellegrino, is approximately six hundred years old. Mark Miller, Bottled Water, Why Is It So Big? Cases for the Growth of Bottled Water Industries (May 2006) (Honors thesis, Texas State University– San Marcos) (on file with author).
[28] CHAPELLE, *supra* note 20, at 4.
[29] *Id.* at 4, 73. The first documented cases of bottled water sales in the United States date back to the 1760s. *Id.*

therapeutic properties of water from a local spring, began to sell his water under the brand name Poland Spring.[30]

The popularity of bottled water ebbed in the early 20th century with the introduction of chlorine to tap water.[31] This disinfectant boosted tap water's popular appeal by making faucet water seemingly purer and safer to drink, resulting in a temporary decline in bottled water consumption, and nearly triggering the bottled water industry's demise in the 1930s and 1940s.[32] It wasn't until the 1970s, when concerns about the quality of municipal water surfaced, that the bottled water industry rebounded.[33] Tap water quality concerns, coupled with Europe's popularization of single-serving size bottles, led to impressive market growth in the mid-to-late 20th century.[34]

Developments in water sourcing also fueled growth in the bottled water industry. Following legislative revisions in bottled water regulation, bottled water no longer needed to come from a single original source, but instead could be drawn from public municipal water supplies.[35] This redefined the bottled water industry and facilitated the expansion of bottler operations and distribution.[36] The bottling of purified tap water drew large beverage corporations like PepsiCo and Coca-Cola into the bottled water business.[37]

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[30] *Id*; INSEAD, THE EVOLUTION OF THE BOTTLED WATER INDUSTRY: READY FOR THE WATER WARS, (2012), *available at* http://www.slideshare.net/arulalmbhatia/growth-of-market-whole-world.
[31] CHAPELLE, *supra* note 20, at 3, 111.
[32] *Id.*
[33] *Id.*
[34] *Id.*
[35] INSEAD, *supra* note 30.
[36] *Id.*
[37] *Id.*

As the industry expanded and globalized, smaller bottlers were pushed out of the market and consolidated into larger multinational corporations.[38] Before 1980, the bottled water landscape was heavily localized and comprised primarily of small bottlers specialized in bulk delivery.[39] This changed over the next few decades as large corporations with established distribution networks and markets entered the business.[40] When this happened, the market went global, and the smaller, localized business model vanished.[41]

In addition to legislation allowing bottlers to source from tap water, two developments propelled the industry's impressive global growth. The first was growing public concern about tap water quality, triggered by the release of an Environmental Protection Agency (EPA) report in the 1970s revealing potentially harmful elements in United States tap water.[42] The second development was the advent of oil-derived polyethylene terephthalate (PET). Before PET became popular, bottlers primarily used glass in their bottling operations.[43] The beverage industry's widespread use of PET plastic bottles in the late 1960s did not include the bottled water industry until Nestlé introduced its PET bottled water line in the 1990's.[44] Identified by a number "1" triangle at the base of most plastic bottles, PET revolutionized the bottled water industry by allowing companies to transport bottled water long distances—even overseas.[45] PET was also an attractive material for bottlers because of its lightweight and transparent design as

[38] INSEAD, *supra* note 30, at 1.
[39] CHAPELLE, *supra* note 20, at 122.
[40] INSEAD, *supra* note 30, at 1.
[41] *Id.*
[42] UNITED STATES ENVT'L PROT. AGENCY, THE HISTORY OF DRINKING WATER TREATMENT, 3 (2000), *available at* http://www.epa.gov/safewater/consumer/pdf/hist.pdf.
[43] CHAPELLE, *supra* note 20, at 70, 78.
[44] INSEAD, *supra* note 30, at 5.
[45] *Id.*; GLEICK, BOTTLED AND SOLD, *supra* note 16, at 91.

well as its neutral affect on the water's taste.[46] In addition to the rise of PET and the public's increasing skepticism towards tap water, the convenience, taste, and status appeal of bottled water has also helped drive the international bottled water market.[47] Although the primary motivations for bottled water consumption vary globally, these three factors have played a central role in cultivating bottled water's global appeal.

These forces have led to impressive growth in the bottled water market. Since 1990, the number of bottled water consumers worldwide has increased six-fold from $37 million to $228 million in 2010.[48] The industry generates roughly $85 billion in annual profits,[49] which is divided primarily between the top market leaders: Coca-Cola, Nestlé, and San Pellegrino.[50] The industry predicts that the Asia Pacific, Africa, and the Middle East will lead growth over the next five years.[51] This matches analyst projections that the Asia Pacific market will expand from $24 billion in 2011 to $34 billion in 2016.[52] At present, the United States, China, Mexico, Indonesia, and Germany (in that order) make up the top five countries in bottled water consumption.[53] Although it's a leading market player, if China's per capita consumption rises, China could easily surpass the United States in global consumption rankings.

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[46] CHAPELLE, *supra* note 20, at 76.
[47] Frank I. Salazar, *Bottled Water Industry*, SBDCNet, http://www.sbdcnet.org/small-business-research-reports/bottled-water-industry (last visited Dec. 14, 2013).
[48] UNICEF, PROGRESS ON DRINKING WATER AND SANITATION 10 (2012), *available at* http://www.unicef.org/media/files/JMPreport2012.pdf.
[49] CREDIT SUISSE, WATER 6 (2007), *available at* http://www.ewatertek.ca/PDF/Credit%20Suisse-Investment%20Water%20Research%20Report-June%202007.pdf.
[50] Richard Hall & Matt Wilson, *2011 Global Bottled Water Congress: Webinar*, ZENITH INTERNATIONAL (Jul. 13, 2011), http://www.zenithinternational.com/pdf/events/00010_webinar.pdf.
[51] *Id.*
[52] Bloomberg News, *Nestle Suffers from Water Woes*, HOUSTON CHRONICLE (Apr. 20, 2012), http://www.chron.com/news/houston-texas/article/Nestle-suffers-from-water-woes-3499142.php.
[53] Hall & Wilson, *supra* note 50, at 12.

Bottled water is currently categorized under three general groups: 1) natural mineral water; 2) spring water; and 3) purified water.[54] These categories are held to different criteria depending on the country. In addition to these categories, the International Bottled Water Association (IBWA) also identifies three other bottled water categories: artesian water or artesian well water; sparkling water; and well water.[55] This paper recognizes three categories of bottled water: mineral water, non-mineral water, and purified tap water. While similar to the generally recognized categories mentioned above, these groups are more broadly defined and better suited to categorizing China's bottled water market. These categories will be later defined in the context of Chinese bottled water laws.

The bottled water industry's remarkable rise in demand has grown largely from the consumer belief that bottled water is healthier, cleaner, and safer than faucet water. This assertion may be true in many regions of the world, but is hard to confirm without more information and data. In countries like China, where there is a tremendous dearth of bottled water information, the premise on which people base their decision to drink bottled water is even shakier. Despite uncertainties about bottled water quality in China, recent contamination scares suggest that the nation's bottled water may present significant public health risks. To understand these risks and give them context, it is necessary to first examine the composition and historical trajectory of China's bottled water industry.

B. China's Bottled Water Market

[54] CATHERINE FERRIER, WORLD WILDLIFE FUND, BOTTLED WATER: UNDERSTANDING A SOCIAL PHENOMENON 3 (2001), *available at* assets.panda.org/downloads/bottled_water.pdf.
[55] IBWA, *Types of Bottled Water – Bottled*, http://www.bottledwater.org/types/bottled-water (last visited Sep. 27, 2013).

1. Origins of the Industry

Bottled water in China can be traced back to the Zhou Dynasty (B.C. 781–771), when mineral water was reportedly used for medicinal purposes.[56] Emperors bathed in hot springs to recover from medical ailments like rheumatism,[57] and the famous Chinese pharmacologist Li Shizhen (A.D. 1518–1593) of the Ming Dynasty published a scientific report on the medicinal benefits of China's mineral waters.[58] Several centuries after Shizhen's study, mineral water became a commercial industry in China.

Prior to the 1980s, bottled water in China was exclusively mineral water, as other water sources had not yet been commercialized. In 1930, Germany established the Laoshan Mineral Water in Shandong Province, making it the first commercial bottler in China.[59] Several other mineral water companies emerged in the 1960s, including Weina Mineral Water of Inner Mongolia Autonomous Region, and Longchuan Mineral Water of Guangdong province.[60] Since that time, bottled water's popularity in China has grew considerably.

Although these mineral water companies predated most foreign bottled water products, China's modern bottled water industry was largely built on the backs of foreign imports. Foreign brands entered China in the late 1980s, and the industry has developed rapidly ever since.[61] Evian launched its first bottling operation in China around 1986,[62]

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[56] P.E. LAMOREAUX & J.T. TANNER, SPRINGS AND BOTTLED WATERS OF THE WORLD: ANCIENT HISTORY, SOURCE, OCCURRENCE, QUALITY AND USE 3 (2001).
[57] *Id.* at 269.
[58] *Id.* at 3.
[59] *China Drinking Water Industry Report 2009-2010*, RESEARCHINCHINA (2010), *available at* http://www.researchinchina.com/FreeReport/PdfFile/634130776590468750.pdf.
[60] P.E. LaMoreaux, *supra note* 56, at 3.
[61] Now a $31.1 billion industry, bottled water accounts for the largest division of China's soft drink market. Market analyst group Zenith International estimated that China's bottled water consumption grew from 8 billion liters in 2000 to nearly 21 billion liters in 2009—approximately a 300% increase in consumption.

and many Chinese business entrepreneurs who gambled on this new industry made millions.[63] Indeed, the wealthiest man in China, Zong Qinghou, is the founder and CEO of Hangzhou Wahaha—one of China's leading bottled water companies.[64] By 1994, approximately 100 bottled water companies operated in China with an output of 3mn tons.[65] The following section examines the industry's rise and market design.

2. The Market Landscape and Projected Growth

A basic sketch of China's bottled water market reveals a fragmented and localized landscape. Although there are over 1,500 domestic bottled water brands scattered throughout the country,[66] only three of those brands are sold at the national level.[67] The remaining brands are smaller, and serve local communities.[68] In 2012, approximately 740 bottling manufacturing firms operated in China.[69] Major bottlers include Hangzhou Wahaha Group Co., Ltd (14.5%), Ting Hsin International Group (14.2%), Nongfu Springs (4.2%), and C'est Bon Food & Beverage (2.3%).[70] Combined, these top sellers

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Shaun Weston, *The Chinese Bottled Water Market*, FOODBEV.COM (Aug. 12, 2009), http://www.foodbev.com/news/the-chinese-bottled-water-market.

[62] Zhang Chunyan, *Flowing Well From Roof of the* World, CHINA DAILY (Oct. 19, 2012), http://europe.chinadaily.com.cn/epaper/2012-10/19/content_15830666.htm.

[63] NETSCRIBES, BOTTLED WATER MARKET IN CHINA (2011).

[64] Russell Flannery, *China's 100 Richest*, FORBES (Oct. 11, 2012), http://www.forbes.com/sites/russellflannery/2012/10/11/chinas100-richest/; *How China's Richest Man Made It*, WASH. POST (Nov. 3, 2012).

[65] *Bottled Water from China*, FINEWATERS.COM, http://www.finewaters.com/Bottled_Water/China/index.asp (last visited Jul. 27, 2013).

[66] LUCY CARMODY ET AL., RESPONSIBLE RESEARCH, ISSUES FOR RESPONSIBLE INVESTORS: WATER IN CHINA 56 (2010).

[67] *Id.* at 55.

[68] *Id.* at 54, 56.

[69] IBISWORLD, *supra* note 12, at 17.

[70] These percentages are based off of 2012 figures. *Id.* at 22-26. A recent *Forbes* article contradicts this list. According to the article, "The top three water brands leading the charge in China now are Kangshifu (Tingyi Holding Corp.), Nongfushanquan (Zhejiang Nongfushanquan Water Co Ltd), Ice Dew (Coca-Cola) and Yibao (China Resources Enterprises)." This list is not likely accurate as it does not include Wahaha—which was by and far the largest bottled water company in 2012. Kenneth Rapoza, *Bottled Water Market Quickly Turning Chinese*, FORBES (Aug. 13, 2013), http://www.forbes.com/sites/kenrapoza/2013/08/13/bottled-water-market-quickly-turning-chinese/.

generate over one-third of the industry's total domestic revenue.[71] The remaining two-thirds of the domestic market is comprised of smaller national brands such as Zhengguanghe from Shanghai and Laoshan from Qingdao. [72]

Foreign brands make up a smaller sliver of the China market. The major foreign players are Nestlé, PepsiCo, Heckman Corporation, Coca-Cola, and Groupe Danone.[73] The current leader among foreign brands is Nestlé, with an estimated 2% of the domestic market.[74] Nestlé was the ninth largest seller of bottled water in China in 2012,[75] peddling popular brands such as Vittel, Perrier, San Pellegrino, Nestlé Pure Life and Nestlé Aquarel.[76] The company's Pure Life brand is one of the nation's most popular, and one of the few foreign brands that sells at a domestically competitive price: $.30 (CN¥2) per bottle.

Although foreign brands can be found at nearly every street corner shop, Chinese brands overwhelmingly satisfy domestic demand.[77] This is largely because foreign brands are relatively costly, selling often at two to three times the price of domestic competitors.[78] Most foreign brands, like Evian, cost between $1–3 (CN¥10-15), putting the brand in China's "premium" market category. By contrast, domestic brands generally sell between $.15–.50 (CN¥1-3). This disparity in price may soon change, however, as

[71] IBISWORLD, *supra* note 12, at 17.
[72] Weston, *supra* note 61.
[73] NETSCRIBES, *supra* note 63. Until recently, Danone dominated the foreign market, holding nearly 30% of the market through a joint venture partnership with Hangzhou Wahaha. Although Danone exited this partnership in 2009 following a legal dispute, the company continues to maintain a strong presence in China's domestic market. David Barboza, *Danone Exits China Venture After Years of Legal Dispute*, N.Y. TIMES (Sept. 30, 2009), http://www.nytimes.com/2009/10/01/business/global/01danone.html.
[74] Dermot Doherty, *Nestle Taps China Water Thirst as West Spurns Plastic*, BLOOMBERG NEWS (Jan. 10, 2013), *available at* http://www.bloomberg.com/news/2013-01-10/nestle-taps-china-water-thirst-as-west-spurns-plastic.html.
[75] *Id.*
[76] Weston, *supra* note 74.
[77] CHINA INFO SHEET: BOTTLED WATER, NEW ZEALAND & TRADE ENTERPRISE 1 (undated).
[78] *Id.*

the price of domestic bottled water is currently in flux.[79] Domestic bottled water prices recently rose 5-10% and this trend is projected to continue as quality standards improve and water scarcity becomes a bigger threat.[80]

China's bottled water market is expected to grow in the coming years. In 2009, Asia was considered the leading driver of global bottled water growth—with China spearheading consumption.[81] Between 2004 and 2009, bottled water consumption in China roughly doubled.[82] Over the past decade, sales have grown from $1 billion in 2000 to $9 billion in 2012.[83] This growth is projected to continue with analysts anticipating an annual growth rate of 16.3% between 2010 and 2015, which would place the industry at a value of $21.4 billion[84]—although more conservative estimates project 6%.[85] Under either scenario, demand for bottled water in China is on the rise and shows little sign of waning. Considering the industry's incredible growth, it is not surprising that the richest man and woman in China lie at opposite ends of the bottled water spectrum: Hangzhou Wahaha's Zong Qinghou on the production end and recycling and billionaire waste guru Zhang Yin on the other.[86]

While the industry is growing at an impressive rate, per capita consumption in China lags behind other countries like Mexico, Italy, and the United States. After

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[79] *Id*.
[80] Weston, *supra* note 74; NETSCRIBES, *supra* note 63.
[81] BEVERAGE WORLD, SOME UPS AND DOWN: BOTTLED WATER GROWTH SLOWS IN SOME MARKETS WHILE IT IS POSITIONED FOR GROWTH IN OTHERS, 46 (2010) *available at* http://www.nxtbook.com/nxtbooks/idealmedia/bw0310/index.php?startid=46.
[82] JOHN G. RODWAN, JR., CHALLENGING CIRCUMSTANCES PERSIST: FUTURE GROWTH ANTICIPATED, U.S. AND INTERNATIONAL DEVELOPMENTS AND STATISTICS 16 (2010), *available at* http://www.bottledwater.org/files/2009BWstats.pdf.
[83] Lily Kuo, *China Still Uses Soviet-Era Regulations to Test its Bottled Water*, YAHOO!, May 3, 2013, http://finance.yahoo.com/news/china-still-uses-soviet-era-102616231.html.
[84] NEW ZEALAND & TRADE ENTERPRISE, *supra* note 77, at 1.
[85] *Id*.
[86] Ms. Yin is famous for her rag-to-riches tale of building her billion-dollar fortune off of China's waste and recycling industry. *China's Richest Woman: From Waste to Wealth*, XINHUA (Oct. 20, 2006), http://www.chinadaily.com.cn/china/2006-10/20/content_713250.htm.

adjusting for inflation, the average American spent $121 per capita on bottled water in 2010, while Chinese consumers only spent $6 (CN¥37) that same year.[87] Similarly, per capita consumption in Italy and Mexico stood at 187 liters and 243 liters, respectively, while China's rate hovered around 95 liters.[88]

Because of China's large population, however, China is primed to become a bottled water leviathan. If every person in China drank just one fourth of the bottled water consumed by the average American in 2004, China would replace the United States as the world's leader in bottled water consumption.[89] It is jarring figures like this that highlight the importance of better understanding China's bottled water market landscape and the market forces driving its growth and threatening its collapse.

3. The Market's Chinese Characteristics

The rise of bottled water in China has given way to an idiosyncratic market structure that is worth examining to understand broader market trends and vulnerabilities in quality control and sustainability. Although China's bottled water market was built on foreign imports, it is uniquely Chinese in structure and design. Chinese eccentricities include high demand for barreled bottled water, a unique distribution system that relies on bicycles and water stores, and a unique market landscape. These market features distinguish the industry from many of its foreign counterparts.

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[87] EUROMONITOR , BOTTLED WATER IN CHINA (2012), http://www.euromonitor.com/bottled-water-in-china/report.
[88] GLEICK, BOTTLED AND SOLD, *supra* note 16.
[89] Emily Arnold & Janet Larsen, *Pouring Resources Down the Drain*, THE EARTH INST. (Feb. 2, 2006) http://www.earth-policy.org/plan_b_updates/2006/update51.

China primarily consumes bottled water in barreled (or bulk) form, which comes in large containers holding roughly 19 liters (5 gallons) of water.[90] The prevalence of barreled bottled water is less common in in other regions of the world, like the United States and Europe. These barrels can be found in the vast majority of Chinese households and businesses.[91] An estimated 10mn Chinese citizens "subscribe to water dispenser services," spending upwards of $4.7 billion (CN¥30 billion) every year.[92] Approximately 44% of industry revenue in China comes from barreled water sales.[93] Beijing, for example, consumes over 100 million barrels of water each year[94] and half of Nestlé's sales in China are in five-gallon jug form.[95] One explanation for the popularity of barreled water in China is the nation's tap water concerns and the convenience of having a large supply of ostensibly safe and clean water for household and business use.[96]

Another uniquely Chinese feature is China's bottled water distribution system. In major cities like Shanghai, customers can place phone-orders for delivery of bottled water at local water stores.[97] Fleets of bicycles often deliver water to homes in urban areas and bikes wheeling by with crates of barreled water strapped to a pulley in the rear is a common sight along China's city streets. This distribution network, however, is in the throes of change as major supermarkets—like Walmart, which sells water in bulk—become more commonplace and influence consumer behavior.

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[90] Wencong, *Questions Remain Over Safety of Bottled Water*, *supra* note 10.
[91] *Id.*
[92] *Id.*
[93] IBISWORLD, *supra* note 12.
[94] Li Yanhui, *Fake Brands, Bacteria Proliferate in Water Market*, GLOBAL TIMES (July 8, 2011), http://china-wire.org/?p=14578.
[95] Dermot Doherty, *China's Unsafe Water is Nestle's Opportunity*, BUSINESSWEEK (Jan. 24, 2013), http://resourcecenter.businessweek.com/reviews/chinas-unsafe-water-is-nestles-opportunity.
[96] IBISWORLD, *supra note* 12, at 10.
[97] Doherty, *China's Unsafe Water is Nestle's Opportunity*, *supra* note 95.

The industry today is primarily private-owned, with about one percent of industry revenue coming from state-owned companies.[98] Twenty years ago, the industry was almost entirely government-owned—this has changed.[99] Fewer state-owned companies has brought greater foreign investment and intensified market competition as currently 80 percent of the bottled water industry is made up of companies that are either foreign-funded joint ventures or foreign-owned.[100] Greater foreign market penetration has helped advance bottling technologies and equipment to the industry.[101] Under a state-controlled company, the CEO and manager is generally appointed by the State-Owned Assets Supervision and Administration Commission (SASAC) and are considered state workers.[102] State-owned companies are generally found in key industries, like finance and energy. The bottled water industry, however, is primarily private. One of the few companies that has strong state involvement is Wahaha, but even this company is not formally recognized as a state-owned enterprise (SOE).[103]

In years ahead, an understanding of China's unique market structure will necessarily help address regulatory deficiencies and manage public health risks.

4. Forces and Trends Driving Growth

[98] IBISWORLD, *supra* note 12, at 21.
[99] *Id.* at 4.
[100] *Id.*
[101] *Id.*
[102] Choon-Yin Sam, *Partial Privatization and the Role of State-Owned Holding Companies in China*, J. OF MGMT. & GOVERNANCE, 767, 767–68 (2013).
[103] *State-Owned Assets Supervision and Administration Commission of the State Council (SASAC)*, THE PEOPLE'S REPUBLIC OF CHINA, http://www.sasac.gov.cn/n2963340/n2971121/n4956567/4956583.html (last visited Nov. 20, 2013). The Chinese government owns only 45% of the company's stock. *Wahaha Shareholding Structure Diagram*, BIZ163.COM (Sept. 30, 2004), http://biz.163.com/41130/8/16F422FA00020S40.html.

The rise of bottled water consumption in China can be attributed to several factors, including 1) poor tap water quality; 2) increasing health awareness and higher income levels; and 3) international tourism.[104] Combined, these factors are propelling bottled water's impressive growth. Premier bottle water brands are also trending, which is primarily a result of China's burgeoning middle class.[105]

The market for bottled water in China has grown largely because the nation's tap water is unsafe to drink. Approximately half of China's urban drinking water does not meet government standards and consumption is regularly linked to public health problems.[106] In the event of a chemical spill, residents typically flock to nearby markets to purchase bottled water, leading to a spike in its consumption.[107] In some instances, however, the bottled water is sourced from the very same water body as that of the contamination.[108] Generally though, it is widely regarded that bottled water remains a relatively safer option than tap water. Because of this perception, the bottled water sector dominates 75-80% of Chinese drinking water consumption.[109] For those unable to afford this more expensive commodity, however, issues of social injustice abound. Together, tap water pollution and the cost of bottled water overwhelming burden the poor, creating a

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[104] Gaurav Kumar, *Bottled Water – China (Part I)*, NETSCRIBES (Jul. 12, 2011), http://www.slideshare.net/ResearchOnIndia/market-research-india-bottled-water-market-in-india-2009; Weston, *The Chinese Bottled Water Market*, *supra* note 74.
[105] Weston, *The Chinese Bottled Water Market*, *supra* note 74.
[106] Jing Gong & Hongqiao Liu, *supra* note 5.
[107] In 2011, a chemical spill on the Xin'an River in Zhejiang province resulted in a spike in bottled water purchases. *Pollution Leads to Run on Bottled Water*, CHINA DAILY (Jun. 7, 2011), http://english.people.com.cn/90001/90776/90882/7401874.html. In 2005, Harbin experienced a similar spike in bottled water demand following a chemical spill. Naomi Cookson, *Water Crisis: When Benzene Entered Harbin's Water Supply, Government Communication—And Public Trust—Broke Down*, 33 China Business Review (2006).
[108] *Pollution Leads to Run on Bottled Water*, *supra* note 107.
[109] KWR WATERGATE RESEARCH INSTITUTE, CHINA TOP WATER SECTOR WATER TECHNOLOGY OPPORTUNITIES FOR DUTCH COMPANIES, 14, (2013) *available at* http://china.nlambassade.org/binaries/content/assets/postenweb/c/china/zaken-doen-in-china/import/kansen_en_sectoren/water/20130730-kansenrapport-watertechnology.pdf.

Catch-22 where they cannot drink tap water but likewise cannot afford to purchase bottled water.[110]

Studies show that China's urban city tap water contains higher levels of chemical contamination than its Western counterparts, including dangerous levels of organic pollutants and other contaminants that cannot be boiled out.[111] Shanghai city authorities have publicly acknowledged the poor quality of their tap water. According to the Shanghai Water Authority, "almost all" of the city's surface water is polluted and fails to meet drinking standards.[112] This is unsurprising considering that 80% of its water comes from the Huangpu River and the remaining 20% from the Yangze—two of the world's most polluted rivers.[113]

Even if the water source is clean, these waters can become contaminated while traveling to the consumers tap. About 20% of Shanghai's water pipes were built before 1968, and this outdated piping leaches lead and other hazardous materials into water supplies.[114] Beijing's piping infrastructure faces similar challenges.[115] This reality makes consuming bottled water—assuming bottled water is a safer drinking source—a more tenable concept in countries like China, where polluted water is pervasive[116] and roughly

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[110] Tim Johnson, *Chinese Thirsting for Safe Drinking Water Pollution, Chemical Spills, Poor Stewardship Mean Lack of Clean Water for Hundreds of Millions*, PHILLY.COM (Feb. 19, 2006), http://articles.philly.com/2006-02-19/news/25409324_1_bottled-water-drinking-water-water-supply.
[111] Gong & Liu, *supra* note 106.
[112] Doherty, *China's Unsafe Water is Nestle's Opportunity*, *supra* note 95.
[113] *Water Quality*, PURELIVING, http://www.purelivingchina.com/learning-center/water-quality/ (last visited Aug. 30, 2013).
[114] Wencong, *Questions Remain Over Safety Of Bottled Water*, *supra* note 10.
[115] Jing & Hongqiao, *supra* note 106 (noting that "Beijing—which has the best quality tap water—has been heavily investing for 10 or more years to transform its water supply system, and still isn't finished: the water is still not drinkable").
[116] "An estimated 700 million Chinese drink contaminated water every day." Steve Toloken, *Investment Company Heckmann Acquiring Chinese Blow Molder*, PLASTICS NEWS (May 26, 2008), http://connection.ebscohost.com/c/articles/32779895/investment-company-heckmann-acquiring-chinese-blow-molder.

300 million individuals in rural areas lack access to safe drinking water.[117] By contrast, in many developed countries, tap water is often of comparable quality and in some cases of superior quality to bottled water, undermining any argument supporting bottled water consumption.[118]

The second driving force behind growth in the Chinese bottled water market is China's rising middle class, which is changing the demographic fabric of Chinese society and boosting demand for luxury goods and high-end commodities.[119] Chinese consumers are growing more health conscious and, as a result, are gravitating towards superior food and water quality—including bottled water. This is most apparent in China's burgeoning "premier" bottled water market. Because premier water brands are costlier, they are typically perceived as superior.[120] Currently, premier brands sell for six to seven times the price of other bottled water.[121] A bottle of Nestlé and Nongfu, for example, costs around $.16 (CN¥1), whereas Evian costs roughly $1.48 (CN¥9).[122] Although most bottlers in the industry are operating at a loss,[123] analysts project that premium bottled water sales will increase 80% annually over the next five years, with sales climbing to

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[117] XIE ET AL., *supra* note 14, at xxi. Notably, the Minister of Water Resources in 2012, Chen Lei, "promised to provide all rural residents with safe drinking water by the year 2015." *Safe Drinking Water*, CHINA–WIRE (Apr. 27, 2012), http://china-wire.org/?p=19946.

[118] Nick McDermott, *Bottled Water "Less Safe" Than Tap (Despite Costing up to 1,000 Times More)*, DAILY MAIL (Jan. 1, 2013), http://www.dailymail.co.uk/news/article-2255803/Bottled-water-safe-tap-despite-costing-1-000-times-more.html; *Bottled Water*, NAT'L RES. DEF. COUNCIL, http://www.nrdc.org/water/drinking/qbw.asp (last visited Sep. 29, 2013).

[119] Weston, *The Chinese Bottled Water Market*, *supra* note 74; Christine Haughney, *The Stylish Side of China*, N.Y. TIMES (July 22, 2012), http://www.nytimes.com/2012/07/23/business/global/fashion-magazines-in-china-laden-with-ads-are-thriving.html?pagewanted=all; Meng Jing, *China Gushes Over High-End Bottled Water*, CHINA DAILY (Oct. 7, 2011), http://usa.chinadaily.com.cn/weekly/2011-10/07/content_13843116.htm.

[120] NETSCRIBES, *supra* note 104.

[121] Zheng Yangpeng, *Opportunity Looms for Premium Chinese Water Brands*, CHINADAILY (Aug. 13, 2013), http://usa.chinadaily.com.cn/business/2012-08/13/content_15668494.htm.

[122] Jing, *supra* note 119.

[123] Yangpeng, *supra* note 121 ("Tibet 5100 is one of the few brands making a profit[, and of] the 100-odd major domestic mineral water producers, most are suffering losses or only making meager profits").

upwards of $1.56 billion (CN¥10 billion) by 2015.[124] Currently, foreign exports supply the majority of premier brands, with France holding approximately 63% of the import market.[125] Several domestic companies are looking to jump on the premier bottled water bandwagon. As a result, many domestic bottled water brands are now selling their brands at a higher price and marketing their products with elevated cache.

One such brand is Tibet 5100. Launched in 2006, Tibet 5100 falls into the "premium" category, selling water from the Qumanong Spring—a Tibetan glacial spring located 5,100 meters above sea level.[126] The water sells for approximately $1.20 (CN¥7.5)—roughly twice the amount of an average domestic bottle, but less than Evian or Perrier.[127] In 2011, Tibet 5100 reported $99.2mn (CN¥633) in revenue, an increase of approximately 76% from the previous year.[128] The brand has also been receiving increased international attention after the company's CEO, Fu Lin, was invited to speak at the 2012 Bottled Water Congress.[129] This Chinese-owned company, incorporated in the Caymen Islands,[130] invariably raises questions of social justice for the Tibetan people, whose water is being extracted. Similar issues of social justice can be seen in the nation-island Fiji. While Fiji bottled water—also incorporated in the Caymen Islands—is bottled and shipped across the world, native Fijians have historically lacked access to safe drinking water and fallen prey to bouts of typhoid and other water-borne ailments.[131] In

[124] Jing, *China Gushes Over High-End Bottled Water*, *supra* note 119.
[125] IBISWORLD, *supra* note 12.
[126] Chunyan, *supra* note 62.
[127] Weston, *The Chinese Bottled Water Market*, *supra* note 74; NETSCRIBES, *supra* note 104.
[128] Yangpeng, *supra* note 121.
[129] Chunyan, *supra* note 62.
[130] TIBET 5100 WATER RESOURCES HOLDING, LTD., ANNOUNCEMENT OF FINAL RESULTS FOR THE YEAR ENDED 31 DECEMBER 2012, 2 (2012), *available at* http://hk.5100.net/files/upload/announcements/2012%20Annual%20Results_Eng.pdf.
[131] Anna Lenzer, *Fiji Water: Spin the Bottle*, MOTHER JONES (Sept./Oct. 2009), *available at* http://www.motherjones.com/politics/2009/09/fiji-spin-bottle.

addition to fueling the premier bottled water, China's rising middle class is also sparking greater demand for bottled water due to "time constraints" and the inconvenience of spending time boiling water.[132]

The last market force is international tourism. Tourists in China—and specifically Westerners—exclusively drink bottled water, and foreigners are largely assumed to be accustomed to superior water quality, reinforcing the perception that bottled water is superior and safe. To cater to the international community (which is warned to not drink bottled water),[133] foreign and domestic bottled water brands are available in almost every convenience store on China's city streets. The prevalence of bottled water in urban areas may also influence the preferences of incoming rural migrants moving from China's countryside to its cities.[134] Indeed, China expects to move over 250 million residents from rural to urban areas over the next twelve years.[135]

These forces and trends will invariably influence the future composition of China's bottled water market. Demographic, environmental, and social trends continue to strain water availability. Regardless of how the country plans to support its nation's growing water needs, the bottled water industry will feel the effects of whatever policy China pursues to address its water needs. If China's bottled water market continues on this accelerated trajectory, critical deficiencies in its regulatory system must be addressed to safeguard public health. Unless the government enacts strong regulatory controls to

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[132] IBISWORLD, *supra* note 12, at 11.
[133] *Health Information for Travelers to China*, CTR. FOR DISEASE CONTROL AND PREVENTION, http://wwwnc.cdc.gov/travel/destinations/traveler/none/china#stay-healthy-and-safe (last visited, Sep. 29, 2013).
[134] Doherty, *Nestle Taps China Water Thirst as West Spurns Plastic*, *supra* note 74.
[135] Ian Johnson, *China's Great Uprooting: Moving 250 Million Into Cities*, N.Y. TIMES (Jun. 6, 2013), http://www.nytimes.com/2013/06/16/world/asia/chinas-great-uprooting-moving-250-million-into-cities.html.

manage these emerging forces, it risks compromising the safety, security, and widespread availability of fresh drinking water in China.

5. Environmental and Energy Issues

The cost of bottled water is not always as clear as its contents. The true cost of individual-sized bottles of water is often concealed by non-internalized environmental externalities. The environmental impacts of water extraction, transportation, packaging and disposal are not reflected in the price of bottled water.[136] This reality leaves society bearing the unaccounted-for environmental and social costs. In a country of 1.3 billion,[137] where bottled water consumption rates are expected to grow, the environmental burden may prove too great for China to bear. The three primary environmental issues that stem from bottled water production are: 1) plastic manufacture and waste; 2) the overexploitation of water resources; and 3) energy use.

Plastic waste is becoming an increasingly critical global issue, and bottled water is contributing to the problem. In China, approximately 16% of urban solid waste is made up of plastic.[138] China's bottled water industry generates millions of tons of plastic waste every year—the vast majority of which end up in landfills—and these bottles can take upwards of 1,000 years to naturally biodegrade.[139] Sophisticated recycling programs and supporting infrastructure in China, like one recently implemented in Guangzhou, are still

[136] JIANG, *supra* note 8, at 3190 ("Water policies largely fail to account for the economic nature of water resources in relation to their natural characteristics.")
[137] POPULATION REFERENCE BUREAU, 2011 WORLD POPULATION DATA SHEET: THE WORLD AT 7 BILLION 1 (2011), *available at* http://www.prb.org/pdf11/2011population-data-sheet_eng.pdf.
[138] ELIZABETH BALKAN, EMERGENCE ADVISORS, WASTE-TO-ENERGY IN CHINA, 3 (Jun. 14, 2012), *available at* http://www.wilsoncenter.org/sites/default/files/Elizabeth%20Balkan%20PowerPoint.pdf.
[139] Arnold and Larson, *supra* note 89.

at a nascent stage.[140] Although China has enjoyed a robust recycling regime for several decades, recycling businesses are mostly small mom-and-pop shops[141] that rely on unregulated distribution channels and are difficult to monitor; they can also result in more environmental harm than good because of this poor oversight.[142] Migrant workers by and large run the recycling business and much of their work is undocumented and so data on China's recycling operations is difficult to obtain.[143] Recently, however, the government has been promoting efforts to methodize and regulate current recycling programs.[144] Plastics recycling is also becoming an increasingly lucrative business for generating local tax revenue—although often at significant public health and environmental cost.[145]

Generally, the return value of a plastic water bottle is $.02 (CN¥0.1). The bottles are broken down into plastic granules and resold as a raw material product for industry use. Beijing is ramping up recycling efforts according to recent reports, and Beijing is expected to build 300 waste recycling sites and has had plans to develop two to four major recycling businesses within the city.[146] With the exception of Germany, where glass is the preferred bottling material because of to the country's strict recycling laws,

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[140] TARA SUN VANACORE, REFUSING TO WASTE AWAY: CHINA'S TALE OF TRASH CITIES AND THE INCINERATOR BOOM 4 (2012) *available at* http://www.wilsoncenter.org/sites/default/files/China_Incineration_SunVanacore_Part1_2.pdf.

[141] According to recent statistics, approximately 60,000 "small-scale family-owned" plastic recycling businesses operated in China in 2006. Adam Minter, *How Beijing—and the Rest of China—Recycles Plastic*, SCIENTIFIC AMERICAN (Nov. 8, 2013), http://www.scientificamerican.com/article.cfm?id=china-recycles-plastic.

[142] Gwynn Guilford, *A Lot of US Plastic Isn't Actually Being Recycled Since China Put up its Green Fence*, (Sept. 16, 2013), http://qz.com/122003/plastic-recycling-china-green-fence/; Minter, *supra* note 141.

[143] Adam Minter, *supra* note 141.

[144] The government recently announced an initiative to build recycling infrastructure in 100 Chinese cities. *Id*.

[145] In Wen'an County, located on the outskirts of Beijing, a barren industrial wasteland has emerged from what was once bucolic farmland and the public health conditions have significantly deteriorated. Minter, *supra* note 141.

[146] *Beijing Business Council: Building 300 New Waste Recycling Sites This Year*, BEIJING EVENING NEWS (Feb. 6, 2012), http://finance.chinanews.com/ny/2012/02-06/3647988.shtml.

most countries use PET for bottled water packaging.[147] Some companies are seeking to mitigate bottled water waste. Coca-Cola and Nestlé, for example, are reducing the amount of plastic used for their bottles.[148] In light of China's severe environmental problems, all bottlers should follow suit and integrate environmental values into production and manufacture.[149]

The second major environmental issue surrounding bottled water is water resource management. China is currently the world's biggest consumer of freshwater—13% of the world's freshwater resources.[150] Water conservation measures and extraction quotas are consequently critical to China's long-term drinking water security.

A significant amount of this freshwater is used in the production of bottled water.[151] Analysts estimate that one liter of bottled water requires approximately three liters of water to produce.[152] Part of this water use comes from the plastic industry, which is estimated to consume "over 350,000 liters of water per day."[153] At present, roughly "24 km^3 of water 'beyond rechargeable quantities' is extracted from the ground, resulting in lowered water tables in groundwater depletion."[154] This is affecting water quality, flow

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[147] RODWAN, *supra* note 82, at 1, 14.
[148] *The Green Change in Water Bottles*, WELLHOME (Jun. 28, 2011), http://www.wellhome.com/blog/2011/06/the-green-change-in-water-bottles/.
[149] Carmody et al., *supra* note 66, at 8.
[150] RYLAN SEKIGUCHI, FREEMAN SPOGLI INST. FOR INT'L STUDIES AT STANFORD UNIV., WATER ISSUES IN CHINA 1 (2007), *available at* http://fsi.stanford.edu/docs/water_issues_in_china.
[151] In the United States, bottled water is, per ounce, more expensive than gasoline and can cost upwards of 250-10,000 times more than tap water, depending on the brand. Maureen Duffy, *Challenges in the Water Industry: The Tap Versus Bottled Water Debate*, AMERICAN WATER (2009), http://www.amwater.com/files/TapVsBottle012609.
[152] PACIFIC INST., *Bottled Water and Energy Fact Sheet*, http://www.pacinst.org/publication/bottled-water-and-energy-a-fact-sheet/ (last visited Sept. 25, 2013).
[153] *Carmody et al.*, *supra* note 66, at 123.
[154] XIE ET AL. *supra* note 14, at 17. China's surface and groundwater levels have dropped significantly in recent years as a result of human use. The Hai River basin, for example, has seen 40% of its connected water bodies disappear, including 194 lakes and depressions, totaling 6.67km^2. Jiang, *supra* note 8, at 3187. Groundwater overexploitation has increased over the past few decades. *Id.* Groundwater levels have also dropped 14 meters in the past 50 years. GLEICK, *supra* note 3, at 86.

rates, and ecosystem vitality.[155] An estimated 70% of China's population relies on groundwater for their drinking water[156] and some scientists are estimating that China could run out of groundwater by 2030.[157] Chinese bottlers draw heavily from both groundwater and surface water supplies, and these water sources are depleting faster than they are being replenished.[158] What's more, because water resources are considered national property, or "a common-pool resource," incentives to conserve water or use it efficiently are nonexistent.[159] And while the state issues water quotas, these quantities do not necessarily reflect scientific realities.[160]

If they haven't already, Chinese bottlers will soon feel the strain of water scarcity, which is expected to begin in earnest in 2050.[161] China is ranked 88th globally in freshwater volume per capita, with approximately 2,200 cubic meters per person. [162] These resources are expected to decline to 1,875 m^3 per person between 2007 and 2033.[163] Given that bottled water production requires significant amounts of water to produce,[164] industry consumption will pose a threat to an already water-scarce nation unless properly managed and regulated.[165] In light of these concerns, Coca-Cola has

[155] Jiang, *supra* note 8, at 3185–3187.
[156] Katie Burkhardt, *Tips for Drinking Safe, Clean Water in China*, ECHINACITIES.COM (May 10, 2013), http://www.echinacities.com/expat-corner/Tips-for-Drinking-Safe-Clean-Water-in-China.
[157] Jennifer Lee, *Drinking the Water*, N.Y. TIMES (Aug. 13, 2008), http://beijing2008.blogs.nytimes.com/2008/08/13/drinking-the-water/.
[158] Jiang, *supra* note 8, at 3185–87; Weston, *The Chinese Bottled Water Market*, *supra* note 74.
[159] Jiang, *supra* note 8, at 3190.
[160] XIE ET AL., *supra* note 14, at xxiv.
[161] *India, China to Face Water Crisis by 2050*, ASIA PACIFIC NEWS (Mar. 30, 2011), http://abcasiapacificnews.com/stories/201103/3177818.htmhttp://abcasiapacificnews.com/stories/201103/3177818.htm.
[162] U.S. DEPT. OF COMMERCE, WATER SUPPLY AND WASTEWATER TREATMENT MARKET IN CHINA 1, 88 (2005), *available at* http://www.icwt.net/china%20water.pdf.
[163] XIE et al., *supra* note 14, at 1.
[164] *Id.*
[165] Jiang, *supra* note 8, at 3186.

vowed to limit its water consumption and become water neutral by 2020.[166] To date, no domestic Chinese bottlers have committed to such targets.

An overhaul of China's water pricing system reflecting water scarcity and environmental externalities, while benefiting water conservation and efficient water usage, is needed to combat China's water scarcity. Water pricing in China is historically determined by "a top-down administration [approach]."[167] Moreover, "prices are purposely set low and are insufficient to cover the full cost of water supply, so they do not allow the market to balance demand and supply."[168] Chinese consumers can expect to pay approximately 1.2% of their disposable income on water, whereas developed countries will generally pay 4%. At such a low rate, consumers lack incentives to conserve water.[169]

Recent efforts are underway to reform China's water pricing model so that it more accurately reflects the cost of servicing safe drinking water while encouraging water conservation and recycling.[170] According to the National Development and Reform Commission (NDRC), China will impose higher water rates for water-intensive industries and endorse water-recycling practices.[171] This progressive pricing system is expected to go into effect by 2015.[172] The pricing scheme will effectively impose a progressive tax that will rise alongside increased water consumption.[173] The tax will presumably result in higher domestic bottled water prices across the board, as bottlers will have to pay higher

[166] CHARLES FISHMAN, THE BIG THIRST: THE SECRET LIFE AND TURBULENT FUTURE OF WATER 120 (2011).
[167] Jiang, *supra* note 8, at 3192.
[168] *Id.*
[169] *Id.*
[170] *China to Adopt Progressive Water Pricing*, ENGLISH.NEWS.CN (Jun. 22, 2012), http://news.xinhuanet.com/english/china/2012-06/22/c_131669919.htm.
[171] *Id.*
[172] *Id.*
[173] *Id.*

fees for water extraction and purchase. This plan also pledges to keep the nation's annual water consumption within 635 billion cubic meters.[174] Some cities in southern China are already imposing stricter water conservation measures such as surcharges on homes that use above a certain amount of water.[175] In recent years, prices for public water have risen two-fold—standing now at roughly $.66/m^3.[176]

In addition to water, a considerable amount of energy also goes into manufacturing and producing bottled water. Estimates suggest that one-quarter of every bottle of water is figuratively oil.[177] Statistics suggest that bottled water can use "2,000 times as much energy to produce and distribute as tap water."[178] In the United States, individual-sized bottled water can use upwards of 11-31 times more energy than tap water.[179] Although the inputs and outputs of bottled water production certainly vary between the United States and China, the supporting rationale is the same: bottled water uses significantly more energy than tap water.

These environmental realities underscore the need for stricter adherence to sustainable methods of bottled water production and a reevaluation of water's true value.[180] Under the weight of environmental pressures, bottled water quality will

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[174] *Id.*
[175] Pan Xiaoling, *Shenzhen Water Surcharge System, Overuse Charged Double*, SOUTHERN METROPOLIS DAILY (Aug. 24, 2004), http://news.163.com/40824/2/0UH244V80001124T.html (author's translation).
[176] *Id.*
[177] Julia Whitty, *Your Water Bottle is One-Quarter Oil*, MOTHER JONES (Feb. 27, 2008), http://www.motherjones.com/blue-marble/2009/02/your-water-bottle-one-quarter-full-oil.
[178] Noah D. Hall, *Bottled Water and Wasted Energy*, GREAT LAKES LAW BLOG (Feb. 27, 2009), http://www.greatlakeslaw.org/blog/bottled_water/.
[179] CHRISTOPHER G. DETTORE, UNIV. OF MICH.– CENTER FOR SUSTAINABLE SYSTEMS, COMPARATIVE LIFE-CYCLE ASSESSMENT OF BOTTLED VS. TAP WATER SYSTEMS 1 (2009), http://css.snre.umich.edu/publication/comparative-life-cycle-assessment-bottled-vs-tap-water-systems.
[180] *Id.* Currently, per-capita water capacity stands at approximately 2,841 m^3—in the United States, this figure is over 10,000 m^3. By 2030, China is expected to have an average water capacity of 1,730 m^3 per capita. The UN defines a water shortage to be any level below 1,000 m^3. *Water Scarcity*, UNITED NATIONS DEP'T OF ECON. & SOCIAL AFFAIRS, http://www.greatlakeslaw.org/blog/bottled_water/ (last visited Dec. 14, 2013).

invariably suffer if such issues are mismanaged. Pricing bottled water to reflect the products environmental impact. This will help companies ensure continued supply and quality control in the face of an increasingly water scarce world with rising national demand.[181] In doing so, the Chinese government will need to be mindful of social justice issues to ensure that safe water is not fenced off from those unable to afford its purchase.

2. Quality Control, Contamination Scares, and Sustainability

The 2008 melamine milk scandal, which left six babies dead and more than 300,000 infants with kidney stones, remains fresh in the minds of Chinese consumers.[182] After this incident and a wave of other high-profile public health scares in China's food and beverage industry, the government tightened quality control regulations. In 2009, the State Council enacted the Food Safety Law[183] to improve food safety through more stringent food product standards, product recall procedures, and severe penalties for offenders.[184] The law establishes procedures for enacting food safety standards, issuing licenses, executing food safety inspections, and managing food import and exports.[185] The National Health and Family Planning Commission, the body charged with implementing this law, is responsible for drafting national food and beverage safety

[181] China is already looking beyond its borders to meet drinking water demand. At a 240-price markup, Nestlé currently exports water from Lake Michigan to Chinese consumers, profiting generously from the arrangement. Kathleen Story, *Sell China water from Great Lakes?*, EXAMINER (Oct. 12, 2012), http://www.examiner.com/article/sell-china-water-from-great-lakes.

[182] *Bosses Accused Over China's Tainted Milk Scandal in Which 6 Children Died and 300,000 Were Contaminated Go on Trial*, DAILY MAIL (Dec. 31, 2008), http://www.dailymail.co.uk/news/article-1103462/Bosses-accused-Chinas-tainted-milk-scandal-6-children-died-300-000-contaminated-trial.html.

[183] *China Adopts Food Safety Law*, CHINADAILY (Feb. 28, 2009), http://www.chinadaily.com.cn/china/2009-02/28/content_7522958.htm.

[184] *Id;* Calum MacLeod, *Some Skeptical of China's New Food Safety Law*, USA TODAY (Mar. 2, 2009), http://usatoday30.usatoday.com/money/industries/food/2009-03-01-chinafood01_N.htm.

[185] Zhong Hua Ren Min Gong He Guo Shi Ping An Quan Fa (中华人民共和国食品安全法) [Food Safety Law of People's Republic of China (promulgated by Standing Comm. Natl. People's Cong., Feb., 28, 2009, effective Jun. 1, 2009)] [hereinafter *Food Safety Law of People's Republic of China*], *available at* http://www.gov.cn/flfg/2009-02/28/content_1246367.htm.

standards, including those for bottled water.[186] Before becoming law, these standards must pass through the National Food Safety Standard Review Committee— a board of medical and scientific experts.[187] For bottled water, this law heightened regulatory review and licensing procedures for bottled water companies.[188] China's Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) is currently revising the 2009 law and a draft of the new law was submitted to the State Council in October of this year.[189] The new law will likely impose stricter requirements on the food and beverage industry to ensure quality control.[190]

Despite the efforts this law, deficiencies in quality control continue to plague China's food and beverage sector and China's bottled water industry is no exception.[191] In some ways, this has held true since the industry's beginning. In the early stages of China's bottled water industry, bottling operations hastily expanded and cut corners in quality control.[192] These abrupt beginnings prompted the AQSIQ to require periodic quality control inspections, which are still in effect today.[193] These inspections serve as the government's primary oversight of the industry.

Nonetheless, several bottled water companies recently failed these inspections.[194] In July 2011, the Beijing Administration for Industry and Commerce, which performs

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[186] *Id.* at art. 4.
[187] *Id.* at art. 21.
[188] *Id.* at art. 27, 29.
[189] Zhong Hua Ren Min Gong He Guo Shi Pin An Quan Fa (Xiu Ding Cao An Song Shen Gao) (中华人民共和国食品安全法 (修订草案送审稿)) [China Food Safety Law (promulgated by Standing Comm. Natl. People's Cong., Oct. 29, 2013) (Draft Revision for Review)] [hereinafter *China Food Safety Law*], *available at* http://www.chinalaw.gov.cn/article/cazjgg/201310/20131000392889.shtml.
[190] *Id.*
[191] Zheng Daosen & Liu Xiruo, *Thorough Investigation of Bottled Water Standards*, BEIJING NEWS (May 2, 2013), http://www.bjnews.com.cn/finance/2013/05/02/261420.html (Chinese).
[192] IBISWORLD, *supra* note 12, at 5.
[193] *Id.*
[194] Between 2003 and 2006, random sampling indicated low passing rates. IBISWORLD, *supra* note 12, at 5.

random market inspections in coordination with the AQSIQ, randomly inspected a cohort of bottled water brands and found that over 30 of these brands violated safety standards.[195] One brand purportedly contained bacteria 9,000 times the permissible safety levels.[196] While these findings only implicated large "barreled" water jugs (not individualized bottles),[197] a 2009 survey conducted by China's regulatory authorities on single-use 500ml bottled water samples found elevated levels of bromate—a suspected carcinogen.[198] In some cases, bromate levels read eight times the permissible level.[199] All brands implicated were domestic, including Inner Mongolia's "King Friends Desert Water" and Harbin Pharmaceutical Group's "Pure."[200]

The recent revelation of Nongfu Spring's regulatory noncompliance offers yet another example of China's supervisory shortcomings.[201] Known to source from four of the "best water sources in China,"[202] this recent scandal also follows on the heels of accusations in 2009 of Nongfu water containing excessive levels of arsenic.[203] The scandal emerged last summer when a *Beijing News* investigative report revealed that Nongfu Spring—which produces water in Guangdong, Zhejiang, Hubei and Jilin[204]—was

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[195] *Beijing Halts Sales of Tainted Bottled Water*, *supra* note 10.
[196] *Id.*
[197] *Id.*
[198] Zhou Y., Wang Z., Xu Y., Ma M., *Simultaneous Determination of Iodate, Chlorite, Bromate in Bottled Drinking Water by Ion Chromatography with Post-Column Reaction and UV Detection*, CHINESE ACADEMY OF SCIENCES (2007), *available at* http://www.ncbi.nlm.nih.gov/pubmed/17679446;Yang Cih-yu, *China's Bottled Water Found to be Less Than Pure*, CHINA TIMES (Sept. 9, 2011), http://www.wantchinatimes.com/news-subclass-cnt.aspx?cid=1103&MainCatID=11&id=20110909000031.
[199] *Id.*
[200] *Id.*
[201] Daosen & Xiruo, *supra* note 191.
[202] IBISWORLD, *supra* note 12, at 19.
[203] *Nongfu Water Fact Sheet*, PPSJ (Jul. 15, 2006), http://guide.ppsj.com.cn/art/1279/12793/.
[204] Nonfu draws its waters from Guangdong's Lake Wanlu, Lake Qiandao in Zhejiang Province, and the Danjiangkou Reservoir in Hubei Province. Bao Chengrong, *Nongfu Spring Reels After Crushing Quality Report*, BEIJING TODAY (May 12, 2013), http://beijingtoday.com.cn/nongfu-spring-reels-after-crushing-quality-report/.

following a provincial standard inferior to national regulatory standards.[205] Moreover, because bottlers are expected to follow the provincial standard of the province where their factory is located, Nongfu's Guangdong factory purportedly violated provincial standards by following the less stringent Zhejiang provincial standard.[206] The Zhejiang standard failed to comply with the national standard for non-mineral bottled water: GB19298-2003.[207] Nongfu countered that its factories adhere to both national and provincial standards and in the case of conflict, to whichever is more stringent.[208] This more lenient standard suggested that tap water quality was superior to Nongfu water—which is what grabbed most media headlines—even though the vast majority of China's tap water does not comply with the new tap water standard.[209] The scandal highlights the chaos and confusion ubiquitous under China's regulatory system and the lack of quality control assurances. One industry expert noted that provincial standards are effectively invalidated if a corresponding national standard exists.[210] If Nongfu was indeed

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[205] *Id.*

[206] *Nongfu Spring Halts Beijing Barrels*, SHANGHAI DAILY (May 7, 2013), http://www.china.org.cn/business/2013-05/07/content_28746787.htm; Xiaodong, *supra* note 7.

[207] Wang Zhenghua, *Quality Concerns Over Bottled Water*, CHINA DAILY (Apr. 17, 2013) http://usa.chinadaily.com.cn/epaper/2013-04/17/content_16414574.htm.

[208] Wen Wei Po, *Zhejiang Department of Health and the Bureau of Quality and Technical Supervision Say Nongfu Passes Inspection*, NEWS365.COM (May 14, 2013), http://whb.news365.com.cn/shsh/201305/t20130514_1136224.html (noting that Zhejiang provincial has five standards below national standard GB19298, but Nongfu responds saying that the company adheres to the national and provincial standards).

[209] Gong Jing, *What's Coming Out of China's Taps*, CHINADIALOGUE (Jul. 7, 2012), https://www.chinadialogue.net/article/show/single/en/4962-What-s-coming-out-of-China-s-taps-.

[210] According to an official newspaper of China, "Chen Junshi, an analyst with the China National Center for Food Safety Risk Assessment, said enterprises are only allowed to adopt local standards in exceptional cases when there are no relevant national standards. Exceptions are also made for companies operating under unique regional conditions that are considerably different from elsewhere in the country." Indeed, the law does not explicitly require compliance with a provincial standard if a corresponding national standard exists. Zhong Hua Ren Min Gong He Guo Biao Zhun Hua Fa (中华人民共和国标准化法) [Standardization Law of the People's Republic of China](Promulgated by Standing Committee of the National People's Congress, art. 6, issued Dec. 29, 1988, effective April 1, 1989) (China) [hereinafter *Standardization Law*], *available at* http://www.npc.gov.cn/wxzl/gongbao/1988-12/29/content_1481259.htm. The law does state, however, that in the absence of a national regulation, a province may implement legislation to fill this absence. *Id.* Enterprise standards are an exception and may

complying, as the company insists, with national standards then Nongfu did not necessarily violate any laws. With so much misinformation and confusion, it is a wonder there are not more scandals—although the country's limited transparency presumably conceals a good deal of potential water quality violations.[211] Nongfu's pending lawsuit against the Beijing Times for $9.7 million (CN¥60 million) has also undeniably created a chilling effect on such investigative journalism.

Part of the reason companies are failing inspections has to do with economics and the cost of proper filtration. State-of-the-art filtration systems, like GE Water & Process Technologies, can be financially burdensome for domestic bottlers. Indeed, the water filtration equipment alone for a relatively small plant (operating at 300grams(g)/minutes(min)) can cost upwards of $1 million.[212] An average medium sized plant (operating at 600,000-700,000g/min) plant can cost closer to $1.5-5 million.[213] Some estimates suggest that for a bottle of water in China to meet regulatory standards it must cost a minimum of $4.92 (CN¥30).[214] Many 500ml domestic brands sell for under $.50-.70 (CN¥10). When accounting for the raw materials, energy input, filtration technology, and environmental impact, this price cannot adequately reflect the product's real cost. Put differently, if bottled water in China on average costs only CN¥10, when a properly treated and filtered bottle should cost CN¥30, then the bottlers must be cutting corners somewhere. This is before even addressing whether bottled water for CN¥30 accurately reflects the true cost of a bottle of water. For example, mineral waters sourced

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exist alongside national standards, so long as they are at least as stringent as national standards. *Id; Bottled Water Scandal Highlights Food Safety Challenges*, XINHUA (Apr. 12, 2013) http://news.xinhuanet.com/english/china/2013-04/12/c_132304484.htm.

[211] Gong Jing, *What's Coming out of China's Taps*, *supra* note 209.

[212] Phone Interview with General Electric Representatives (October 2013).

[213] These figures only look at the cost of water filtration technology and not other capital or operational costs. *Id.*

[214] Wencong, *Questions Remain over Safety of Bottled Water*, *supra* note 10.

from remote regions in China and Tibet[215]—which presumably offer superior water sources to their urban counterparts—sell for CN¥4-6.[216] This price is indisputably a far cry from the actual value of this increasingly scarce and polluted resource—especially given the source's politically sensitive and environmentally fragile location.[217]

Water filtration processes include media filtration, microfiltration, ultrafiltration, nanofiltration, reverse osmosis, ion exchange (softening and deionizing), chlorination, irradiation (ultraviolet), and adsorption.[218] These filtration mechanisms target undissolved and dissolved solids, and biological and chemical contaminants.[219] Depending on the original quality of the water, a series of these processes must be applied in order to ensure the water's safety.[220] Because many of these filtration mechanisms do not target all of these groups, proper filtration typically requires a combination of the above processes.[221] It is hard to know which, if any, of these filtration methods are used, however, as bottlers are not required to list their filtration method on the product's label and often do not disclose their filtration methods to the public.[222] Economic considerations often induce bottlers to prioritize sensory and microbial indexes over heavy metal testing,[223] as testing for these metals can be costly.[224] This invariably

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[215] The author's references to Tibetan waters in the context of bottled water in China do not assume any political position on Tibetan sovereignty and strive to respect Tibetan autonomy.
[216] *Id.*
[217] The conflict over Tibetan sovereignty has left the region politically unstable; moreover, due to the fragility of the region's ecosystem and its waters, and the area's cultural sensitivity, Chinese bottlers grossly undervalue the cost of bottled water sourced in Tibet.
[218] DOROTHY A. G. SENIOR &NICHOLAS DEGE, TECHNOLOGY OF BOTTLED WATER, 132–38 (2008).
[219] *Id.*
[220] *Id; Water Health Series: Filtration Facts*, ENVT'L PROT. AGENCY, http://www.epa.gov/safewater/faq/pdfs/fs_healthseries_filtration.pdf (last visited Sept. 18, 2013).
[221] ENVT'L. PROT. AGENCY, *supra* note 220.
[222] *See* FRESHFIELDS, BRUCKHAUS, DERINGER, BRIEFING: CHINA FOOD LAW 2 (2012), *available at* http://www.freshfields.com/uploadedFiles/SiteWide/Knowledge/November%202012_China%20food%20law.PDF.
[223] *Id.*
[224] *Id.*

poses a significant and more insidious danger to public health, as the side effects of low-dose exposure to heavy metals are not always readily apparent. Another reason heavy metals are less frequently tested is that their dangers are not well known in China.[225]

Indeed, Chinese bottlers appear to lack institutional knowledge on water contaminants and sources of contamination.[226] This highlights another reason why bottlers are failing market inspections. The head of the Institute of Drinking Water Safety Research at Tsinghua University, Liu Wenjun, has publicly expressed a lack of confidence in the ability of public officials to connect water contaminants—namely organic compounds—with public health risks.[227] In his view, China cannot afford to use basic water purification methods like those employed in Canada in Europe because Chinese waters are significantly more degraded and require more thorough filtration.[228] Regulations do not require testing for a number of indicators, such as acidity, and certain compounds like mercury and silver.[229]

Public officials are also not always familiar with groundwater and hydrological systems and water contamination risks. For example, in 2012, an official of the China Mineral Water Committee stated that "[u]nlike [China's polluted] surface water, mineral water is usually hundreds of meters underground, so it's free from contamination."[230] Considering that groundwater contamination is rampant in China—with recent data

[225] Based on an original study by the authors, many Chinese believe that the boiling process removes all impurities from water making it safe to drink.
[226] Jing & Hongqiao, *supra* note 106.
[227] *Id.*
[228] *Id.*
[229] Patrick Boehler, *China Still Tests Bottled Drinking Water Using 'Soviet Standards,'* SOUTH CHINA MORNING POST (May 2, 2013), http://www.scmp.com/news/china/article/1228136/china-still-tests-bottled-drinking-water-using-soviet-standards.
[230] Yangpeng, *supra* note 121.

suggesting that approximately 90% of China's groundwater is polluted[231]—bottled water reserves aren't necessarily immune. The official's statement suggests that water contamination risks, alongside filtration requirements, may not be fully understood. Mineral water is generally understood as groundwater containing a certain level of dissolved solids.[232] Surprisingly, mineral water does not undergo water treatment.[233] This is because Chinese mineral water bottlers are required under law to preserve the water's natural mineral composition.[234] As a result, mineral water in China is bottled straight from the ground, with minimal, if any, filtration.[235]

In addition to proper filtration, bottlers must also ensure that these filtration systems are properly managed. Water purification infrastructure and machinery can themselves be a source of contamination if the pipes and machinery are not regularly cleaned.[236] Maintenance and upkeep are additional costs that bottlers must bear in order to ensure water safety.

Poor water quality is not the only public health risk facing bottled water consumers. Scandals involving the falsifying of bottled water brands are also emerging from the shadows.[237] In the case of barreled water, the risk is greater as bottled water jugs

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[231] *Officials Blamed for Water Pollution*, RADIO FREE ASIA (Feb. 18, 2013) http://www.rfa.org/english/news/china/water-02182013150415.html.
[232] *Do You Know Where Your Bottled Water Comes From*, CONSUMER REPORTS MAGAZINE (July 2012), http://www.consumerreports.org/cro/magazine/2012/07/do-you-know-where-your-bottled-water-comes-from/index.htm.
[233] Yin Yong Tian Ran Kuang Quan Shui （饮用天然矿泉水) [Drinking Natural Mineral Water (issued by General Administration of Quality Supervision, Inspection and Quarantine of People's Republic of China and Standardization Administration of the People's Republic of China, Dec. 29, 2008, effective Oct. 1, 2009), at art. 5.3.2 (China) [hereinafter *Drinking Natural Mineral Water*], *available at* http://wenku.baidu.com/view/3094f847a8956bec0975e376.html.
[234] *Id.*
[235] *Id.*
[236] Wencong, *Questions Remain over Safety of Bottled Water*, *supra* note 10.
[237] *Now China Points Finger at Fake Water*, REUTERS (Jul. 10, 2007), http://www.reuters.com/article/2007/07/10/us-china-water-idUSPEK397820070710 ("up to half of the water used in water coolers across China's capital could be 'fake,' or not as pure as its manufacturers

can be reused as many as 40 times before they are discarded.[238] An employee of the bottled water business reported "about 60 percent of barreled water on the [Chinese] market is fake brands…and some illegal water factories fill the barrels with tap water but paste the labels of popular brands on them."[239] The art of mislabeling is supported by anecdotal evidence,[240] as well as statistical data from the China National Health Association on the national quality-grade output for polycarbonate—the material used to make the larger barrel water jugs. These statistics show that sales of polycarbonate fall short of demand,[241] inviting the question: what material are bottlers using to make up the difference, and could it pose a risk to human health?

Serial numbers on water products are also rarely verified: just three out of 10,000 serial numbers are authenticated. This "leav[es] an opportunity for fake-brand water producers to recycle old serial numbers."[242] This lack of oversight in the bottled water industry is a fundamental problem that heightens product contamination. Director of the Beijing Institute of Public Health and Drinking Water, Li Fuxing, reported witnessing workers in Hebei province mix debris into the bottles before sale and commented on how "some distributors simply pump tap water into the bottles that are labeled as famous

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claim."); *Fake Bottled Water Sold in China*, YOUTUBE (May 9, 2013), http://www.youtube.com/watch?v=EFmQfTKuCH0.

[238] Wencong, *Questions Remain over Safety of Bottled Water*, *supra* note 10.

[239] *Id.*

[240] *Welcome to China, Here's a Fake Bottle of Evian Water,* THELITTLECOLUMNIST (Aug. 3, 2011), http://thelittlecolumnist.wordpress.com/2011/08/03/welcome-to-china-heres-a-fake-bottle-of-evian-water/; *Chicken Dies Drinking Bottled Water in China*, THE EPOCH TIMES (Sept. 11, 2007), http://www.theepochtimes.com/news/7-9-11/59671.html.

[241] Wencong, *Questions Remain over Safety of Bottled Water*, *supra* note 10.

[242] Li Yanhui, *Fake Brands, Bacterial Proliferate in Water Market*, GLOBAL TIMES (Jul. 8, 2011), http://www.globaltimes.cn/NEWS/tabid/99/ID/665216/Fake-brands-bacteria-proliferate-in-water-market.aspx.

brands…[and others] replace qualified bottles with substandard ones."[243] These realities create a breeding ground for counterfeit bottling and product contamination.

As the domestic bottled water market expands, improved oversight will become even more necessary. Roughly 207 new water products entered the market between 2007 and 2010.[244] In the past two years, roughly 220 bottled water companies have emerged in Inner Mongolia— a region known for poor water quality.[245] This rise in domestic market brands and products raises questions about the capability of local regulators to ensure quality control. The deputy of the region's quality control bureau conceded that the company is facing quality control problems as a result of antiquated manufacturing processes.[246] Because bottled water regulation in China relies heavily on industry self-monitoring, the increase in domestic bottlers in a fractured and deregulated market will necessarily increase the odds of contamination and thus heighten consumer health risk.

Domestic companies are not the only public health offenders. In 2012, Evian faced charges for excessive nitrates in its bottled water.[247] Evian responded by highlighting the difficulty of confirming whether the affected water was, indeed, Evian water since "[the products] were not imported by an assigned official importer to the Chinese market."[248] This incident marked the sixth time in recent years that the company was inspected over quality control problems.[249] In its response to the accusations, Evian highlighted the lack of quality control companies have over the product once it enters

[243] Wencong, *Questions Remain over Safety of Bottled Water*, *supra* note 10.
[244] NEW ZEALAND & TRADE ENTERPRISE, *supra* note 77, at 1.
[245] Yang Cih-yu, *China's Bottled Water Found to be Less Pure*, WANT CHINA TIMES (Sept. 9, 2011) http://www.wantchinatimes.com/news-subclass-cnt.aspx?id=20110909000031&cid=1103.
[246] *Id.*
[247] Yangpeng, *supra* note 121.
[248] *Id.*
[249] *Id.*

China and the company's limited oversight over its distribution network.[250] Indeed, foreign companies generally operate in partnership with domestic manufacturers and bottlers, thereby exposing their product line to China's deregulated distribution network.[251]

The quality of Chinese bottled water is further complicated by the fact that most consumers do not know where the water comes from or how it is treated. The labels on bottled water, often ringed with images of snow-capped mountains and azure blue streams, project a chimeric fiction of purity. The reality may be harder to swallow. Bottled water brands worldwide often fail to disclose the water's source, which typically bears little resemblance to images coating the bottle.[252] Brand names can also be misleading, with labels bearing names of mountains and glaciers when the water is actually sourced from public municipalities.[253] Chinese bottlers likewise provide little more than an idealistic image on the outside label as there is usually limited, if any, information about the source of the water or the filtration processes involved.[254] Some brands do, however, disclose their source and filtration method. Nongfu Spring, for example, lists its source on its website.[255] Wahaha likewise states that its water comes from a spring in Changbai Mountain."[256] Wahaha additionally discloses its water purification method: reverse osmosis technology,[257] which is considered one of the most effective and advanced methods for water purification. Most bottlers, however, are not as

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[250] *Id.*
[251] IBISWORLD, *supra* note 12, at 1.
[252] GLEICK, BOTTLED AND SOLD, *supra* note 16, at 91; Carol Potera, *The Price of Bottled Water*, 110 ENVTL. HEALTH PERSPECTIVES 76, 76 (2002), *available at* http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240751/pdf/ehp0110-a0074c.pdf.
[253] Potera, *supra* note 252, at 76.
[254] *See* Appendix B.
[255] NONGFU SPRING, http://www.nongfuspring.com/app/appOut.action (last visited May 13, 2013).
[256] WAHAHA, http://en.wahaha.com.cn (last visited May 13, 2013).
[257] *Id.*

forthcoming with such information. This lack of disclosure presents obvious public health issues, especially for a country where water sources are not subject to the same quality assurances as more developed countries. While the global bottled water industry is notorious for its lack of disclosure, it is especially important for countries with severe water pollution and notoriously weak legal and regulatory enforcement to be forthcoming about the water's source and purification method.

China's recent contamination and counterfeit scandals have unsurprisingly escalated bottled water safety concerns. Absent stricter regulatory oversight, the safety of bottled water cannot be assured, and counterfeit bottling and renegade bottling practices will only prove a more potent threat.

3. The Legal Landscape of Bottled Water in China

Legal ambiguities cast a shadow over much of China's bottled water law. This lack of clarity is partly attributable to China's labyrinthine legal system and the highly complex regulatory structure that underpins the industry. Because China's legal system remains relatively young, and regulatory enforcement is notoriously weak, China's bottled water laws are particularly vulnerable to public health and environmental problems. Understanding these regulations has been further frustrated by a lack of information concerning the laws and agencies involved in bottled water production and distribution. Errors in costly industry reports—such as IBISWorld's *Bottled Water in China 2012* market report, which references outdated laws and regulations[258]—highlight the challenges to understanding China's bottled water regulatory system.[259] These

[258] *Id.*

[259] IBISWorld's market report, *Bottled Water Production in China*, *supra* note 12, fails to reference the most recent laws and regulations. The report cites Drinking Natural Mineral Water GB8537-1995, which

inaccuracies also draw attention to the decentralized and often-slipshod method Chinese laws are published or amended and the absence of an official catalog (like the United States' Code of Federal Regulations) for locating the nation's most up-to-date and authoritative laws and regulations. This section accordingly seeks to bring clarity to China's bottled water legal terrain.

It is first important to understand the fundamentals of law in China. National laws in China are issued either by the National People's Congress (NPC) or its Standing Committee. The State Council, which is subordinate to the NPC, is charged with implementing regulations.[260] Ministries under the State Council have regulatory authority to issue "rules." These rules operate as the least authoritative form of national regulation after laws and regulations.[261] Because rules carry the same legal weight as local decrees, when a conflict arises, the State Council is called to determine which of the two prevails.[262]In addition to laws, regulations, and rules, there are also standards, which follow the Standardization Law and are promulgated by the Administration of Quality Supervision, Inspection, and Quarantine (AQSIQ) in coordination with the less authoritative Standardization Administration of China (SAC).[263] Beyond this national framework, local governments at various levels (i.e. provincial, city, and prefecture) implement a local body of law.[264]

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should read GB8537-2008; Hygienic Standard of Bottled Purified Water for Drinking GB17324-1998, which should read GB17324-2003; and Standard of Bottled Purified Water for Drinking GB17323-1998, which is outdated. IBISWorld also fails to include other relevant regulations, such as GB 19298-2003, which applies to bottled water that is not mineral water or purified bottled water. *See* IBISWORLD, *supra* note 12.

[260] CHARLES MCELWEE, ENVIRONMENTAL LAW IN CHINA: MITIGATING RISK AND ENSURING COMPLIANCE 44–48, 78 (2011).

[261] *Id.* at 100.

[262] *Id.* at 104.

[263] *Id.* at 104.

[264] *Id.* at 108-110.

Several laws, regulations, and agencies oversee the life cycle of a bottle of water in China. These change depending on the water's source and stage of manufacture, different laws, regulations, and agencies govern. Generally speaking, only a handful of laws apply to bottled water, whereas myriad regulations and local ordinances are applicable. A bottler may withdraw mineral water, non-mineral water, or purchase tap water from a municipality. Based on which of these sources a bottler draws from, the bottled water is subject to one of three regulatory routes as each of these water sources has a separate legal status. Mineral water and non-mineral water, for example, are subject to a licensing requirement that does not apply to purified tap water.[265] Other laws and agencies, alongside bottled water standards, come into effect at the commodification stage (*see* Table 2).

This section first explores water regulation at the extraction stage and the regulatory schemes underlying each of the three water sources. Second, this section will examine the regulatory process for bottled water at the commodity stage.

A. Extraction and Compensation

1. Mineral Water

China currently supports roughly 3,000 qualified mineral water sources,[266] and has approximately 100 major domestic producers.[267] Unlike non-mineral and purified tap

[265] Qu Shui Xu Ke He Shui Zi Yuan Fei Zheng Shou Guan Li Tiao Li（取水许可和水资源费征收管理条例) [Regulation on the Administration of the License for Water Drawing and the Levy of Water Resource Fees] (promulgated by State Council, adopted Feb. 21, 2006, effective Apr. 15, 2006), at art. 1.3 (China) [hereinafter *Regulation on the Administration of the License for Water Drawing*], *available at* faolex.fao.org/docs/texts/chn64808.doc (supplementing the Water Law with a focus on the management of water extraction activities, licensing procedures, and compensation).

[266] Wencong, *Questions Remain over Safety of Bottled Water*, *supra* note 10. Statistics from the China Mineral Water Committee suggest that China has 4,400 identified sites that qualify for producing mineral water. Yangpeng, *Opportunity Looms for Premium Chinese Water Brands*, *supra* note 121.

[267] Yangpeng, *Opportunity Looms for Premium Chinese Water Brands*, *supra* note 121.

water, mineral water is considered a mineral and, accordingly, falls under the authority of the Ministry of Land and Resources (MLR) and the Mineral Resources Law of the People's Republic of China (Mineral Resources Law).[268] Mineral water law is informed by three pieces of legislation: the Mineral Resources Law Rules for Implementation (1994), Provisions on Mineral Resources Compensation, and Procedures for Registration to Mine Mineral Resources.

Under the Mineral Resources Law, the government exercises full control over underground minerals and issues permits for its extraction.[269] Accordingly, companies and individuals interested in extracting minerals must first register and obtain a license to extract water.[270] These entities or individuals must also pay resource taxes as well as additional compensatory fees in accordance with relevant government regulations. Four types of government compensation typically accompany mineral water extraction: 1) purchase of a general mining right; 2) costs accompanying any government-performed land surveys 3) payment for the mineral water based on the quantity extracted (mineral resource fee); and 4) a mineral sales tax.[271] Non-mineral water extraction, alternatively, only requires that a bottler pay the third type of compensation.[272]

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[268] Zhong Hua Ren Min Gong He Guo Kuang Chan Zi Yuan Fa Shi Shi Tiao Li （中华人民共和国矿产资源法实施条例） [Rules for Implementation of the Mineral Resources Law of the People's Republic of China] (promulgated by State Council, adopted and effective Mar. 26, 1994), at Appendix [hereinafter *Rules for Implementation of the Mineral Resources Law*], *available at* http://www.ahdkj.gov.cn/en/laws.jsp (listing mineral water as a kind of mineral resource).

[269] *Id.* at art. 3.

[270] *Regulation on the Administration of the License for Water Drawing*, *supra* note 265.

[271] Kuang Chan Zi Yuan Kai Cai Deng Ji Guan Li Ban Fa (矿产资源开采登记管理办法)[Procedures for Administration of Registration of Mining of Mineral Resources] (promulgated by State Council, February 12,1998), at art. 9 (China) [hereinafter *Procedures for Administration of Registration of Mining of Mineral Resources*], *available at* http://www.mlr.gov.cn/zwgk/flfg/kczyflfg/200601/t20060119_72222.htm; Kuang Chan Zi Yuan Bu Chang Fei Zheng Shou Guan Li Gui Ding (矿产资源补偿费征收管理规定)[Provisions on the Administration of Collection of the Mineral Resources Compensation] (Promulgated by State Council, February 27, 1994), at art. 5 (China) [hereinafter *Provisions on the Administration of Collection of the Mineral Resources Compensation*], *available at* http://www.chinaacc.com/new/63/73/131/2006/5/zh217015195712156002273O-0.htm;

To bear the "mineral" label, Chinese laws require that the water be drawn "from deep underground . . . with a certain amount of minerals, trace elements or other constituents, [and] without contamination."[273] Mineral water should not be confused with mineral-fortified water, which is either purified tap water or non-mineral water with added minerals.[274] Fortified mineral water must comply with either of the two primary bottled water standards for purified tap or non-mineral water, as well as GB2760-2007 (Standards for Food Additives).[275] Mineral water producers have acknowledged that their water generally undergoes minimal filtration because it is perceived to have "virtually no impurities."[276] Once a site is designated for mineral water extraction, local governments must take protective measures to ensure the integrity of the water and prevent contamination by imposing land restrictions.[277] For example, human activities are also severely constrained and tourism and development in the area are outright prohibited.[278]

Mineral water's legal status in China has been historically complicated. Although mineral water was originally under the supervision of the Ministry of Water Resources

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Zhong Hua Ren Min Gong He Guo Zi Yuan Shui Zan Xing Tiao Li（中华人民共和国资源税暂行条例）[Provisional Regulations on Resources Tax of the People's Republic of China] (promulgated by State Council, Dec 25, 1993), at art. 5 (China) [hereinafter *Provisional Regulations on Resources Tax of the People's Republic of China*], *available at* http://www.chinaacc.com/new/63/67/88/2005/10/ad341281111720150021472.htm;
Zhong Hua Ren Min Gong He Guo Zi Yuan Shui Zan Xing Tiao Li Shi Shi Xi Ze（中华人民共和国资源税暂行条例实施细则) [Detailed Rules for the Implementation of the Provisional Regulations of the People's Republic of China on Resource Tax] (Promulgated by Ministry of Finance, Dec 30, 1993), at art. 4 (China) [hereinafter *Implementing Provisional Rules of China on Resource Tax*], *available at* http://www.chinaacc.com/new/63/67/81/2005/12/dr11021226451032150021053 8-0c.htm.

[272] *Regulation on Administering License Water Drawing*, *supra* note 265.

[273] *Drinking Natural Mineral Water*, *supra* note 233.

[274] *Mineral Fortified Water*, http://baike.baidu.com/link?url=DTHYnbqdoGCl5TNKhw50tLML8uMUSMpwfaMWMxpdTbTL0iP0Hc__NYpVPLu9OZzy (last visited Nov. 19, 2013).

[275] *Id.*

[276] Yangpeng, *Opportunity Looms for Premium Chinese Water Brands*, *supra* note 121.

[277] *Rules for Implementation of the Mineral Resources Law*, *supra* note 268, at art. 24, 27.

[278] *Id.*

(MWR),[279] the MLR also believed that it should oversee mineral water extraction and receive compensation fees.[280] Mineral water's high economic value and the lack of coordination between these government agencies made this debate all the more acrimonious.[281] The matter was resolved in 1998,[282] and as indicated above, mineral water is now regulated under the MLR. However, this lack of cooperation between government agencies in China continues to hamper environmental efforts throughout the country.

2. Non-Mineral Water

Non-mineral water extraction follows a separate regulatory route. Like mineral water, however, regulations at this stage focus primarily on withdrawal regulations, licensing, and extraction and resource fees.

Chinese law defines non-mineral water as water drawn "directly from rivers, lakes or underground with the use of water drawing engineering structures or facilities."[283] The two main laws governing non-mineral water extraction and compensation are the Water

[279] Zhong Yang Ji Gou Bian Zhi Wei Yuan Hui Ban Gong Shi Guan Yu Kuang Quan Shui Di Re Shui Guan Li Zhi Ze Fen Gong Wen Ti De Tong Zhi (中央机构编制委员会办公室关于矿泉水、地热水管理职责分工问题的通知) [The Notification on Division of Management Responsibility of Mineral Water and Geothermal Energy from Central Office of Government Setup Committee] (issued by the Center Office of Government Setup Committee, Dec.16, 1998) (China), *available at* http://www.fzgtzyj.gov.cn/ZWView.asp?ID=324&PID=3.

[280] *Rules for Implementation of the Mineral Resources Law*, *supra* note 268 (stipulating that mineral water is a mineral in the appendix).

[281] For example, in the 1990s, a number of mineral water companies were uncertain as to which government agency should received compensation fees. Different courts had different opinions on the issue. *See* Liu Jian Dong, Zhang Wei Ling, Meng Jun, *Water Resources or Mineral Resources: The Argument over the Legal Nature of Mineral Water*, XINJIANG LEGAL DAILY (Jun. 30, 2010), *available at http://www.xjfzb.com/view.asp?id=38875*.

[282] In 1998 the government issued the Notification on Division of Management Responsibility of Mineral Water and Geothermal Energy, stipulating that an applicant must first apply to the water resources administration for a water collection license before applying to the mineral resources administration. This notification further stated that miners were required to compensate the MLR and need notify the MWR. *See supra*, note 280.

[283] *Regulation on the Administration of the License for Water Drawing*, *supra* note 265, at art. 2, 4.

Law of the People's Republic of China (last modified 2002)[284] and the Regulation on the Administration of the License for Water Drawing and the Levy of Water Resource Fees (2006).[285]

The MWR is the leading authority on non-mineral water resource management.[286] The Ministry's administrative departments "at the county level or above" which generally include provincial, city, and prefecture Environmental Protection Bureaus (EPBs), are charged with the implementation and administration of non-mineral water extraction laws and withdrawal licenses.[287] The Ministry of Environmental Protection (MEP), alternatively, is responsible for controlling water pollution and coordination between these two agencies is effectively non-existent.[288] Naturally, by keeping these agencies separate from one another, the government impairs regional resource management policies and water pollution control efforts.[289]

The MWR is composed of a network of water administration departments and watershed authorities that regulate different water bodies depending on the size, significance, and geographic composition of the water body.[290] When a body of water spans several administrative districts, for example, the government creates a specific river basin commission, like the Yangzte River Conservancy, to oversee regulation and

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[284] Zhong Hua Ren Min Gong He Guo Shui Fa（中华人民共和国水法）[Water Law of the People's Republic of China (Order of the President No. 74)] (promulgated by Standing Comm. Natl. People's Cong., adopted Jan. 21, 1988, revised Aug. 29, 2002, effective Oct. 1, 2002), at art. 1–2 (China) [hereinafter *China's Water Law*], *available at* http://english.gov.cn/laws/2005-10/09/content_75313.htm (dictating how water resources are managed and allocated for economic use and oversees water development, utilization, protection, and preservation of resources. This law also applies only to surface water and groundwater).
[285] *Regulation on the Administration of the License for Water Drawing*, *supra* note 265.
[286] Jiang, *supra* note 8, at 3191.
[287] *Regulation on the Administration of the License for Water Drawing*, *supra* note 265; *China's Water Law*, *supra* note 284, at art. 7.
[288] Jiang, *supra* note 8, at 3191.
[289] *Id.*
[290] *China's Water Law*, *supra* note 284, at art. 12.

permitting.[291] River basin commissions have a reputation for kowtowing to local politicians and have "limited power to allocate water resources, coordinate water resource exploitation and conservation, and enforce water resource planning at the basin level."[292] As a result, broad-based water management of surface waters in China is weak and "local myopic decision-making" generally prevails.[293] Moreover, China's Water law "does not clearly define the authority of local governments and river basin management commissions . . . caus[ing] a vacuum of authority."[294] This dysfunction necessarily undercuts efforts to manage water extraction quotas.

Under water withdrawal regulations, applicants are required to consider the environmental impacts of their operations and provide a report detailing the source and purpose of the water withdrawal and the "impacts to the ecology and environment, etc."[295] As this regulation illustrates, China's acceptance of "etc." as permissible legal language complicates legal interpretation and an understanding of the intent and scope of many Chinese laws. China's water laws also call for the "conservation and reasonable exploitation and utilization of water resources."[296] These efforts however are rarely executed in earnest and what defines "reasonable" is seldom clear.

Apart from a handful of exceptions, non-mineral water withdrawals require a license.[297] To obtain a license, a bottler must apply to the local government water administration and, where applicable, regional watershed authorities.[298] Licenses are then issued in accordance with China's Water Law, comprehensive water planning and

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[291] *Id*.
[292] Jiang, *supra* note 8, at 3191.
[293] *Id*.
[294] Xie et al., *supra* note 14.
[295] *Regulation on the Administration of the License for Water Drawing*, *supra* note 265, at art. 11.
[296] *Id.* at art. 1.
[297] *Id.* art. 2, 4.
[298] Jiang, *supra* note 8, at 3191.

withdrawal quotas, and the central government's "medium and long-term planning for the supply and demand of water and the functional division of water."[299] The amount of water allocated for withdrawals is based on previously agreed upon water allocation schemes and industrial water use quotas determined by regional administrative departments.[300]

Unfortunately, due to enforcement obstacles, even the most stringent of water regulations offer little reassurance that China's waters are protected. This is in large part because Chinese laws are drafted to "operate at a level of generality that provides flexibility to those who are require to enforce them."[301] For example, the seemingly flippant addition of the word "etc." at the end of the above-referenced regulation suggests a casual attitude towards the environmental consequences of water extraction. This assumption is reinforced by China's reputation for favoring policies that prioritize economic growth over environmental protection.[302] Ambiguities in the law's provisions further magnify the difficulty of interpreting and enforcing environmental rules and regulations. For example, China's Water Law states that water resource development "shall follow the principle of promoting benefits while eliminating disasters."[303] Although this is a translated version of the statute, the original text likewise lends itself to myriad interpretation.[304] Nepotism and cronyism (part of a cultural norm in China

[299] *Regulation on the Administration of the License for Water Drawing*, *supra* note 265, at art. 6, 15.
[300] *Id.* at art. 15, 16.
[301] MCELWEE, *supra* note 260, at 8.
[302] R. Edward Grumbine, *China's Emergence and the Prospects for Global Sustainability*, 57 AM. INST. OF BIOLOGICAL SCIENCES 249, 250 (2007).
[303] *China's Water Law*, *supra* note 284, at art. 20.
[304] *Id.*

referred to as *guanxi*) permeate China's governing institutions, leaving law enforcement agencies weak and susceptible to corruption.[305]

In addition to obtaining a license, non-mineral bottlers must also pay a water resources fee.[306] These fees are collected by local (county and municipality) water administrations.[307] Fee rates are decided by the various provincial, regional, and municipal administrations and then approved by the national government.[308] In Zhejiang Province, for example, the Price Bureau and Department of Finance has set the water withdrawal fees at $\$0.82/m^3$ (CN¥5) (surface water) and $\$1.64/m^3$ (CN¥10) (groundwater).[309] Water fees must comply with various environmental, economic, and social principles. For example, licensing laws require that any water withdrawal fees comply with "principles of publicity, fairness, justice, [and] high efficiency."[310] Fees must also "promote the reasonable exploitation, utilization, conservation and protection of water resources."[311] The efficacy of these provisions, how they are interpreted, and the frequency of their enforcement is uncertain. The extent to which these fees accurately reflect the environmental, social, and economic costs of withdrawals is undeniably skewed.

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[305] MCELWEE, *supra* note 260, at 8.
[306] According to Article 2, "The term 'water drawing' as mentioned in the present Regulation shall refer to the drawing of water resources directly from rivers, lakes or underground with the use of water drawing engineering structures or facilities. Any entity or individual that draws water resources shall, except for the circumstances prescribed in Article 4 of the present Regulation, apply for a license certificate for water drawing, and pay water resource fees." *Regulation on the Administration of the License for Water Drawing and the Levy of the Water Resources Fee*, *supra* note 265, at art 2.
[307] Shui Zi Yuan Fei Zheng Shou Shi Yong Guan Li Ban Fa (水资源费征收使用管理办法), [Administrative Measures for the Levy and Utilization of Water Resource Fees] (promulgated by Ministry of Finance, National Development and Reform Commission, Nov. 1, 2008) (China) [hereinafter *Administrative Measures for Water Resource Fees*].
[308] *Id*. at art. 8.
[309] *Notification on the Adjustment of Water Resources Fees*, PRICE BUREAU AND DEPARTMENT OF FINANCE IN ZHEJIANG PROVINCE, http://www.zjwater.com/pages/document/34/document_524.htm (last visited Dec. 15, 2013).
[310] *Administrative Measures for Water Resource Fees*, *supra* note 307, at art. 8.
[311] *Id*. at art. 29.

3. Purified Tap Water

The final water category is purified water, which is defined as water that "compl[ies] with the living standards of hygiene . . . through electrodialysis, ion exchange, reverse osmosis ion or distillation and other appropriate processing, [such as] sealing . . . [and] do not contain any additives . . ."[312] Purified tap water is essentially filtered municipal water. Bottlers purchasing tap water are expected to draw from municipalities whose water complies with GB5749-2006—the standard for tap water.[313] The bottled water standard for purified tap water, however, is GB17324-2003, which is more stringent than its tap water counterpart.

Since bottlers of purified tap water do not technically withdraw surface or groundwater, like non-mineral bottlers, they bypass licensing requirements and extraction fees. Accordingly, the municipality (not the bottler) obtains the license to extract and pays the government a water resource fee—like non-mineral and mineral water bottlers.[314] The municipality then sells its water to bottlers (and residents) at a price that reflects these compensatory costs.[315]

B. Commodification

1. National Laws, Regulations, Ministries, and Standards

[312] Ping（Tong）Zhuang Yin Yong Chun Jing Shui Wei Sheng Biao Zhun (瓶（桶）装**饮**用**纯净**水**卫**生标准) [Hygienic Standard of Bottled Purified Water for Drinking] (promulgated by Ministry of Health of the People's Republic of China and Standardization Administration of the People's Republic of China, adopted Sept. 24, 2003, effective May 1, 2004) (China) [hereinafter *Hygenic Standard of Bottled Purified Drinking Water*], *available at* http://wenku.baidu.com/view/c1fb2214f18583d0496459d7.html.
[313] Wang Zhenghua, *Quality Concerns Over Bottled Water*, CHINA DAILY (Apr. 17, 2013), http://usa.chinadaily.com.cn/epaper/2013-04/17/content_16414574.htm.
[314] *Regulation on the Administration of the License for Water Drawing*, *supra* note 265, at art. 2,
[315] *Regulation on the Administration of the License for Water Drawing*, *supra* note 265, at art. 55.

After the water is drawn from one of these three sources, it takes the shape of a commodity and becomes subject to additional domestic regulations and standards. There are a substantial number of national laws, regulations, ministries, and standards overseeing this process.

One of the first requirements for any seller (domestic or foreign) of bottled water is to obtain a sales or production permit from the National Center for Health Inspection and Supervision.[316] Water sourced locally requires an additional permit.[317] For foreign imports, the bottled water must proceed through the China Entry-Exit Inspection and Quarantine Bureau (CIQ).[318] However, the introduction of new foreign products into the Chinese bottled water market has become less common in recent years, as trade barriers and regulatory restrictions are making it increasingly difficult on foreign business to expand in China.[319]

After obtaining a permit, bottled water companies must ensure that their product complies with national laws, regulations. The most important law for quality control and public health is the Food Safety Law and its implementing regulation. Under the Food Safety Law, the State Council established a Food Safety Committee under the State Council and charged the health agency with creating food safety standards.[320] The law also established a food safety risk assessment system composed of an expert committee to evaluate public health risks in the food and beverage industry.[321]

[316] NEW ZEALAND & TRADE ENTERPRISE, *supra* note 77.
[317] *Id*.
[318] *Id.*
[319] *Id*.
[320] Food Safety Law, *supra* note 189, at art. 4.
[321] *Id*. at art. 13.

Bottlers must also adhere to national standards—several of which follow from the directives and objectives of these laws. National standards or "GB (国标*guo biao*) standards" begin with either GB (mandatory) or GB/T (voluntary).322 There are over 2,000 national food standards.[323] The three main standards for bottled water are:[324] GB8537-2008 for mineral water, GB17324-2003 for purified tap water, and GB19298-2003 for non-mineral water (*see* Table 2).[325]

Table 2. Primary Bottled Water Standards

GB 8537-2008: Mineral Bottled Water Standard	**GB17324-2003:** Purified Tap Bottled Water Standard	**GB19298-2003:** Non-Mineral Bottled Water Standard

Additional applicable standards include the Standard for Drinking Water Quality (GB5749-2006), which applies to tap water quality and subsequently to purified bottled water; the Hygienic Standard of Bottled Water for Drinking (GB19298-2003), which has 21 indicators for measuring water quality; and the National Food Safety Standard for Nutrition Labeling of Prepackaged Foods (GB 28050-2011), which prescribes labeling requirements for prepackaged foods. Mineral water must comply with two additional standards: the Methods for Testing Mineral Water (GB/T 8538-2008), which specifies

[322] Standardization Law, *supra* note 210, at art. 7. Standards begin with the letters GB and are followed by series of numbers and end with a hyphen and the date the standard was issued—or, if the standard was amended, the date it was most recently amended.
[323] MCELWEE, *supra* note 260.
[324] China issued its first bottled water standard in 1987: the Standard for Natural Drinking Mineral Water of the People's Republic of China (GB8537-1987). At the time, this standard applied only to mineral water, as it was the only bottled water commercially available. Two years later, China revised this standard to include both soft drinks and bottled water: GB10789-89. Not long thereafter, standards were issued for both purified tap and non-mineral bottled waters. *Id. Bottle Water from China*, FINE WATERS, http://www.finewaters.com/Bottled_Water/China/index.asp (last visited May 13, 2013).
[325] *Drinking Natural Mineral Water*, *supra* note 233, at art. 5.2.1–8.4.3; *Hygenic Standard of Bottled Purified Drinking Water*, *supra* note 312, at article 3.2–9.3.

how mineral water is to be tested and the Hygienic Code for Mineral Water Factories (GB16330-1996), which imposes hygienic requirements on the factory conditions of bottlers.[326]

The main three bottled water standards, as well as several standards listed above, generally stipulate contamination, physiochemical, and microbial indexes, sensory requirements (i.e. properties detectable through human senses), and guidelines for water treatment, storage, and transportation.[327] Several of these standards impose maximum contaminant levels (MCLs) for quality control purposes (*see* Table 3).

Table 3: Water Standards Maximum Permissible Levels (ppm)[328]

	GB 5749:2006 Tap Water	GB 8537:2008 Mineral Bottled Water	GB 17324:2003 Purified Bottled Water	GB 3838: 2002 Surface Water
Arsenic	0.01	0.01	0.01	0.05
Cadmium	0.005	0.003	-	0.001
Hexavalent Chromium	0.05	0.05	-	0.01
Copper	1	1	0.01	0.01
Iron	0.3	-	-	0.3
Lead	0.01	0.01	0.01	0.01
Mercury	0.001	0.001	-	0.00005
Nickel	0.02	0.02	-	0.02

[326] Yin Yong Tian Ran Kuang Quan Shui Jian Yan Fang Fa (饮用天然矿泉水检验方法) [Methods for Examining Mineral Water]（Promulgated by State Administration for Quality Supervision and Inspection and Quarantine and Standardization Administration, Apr. 1, 2009) (China), *available at* http://www.doc88.com/p-031716570455.html; Yin Yon Tian Ran Kuang Quan Shui Chang Wei Sheng Gui Fan（饮用天然矿泉水厂卫生规范）[Hygienic Code for Mineral Water Factories] (Promulgated by Ministry of Public Health, effective Sept.,1,1996) (China), *available at* http://www.czypt.gov.cn/NewsContentView.aspx?model=FoodsStandard¶m=4c7e39ca-dd8c-4728-b191-184aaa13fe4f .

[327] *Drinking Natural Mineral Water*, *supra* note 233, at art. 5.2.1–8.4.3; *Hygenic Standard of Bottled Purified Drinking Water*, *supra* note 312, at article 3.2–9.3.

[328] *Analysis of Toxic Elements in Drinking and Bottled Waters Using the Thermo Scientific iCAP 7200 ICP-OES*, THERMO SCIENTIFIC, *available at* https://static.thermoscientific.com/images/D21758~.pdf (last updated 2013).

Zinc	1	0.2	-	0.05

The national ministries that oversee the commodification stage of bottled water are too numerous for this section to address in any great detail. These ministries include the State Food and Drug Administration (SFDA); the AQSIQ; the National Health and Family Planning Commission (previously Ministry of Health); the State Administration for Industry & Commerce; and the National Development and Reform Commission (NDRC).[329] The roles and responsibilities of these agencies vary and in many cases overlap.

The most relevant of these ministries, for purposes of this paper, is the AQSIQ. This agency is responsible for standardization in China as well as quality inspections in the production sector.[330] Local divisions of the AQSIQ will typically perform spot checks or random inspections of local bottlers to ensure compliance with national and local bottled water standards.[331] The Administration for Industry and Commerce (AIC) also has authority to carry out random market inspections.[332] The AIC is further charged with detecting for counterfeit products and ensuring that bottlers have obtained a sales permit.

Following the recent Nongfu scandal, the government proposed "unifying" the bottled water standard to consolidate provincial, corporate, and national standards into one national standard.[333] According to China's National Center for Food Safety Risk

[329] *AQSIQ Testing Indicates that 46 Bottled Water Brands Failed Inspections*, SOHU.COM (Jul. 11, 2001), http://health.sohu.com/33/69/harticle15116933.shtml (Chinese).
[330] *Id.*
[331] *Id.*
[332] Yang Bin, *Beijing Stops Sale of 35 Substandard Foods, Including Water Brands*, BEIJING EVENING NEWS (Oct. 26, 2011), *available at* http://business.sohu.com/20111026/n323514459.shtml (Chinese).
[333] Wang Xiaodong, *Unified Standards for Bottled Water in the Pipeline*, CHINADAILY (May 4, 2013), http://europe.chinadaily.com.cn/china/2013-05/04/content_16474651.htm.

Assessment,[334] "[t]he National Health and Family Planning Commission is speeding up its consolidation of current standards on bottled water, and new national standards will be published." The government is expected to release this unified standard in 2015.[335] Indeed, China has over 5,000 standards for regulating food quality and hygiene, and many of these standards contradict one another and overlap.[336] The rationale for a unified standard, according to experts, is ensure that bottled water standards are known both to the public and food authorities who supervise quality control.[337] And yet, while the objective of unification would be to improve bottled water safety, a unified standard could very well have the opposite effect. Through unification, China undermines federalism and the ability of provinces to implement more stringent bottled water standards. Already, ambiguities in the language of the Standardization Law have led to confusion surrounding the relationship between national and provincial standards. The government's announcement to unify bottled water standards will effectively eliminate provincial standards, which were already required to adhere to appropriate national standards based on the waters source. If the government is going for simplicity, it may make sense to create one unified standard that applies for all bottled mineral, non-mineral, and purified tap water. This way, companies would not be able to effectively circumvent the filtration process just because the water comes from "deep underground" as is currently the case with China's mineral water.[338]

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[334] This is a government-funded organization formed in 2011 dedicated to food safety. *China Forms Food Safety Risk Assessment Center*, ENGLISH.NEWS.CN (Oct. 14, 2011), http://news.xinhuanet.com/english2010/china/2011-10/14/c_131191294.htm

[335] *China to Unify Bottled Water Quality Standards*, GLOBAL TIMES (May 4. 2013), http://www.globaltimes.cn/content/779119.shtml#.UoMCWSvk9Jw.

[336] *Id.*

[337] *Id.*

[338] *Drinking Natural Mineral Water*, *supra* note 233, at art. 3.1.

Indeed, if from consolidation emerged a more stringent standard, this outcome could help minimize public health risks by putting out of business those bottlers unable to afford the costs of compliance. But as indicated above, the efficacy of these proposed standards (assuming they reflect modern public health risks) will also depend on how rigorously they are enforced. And if tap water quality standards are any indication of how a new—and more stringent—bottled water standard will fare, there is reason for pessimism. China's newly revised tap water standard is considered largely unattainable and critics suggest that it will not result in major improvements to China's tap water.[339] The new standard increases the number of quality indicators from 25-106[340]—rivaling European Union standards—however reports indicate that only about 50 % of urban areas meet the required standards from 1985.[341] Accordingly, China can boast the most impressive and stringent of standards on paper, but if they are not adhered to, or if they are poorly enforced, these standards are little more than words on a page. China may have the hardware that gets the laws on paper, but the country is sorely lacking the software needed to enforce laws once they are on the books.

2. Local and Industry Standards

In addition to national laws and standards, bottlers must also adhere to local and business standards where applicable.

[339] Carmody, *supra* note 66 at 54; Gong Jing & Wang Haotong, *What's Coming Out of China's Taps*, CHINADIALOGUE (Jul. 6, 2012), http://www.chinadialogue.net/article/show/single/en/4962-What-s-coming-out-of-China-s-taps-.
[340] *China's New Drinking Water Standards in Effect*, CCTV (Jul. 1, 2012), http://english.cntv.cn/program/newshour/20120701/105621.shtml.
[341] Gong Jing & Liu Hongqiao, *supra* note 5.

Local standards are primarily issued at the provincial level.[342] Provincial standards must comply with national standards but may impose more stringent regulations for within the province. If a national standard exists, a provincial standard is legally subordinate to its national counterpart; alternatively, if a national standard is absent, the local standards prevail.[343]

As with national standards, there are mandatory and voluntary local standards. Currently, there are approximately 1,200 local standards in the food and beverage sector.[344] The Nongfu Case shed light on the legal implications of provincial standards.[345] At issue in the Nongfu case was the Zhejiang province standard for non-mineral drinking water: DB 33/383-2005. Because bottlers are required to follow mandatory national and local standards, Nongfu violated the law by relying on a provincial standard that fell below national standards[346] and was also less stringent than the applicable provincial standard Nongfu was required to follow for that factory—the Guangdong provincial standard.[347]

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[342] Only provinces, autonomous regions (i.e. Tibet and Xinjiang), and municipalities operating directly under the center government (i.e. Shanghai and Chongqing) can issue local standards. Standardization Law, *supra* note 210, at art. 6.

[343] Zhenghua, *supra* note 313. According to Article 6 of the Standardization Law

> Where, in the absence of both national and trade standards, safety and sanitary requirements for industrial products need to be unified within a province, an autonomous region or a municipality directly under the Central Government, local standards may be formulated. Local standards shall be formulated by departments of standardization administration of provinces, autonomous regions and municipalities directly under the Central Government and reported to the department of standardization administration and the competent administrative authorities under the State Council for the record, and shall be annulled on publication of the national or trade standards. *Id.*

[344] Freshfields, *supra* note 222.

[345] Nongfu has filed a lawsuit against Beijing News based on the report and is demanding CN¥60mn for the report's alleged reputational damage. *Nongfu Spring Halts Beijing Barrels*, *supra* note 206.

[346] Wen Wei Po, *supra* note 208.

[347] *Id.*

At the national level, the three primary standards govern mineral, non-mineral, purified bottled water. However, provinces have also developed local varieties of bottled water, namely mountain spring water and natural water.[348] Guangdong and Zhejiang provinces have recently issued standards for "natural water;"[349] and in 2011, Guangdong province launched a new standard for "mountain spring water" (DBS 44/001-2011).[350] While the Standardization Law is vague on the issue of province-based labeling requirements, bottlers are expected to follow these local and province-based standards, presumably following the logic that there are no corresponding national standards for these specific water types. Less clear, is the legal authority of provincial standards when a corresponding national standard exists. The Standardization Law explicitly allows provinces to enact standards when national standards are absent,[351] but does not state what legal authority provincial standards continue to have when national standards come into effect.

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[348] Li Fei, *Nature Water standards are in disarray*, LEGAL WEEKLY (Apr. 16, 2013) http://www.legalweekly.cn/index.php/Index/article/id/2513.

[349] Ping Zhuang Ying Yong Tian Ran Shui（瓶装应用天然水) [Bottled Natural Water for Drinking] (Promulgated by Zhejiang Bureau of Quality and Technical Supervision, effective Jan. 1, 2006) (China), *available at* http://wenku.baidu.com/link?url=3R8eUDg7OyYmtBpDKKbFkr62hWP_cOAOJ-Xak357gpv3d5pqYnSRHr9jMvMH61wENLZfai4_s3hYo4HN48FHF3VcU7ZY5m6gn9rsMBONeH3.

[350] Ying Yong Tian Ran Shan Quan Shui（饮用天然山泉水）[Drinking Natural Spring Water] (Promulgated by Guangdong Department of Health, effective May 1, 2012) (China) [hereinafter *Drinking Natural Spring Water*], *available at* http://wenku.baidu.com/link?url=zXMgJBGspPlWro1ohc57aRZrZWRqNKd4kyLT_gRfkUSdf9l4bT_yLbk6SAwvT9CUWi443pnRcBQ3JGpROBonYLJDX_-ujKV_qmYBLmvWWly.

[351] Standardization Law, *supra* note 210, at art. 6. Standardization Law of the People's Republic of China, "Where, in the absence of national standards, technical requirements for a certain trade need to be unified, trade standards may be formulated. Trade standards shall be formulated by competent administrative authorities under the State Council and reported to the department of standardization administration under the State Council for the record, and shall be annulled on publication of the national standards. Where, in the absence of both national and trade standards, safety and sanitary requirements for industrial products need to be unified within a province, an autonomous region or a municipality directly under the Central Government, local standards may be formulated. Local standards shall be formulated by departments of standardization administration of provinces, autonomous regions and municipalities directly under the Central Government and reported to the department of standardization administration and the competent administrative authorities under the State Council for the record, and shall be annulled on publication of the national or trade standards." http://www.energylabel.gov.cn/en/PoliciesandRegulations/RelatedWorkPolicies/detail/537.html.

When it comes to new, province-based varietals of bottled water, like Guangdong's mountain spring water, the Standardization Law suggests that bottlers should follow provincial-based standards. In order for a bottler to brand its water mountain spring water, the water must come from mountain streams (not ground-level lakes or rivers) in Guangdong and proceed through a basic filtration process that allows the water to retain certain natural properties and elements.[352] The standard does not permit the bottler to add any elements to the water.[353] Major provincial bottlers, including Dinghu, Lansong, and Wangzishan are presumably subject to this new standard.[354]

One-third of China's most popular bottled water brands adhere to internal industry standards[355] and there are over 2,900 food and beverage industry standards.[356] These standards are generally more stringent than the national and local standards.[357] Nestlé, for example, follows national standards as well as its own internal standards.[358] Of course, as in the United States, the industry itself monitors and enforces its own standards, not government regulators.[359] This approach works all right in the United States, but is arguably riskier for a country like China, where there is little government oversight of industry, no free press, and (perhaps as a result of the latter two realities) severe water pollution. Recently, media reports suggested that Coca-Cola's mineral water standards in Yunnan followed an internal industry standard (Q / KKK 0003 S-

[352] *Id*. at art. 3.1.
[353] *Id*.
[354] *Drinking Natural Spring* Water, *supra* note 350.
[355] Zheng Daosen & Liu Xiruo, *supra* note 191.
[356]Freshfields, *supra* note 222.
[357] Daosen & Xiruo, *supra* note 191.
[358] Zhang Ye, *Unchartered Waters*, GLOBAL TIMES (Apr. 22, 2013), http://www.globaltimes.cn/content/776474.shtml#.UZFWcr-vsy4.
[359] Daosen & Xiruo, *supra* note 191.

2009) was in violation of GB19298-2003 because the standard did not test for radioactivity (gross beta/gross alpha) and cadmium—as required under this national standard.[360]

It is hard to gauge compliance with little information on company standards and confusion surrounding national and provincial regulations. Bottlers are not typically forthcoming with details on their internal standards: Nestlé, Uni-President, Coca-Cola and Master-Kang all refuse to disclose their standards in the name of trade secret confidentiality[361]—even though withholding this information violates Article 26 of China's Food Safety Law, which requires that these standards be available to the public.[362]

4. Law and Policy Recommendations

This paper submits the following recommendations to address public health and environmental concerns surrounding bottled water in China: 1) stricter bottled water transparency requirements, more frequent independent testing, and greater regulatory enforcement efforts to ensure quality control; 2) a tax on bottled water to reflect the product's social and environmental costs that goes towards freshwater resource protection and water pollution remediation; 3) greater coordination and cooperation between government agencies involved in water resource management; 4) an updated water pricing system that reflects water availability and the cost of servicing safe water while eliminating incentives that discourage efficient water consumption and recycling; and

[360] *Coca-Cola, Nestle and Others Refuse to Disclose Internal Bottled Water Standards*, XINHUA (May 6, 2013), http://news.xinhuanet.com/yuqing/2013-05/06/c_124667789.htm.
[361] *Id.*
[362] *Food Safety Law*, *supra* note 189, at art. 26.

finally 5) greater capital and technological investment in the quality and safety of municipal waters supplies. The latter two recommendations are complementary assuming that a rise in bottled water price will trigger greater investment in public water supplies.

Under the first recommendation, China should implement more stringent label disclosure requirements, such as the water's method of filtration and source. China should also ensure that agencies performing water quality testing are entirely independent of the water treatment plants being tested. Currently, only a small number of agencies that perform water quality testing operate independently.[363] Bottled water quality testing should also occur on a more frequent basis, with the test results made publicly available. Even though bottled water is largely unregulated across the globe,[364] countries struggling with severe water pollution and weak regulatory and enforcement systems—such as China—must utilize these stricter and more transparent policies to protect public health. The potential for severe water contamination scares and counterfeit bottling is greater in these countries, thus creating a stronger need for regulation to manage these risks.

Second, bottled water pricing should strive to more accurately reflect the product's environmental and social costs. To ensure adequate quality control and sustainability, the central government should impose a "luxury" tax on bottled water to compensate for the product's negative externalities—the energy (and carbon) used to create it, the water supplies that it depletes, and the waste it produces. Increasing the price of bottled water

[363] Jing & Haotong, *supra* note 5.

[364] The United States should not necessarily serve as an example. Of the top ten most popular water bottled brands in America, nine of them do not specify either their water source, the treatment method used, or provide contact information for consumers seeking water quality data. NNEKA LEIBA, SEAN GRAY & JANE HOULIHAN, ENVIRONMENTAL WORKING GROUP, 2011 BOTTLED WATER SCORECARD 4 (2011), *available at* http://static.ewg.org/reports/2010/bottledwater2010/pdf/2011-bottledwater-scorecard-report.pdf. A 2010 survey found that 18% of bottled water does not disclose the water source and 32% fails to indicate the method of filtration. *Id.* In a 2009 study looking at 188 bottled water brands, only three provided the source name and location, treatment process, and level of purity. *Id.*

while simultaneously improving public water quality will help China manage water demand, promote conservation and efficient water consumption, and provide clean water access to the general public.

Third, China's current water management system requires significant restructuring. At present, water pollution control and water resource planning are two separate administrative bodies: the MEP manages water quality and the MWR manages water allocation and planning.[365] This disconnect impairs efforts to promote efficient water use, ensure quality control, and advance environmental sustainability. Further, river basins are managed by a host of different agencies at various administrative levels, resulting in a fragmented and disjointed water management system.[366] Water resource management is horizontally and vertically fractured with overlapping responsibilities, ultimately creating an "unwieldy system" that undermines administrative coordination.[367] The World Bank has advised China to segregate the MEP from river basin management commissions and permit the latter to have independent intergovernmental authority with accountability exclusively to the State Council.[368] Although the World Bank's recommendations to developing countries are hardly foolproof, this is a sound suggestion, as it would help minimize administrative congestion and allow for more effective regional planning.

Emphasizing broad-based water management will improve efficiency and ensure that proper water management takes precedent over factional political interests. The Chinese government should additionally develop its water rights system to ensure the efficacy of

[365] Jiang, *supra* note 8, at 3191.
[366] *Id.*
[367] XIE ET AL., *supra* note 14, at xxii.
[368] XIE ET AL., *supra* note 14, at xxiv.

the permit process and lawful water extraction.[369] Basin commissions should have overarching authority to regulate regional water bodies and issue permits. These commissions should also condition permits on performing comprehensive Environmental Impact Assessments, which should show that the proposed water withdrawals will not adversely affect the environment and that the permits comply with water withdrawal quotas. The current water management system should also rely more heavily on scientific data and EIAs to inform water policy. Such system management approaches are often unavailable or unsophisticated and so China would benefit from greater investment in these technologies.[370]

Fourth, bottled water prices presently conflict with market signals and environmental realities. China's current method for determining water's economic value is skewed. Local governments generally set water prices with guidance from the National Development and Reform Commission—the national government agency that oversees and implements economic and social development policies.[371] The average price of water in thirty-six of China's cities is $\$.30/m^3$ (CN¥ $1.76/m^3$), and according to the World Bank, water rates must not fall below $\$.33/m^3$ (CN¥$2/m^3$) to recover costs.[372] Indeed, basic filtration is estimated to cost an average of $\$.16\text{-}.25/m^3$ (CN¥$1\text{-}1.5/m^3$).[373] In terms of water productivity rates, China stands at roughly $\$3.60/m^3$, which pales in comparison to middle income and high-income countries—averaging $\$4.80/m^3$ and $\$35.80/m^3$,

[369] Jiang, *supra* note 8, at 3192, 3195.
[370] Jiang, *supra* note 8, at 3195.
[371] *Id.* at 190–191; *Main Functions of the NDRC*, NRDC, http://en.ndrc.gov.cn/mfndrc/ (last visited Sep. 29, 2013).
[372] CHINA DEVELOPMENT RESEARCH FOUNDATION, CHINA'S NEW URBANIZATION STRATEGY 219 (2013).
[373] For example, households in Xi'an province pay approximately CN¥$1.6/m^3$ for water, while the actual cost (i.e. filtration, extraction, etc.) of the water is CN¥$5/m^3$. Jiang, *supra* note 8; XIE ET AL., *supra* note 14.

respectively.[374] Although the government has permitted water tariffs to steadily increase since the early 1990s, studies indicate that water prices currently fail to adequately reflect environment and scarcity costs and are insufficient to recover service costs.[375] China's staunch fear of triggering social unrest with a hike in water prices has been a key obstacle to instituting water-pricing reforms.[376] However, failure to effectively address the nation's water pricing and allocation system now will only strengthen the future likelihood of social unrest and political upheaval.

To address this, local governments could demand higher fees from bottlers for extracting water.[377] These water resource fees could then be converted to taxes, shifting revenue from local governments[378] to the central government. These funds would then help facilitate regional and nationwide water conservation and sustainability projects.[379] Besides, China has a strong financial interest in conserving water, as the economic burden of water scarcity costs China approximately 1.3% of its GDP.[380] Although there are ethical concerns surrounding market-based water pricing, as it will invariably lead to higher water costs, it is important that the price of water more accurately reflect its market value while ensuring widespread public access.

Lastly, the government should inject greater investment into public water supplies. Chinese citizens cannot escape water pollution simply by drinking clean water—a common misconception. Indeed, showering, bathing, and brushing one's teeth are all

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[374] XIE ET AL., *supra* note 14.
[375] *Id.* at xxvi.
[376] LEE, WATER AND DEVELOPMENT IN CHINA, *supra* note 15, at 214.
[377] XIE ET AL., *supra* note 14, at xxvi.
[378] *Id.* at 84.
[379] *Id.* at xxvii.
[380] This figures is believed to be much higher, however, as this percentage does not reflect ecological impacts, such as the disappearance of wetlands and rivers, and the "amenity loss" of water pollution. XIE ET AL., *supra* note 14, at xii.

exposure pathways to pollution either through skin absorption, inhalation, or incidental ingestion.[381] Efforts to increase the price of water through the proposed new water pricing model will likely help generate tax revenue to fund needed upgrades and renovations to water systems, thereby mitigating public health risks.[382]

Indeed, if water extraction and filtration become more costly, the price of bottled water will necessarily rise, which could lead to issues of social injustice for those who can only afford municipals water. It might also lead to a rise in bottled water counterfeiting and piracy, which should be met with greater oversight and regulatory control. As far as ensuring equal access to potable water, the Chinese government should subsidize the cost of safe and clean municipal drinking water. This would make a luxury commodity except in cases where water is either unavailable or contaminated, in which cases it should become a free government-provided service. For a country that considers itself communist, giving access to ostensibly safe drinking water only to those who can afford its purchase seems drunk on irony. The environmental and social implications of globalized water markets, including ethical considerations, while beyond the scope of this paper, are important to consider in any discussion involving bottled water or its future.[383]

CONCLUSION

In the years ahead, China's bottled water market will need to respond to increased demand, water scarcity, and public health concerns. Without a firm commitment to quality control and the environment, the survival and success of China's bottled water

[381] Jing & Hongqiao, *supra* note 5.
[382] *China to Adopt Progressive Water Pricing*, *supra* note 170.
[383] *See* Noah D. Hall, *Protecting Freshwater Resources in the Era of Global Water Markets: Lessons Learned from Bottled Water,* 13 U. DENV. WATER L. REV. 3 (2009) (discussing global water markets and water resource protection).

industry remains on shaky ground. Bottled water cannot sustainably support the daily water needs of China's population under its current paradigm. Bottlers should consider the environmental and energy inputs and create bottled water products that are water-energy-waste neutral. And without stricter regulations and enforcement mechanisms, the safety of China's bottled water will remain in doubt. Ensuring that bottled water consumers are drinking from reliable and safe sources is paramount to China's economic and social progress. To that end, the Chinese government must update its bottled water regulation and water policies to reflect needed improvements in quality control.

More importantly, Chinese reliance on bottled water as a drinking resource is a symptom of a larger and more serious disease: China's extremely polluted water resources. China is home to some of the most polluted freshwater resources in the world, and its municipal water systems are in desperate need of repair and modernization. To date, the government has failed to provide its own people with access to safe drinking water—one of the building blocks of life. That is the height of incompetence. The government must address water quality problems in its freshwater resources and municipal water systems. If it fails to do this, safe and clean drinking water will only be available to those who can afford it, which will likely increase social unrest and further tarnish China's already tainted public image.