

# Water & Business: What Every MBA Needs to Know

## Executive Summary

Water is a fundamental input to the global economy, and a critical component of corporate supply chains, infrastructure, products, and operations. By 2030, demand for water is expected to exceed supply by as much as 40% (more in some regions), creating water stress on both businesses and communities. Businesses may come in direct tension with communities over water use rights. Droughts or flooding may affect agricultural production or interrupt manufacturing or transportation operations. Water infrastructure will be needed to accommodate demand growth and existing infrastructure will need to be made more resilient to extreme weather events.

MBA students should understand water as a pressing challenge in coming decades, with complex connections to food and energy production, climate change, and other issues. There are growing water-related risks for businesses—including financial, reputational, and operational risks. As water stresses increase, businesses may be held more accountable for their water use and stewardship efforts. These conditions create market opportunities for companies offering innovations in water supply and treatment technologies, agricultural technologies, “water-smart” products, and infrastructure finance.

**“Whichever industry you’re in, water will impact your business at some point.”**

- Malcolm Preston, Global Sustainability Leader, PwC, 2015

<https://www.pwc.com/gx/en/services/sustainability/water.html>

## The Issue

Water supply and quality problems are becoming more acute in many parts of the world. Over 2 billion people around the world currently live in locations of “extremely high water stress.”<sup>i</sup> Water availability and quality will likely worsen as the global population grows; as demands for food, agricultural inputs, and energy increase; and as climate change worsens. The World Economic Forum’s 2020 Global Risk Report ranks water crises among the top 10 global risks in terms of both likelihood and potential impact.<sup>ii</sup>

### Water uses

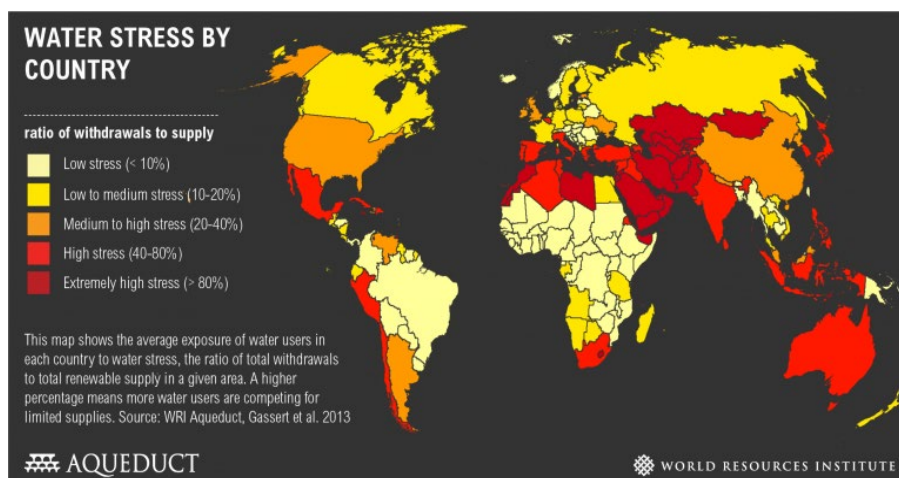
Water is a critical resource for nature and people, as well as a common economic commodity. The world has a finite supply of water, and this resource is generally non-substitutable. Water is used in almost every industry—as an essential input for agriculture, food, and beverage production; as a part of the industrial processes in many manufacturing and industrial operations (most often for cleaning or cooling processes); and as a critical input in energy generation, among other applications. Companies have unique water footprints, requiring different amounts and types of water at different parts of their supply chains. For example, a beverage company might use water as a direct ingredient in its product at each bottling location, but also depends on water in the production of sugar and other agricultural ingredients further up its supply chain as well as water for operational processes during manufacturing.

### Water scarcity

Only 2.5% of the world’s water is freshwater.<sup>iii</sup> By 2030, it is estimated that global water demand will exceed supply by 40%, with an even bigger gap in some countries.<sup>iv</sup> Effects of mismatched supply and demand are already felt by many communities. Water scarcity is caused by population growth (demand for drinking water), growth in water-intensive agricultural and industrial activity, pollution, and increases in the frequency and duration of droughts (which may also be exacerbated by climate change). At a local level, water scarcity

can drain reservoirs and force cities to impose restrictions on water use, as happened in Cape Town, South Africa in 2018.

In places of water stress, agricultural, industrial, and commercial interests often come in direct conflict with community drinking water needs. For instance, a June 2019 *Wall Street Journal* article highlighted the conflict between **Kraft Heinz** and the town of Lowville, NY, when a new Kraft dairy product facility came to town and drew the municipal water supply to “dangerously low levels.”<sup>v</sup>



Source: World Resources Institute

© 2013. Available at: <https://www.wri.org/resources/charts-graphs/water-stress-country>.

## Pollution

Urbanization and development, industrial effluent, and agriculture uses upstream all can deteriorate water quality for users farther downstream. Commercial activity often has damaging effects on water supplies, but can also be disrupted by poor water quality.

## Infrastructure issues

In many parts of the world, water treatment infrastructure is insufficient to treat water at the pace of demand. In others, inadequate investment in maintenance has led to deteriorating infrastructure. Aging infrastructure can also harm water quality (such as the public drinking water crisis in Flint, Michigan).

## Droughts and floods

Prolonged droughts and flooding events create another type of crisis on a local level, exacerbating water stress for both communities and companies. For example, drought in California's major agriculture region in 2015 cost an estimated \$2.7 billion<sup>vi</sup> while flooding in Houston, TX in 2017 following Hurricane Harvey caused an estimated \$125 billion in damages.<sup>vii</sup>

## Oceans

Ocean-related industries accounted for \$304 billion of economic activity in 2016, including seafood, shipping, tourism, offshore energy, deep-sea mining, and other industries.<sup>viii</sup> Corporate water strategies do not always incorporate ocean considerations, but oceans face their own environmental pressures (warming seas, declining fish stocks, and increasing pollution levels) which threaten to inhibit growth in related industries. As the world's freshwater resources continue to be stressed, there is increased interest in desalination of ocean water and brackish water.

## Business Risks

As pressures on water increase, businesses need to anticipate threats and perform water risk assessments to stay competitive and maintain a social license to operate, especially in water-stressed markets. **Ceres**, a leading sustainability NGO (non-governmental organization) outlines four primary types of water risks that affect businesses: market risk, reputational risk, regulatory & litigation risk, and operational risk.<sup>ix</sup>

**“By 2030, the impacts of climate change will further increase risks to availability and quality of local water resources for our bottling operations and ingredient sourcing regions, including in key markets such as the U.S., Mexico, India, Pakistan and others.”**

- The Coca-Cola Company

2018 Coca-Cola Sustainability Report

## Market risk

Drought and other water scarcity issues create volatility in market prices for agricultural commodities—from fruits and vegetables to animal feed crops and textile crops—potentially affecting prices not only for farmers but also for companies that use those commodities as inputs. Severe drought in Australia in 2019, for instance, halved the country's cotton production in one year.<sup>x</sup>

## Reputational risk

Businesses face reputational risks when consumers, communities, investors or other stakeholders raise concern about their water use. As a case in point, [The Wonderful Company](#) and its owners have faced a string of critical press and lawsuits for their exploitation of Fiji's water supply for their [Fiji Water](#) brand as well as their irrigation and land use practices in California's Central Valley.<sup>xi</sup>

Consumers expect businesses to be good stewards of water. Reputational concerns around water can occur in both water-scarce and water-rich communities, so companies need to be aware of consumer perceptions regardless of where they operate. A 2018 survey conducted by [Nestlé Waters North America](#) found that "more than half (53 percent) of consumers and two-thirds (67 percent) of experts surveyed say that businesses in the US use too much water."<sup>xii</sup> Both companies and investors face social "license to operate" risk when water use conflicts arise.

## Regulatory & litigation risk

Regulatory and litigation risks are potentially the most costly risks to businesses, particularly in cases involving contamination of water supplies by businesses. For instance, [Duke Energy's](#) costs to clean up coal ash ponds after a 2014 release polluted the Dan River in North Carolina could exceed \$10 billion.<sup>xiii</sup> In 2017, [Chemours](#) and [DuPont](#) settled a water contamination case in Ohio for \$671 million, and continue to face more litigation<sup>xiv</sup>.

Companies may also face regulatory challenges to their water access. For example, California's [Rhys Vineyards LLC](#) agreed in 2019 to pay \$3.76 million to settle regulatory action after they diverted rainwater runoff without appropriate water rights.<sup>xv</sup>

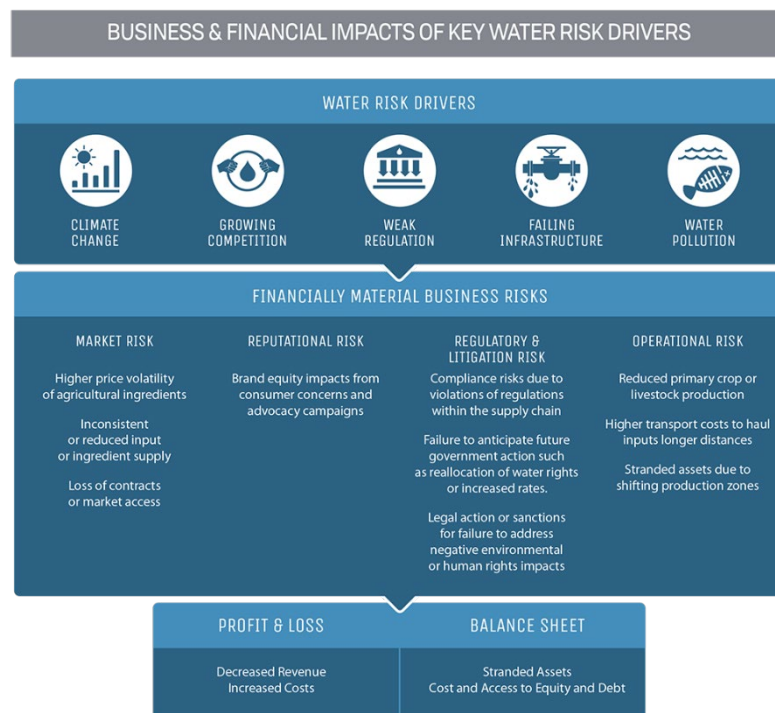
### Industries with high water risks

- Agriculture & livestock
- Food & beverage products
- Fishing & aquaculture
- Manufacturing (steel, automotive, semiconductor, textiles)
- Chemicals & plastics production
- Mining
- Wood & paper products
- Oil & gas production/refining
- Thermoelectric power (fossil fuels, nuclear)
- Hydroelectric power

Sources: .ThomasNet.com, USGS.gov, and Census.gov.

## Operational risk

Water issues—whether related to scarcity, drought, or flooding—can cause a host of direct operational risks to companies. For example, poor water quality in Flint, Michigan forced [General Motors](#) to switch their water supply.<sup>xvi</sup> Major droughts in California in 2016 impacted production in the agricultural industry, resulting in \$600 million in damages.<sup>xvii</sup> Sea level rise and coastal flooding are of particular concern in certain regions; low-lying areas as well as those near large rivers and oceans are most likely to face damage to physical assets with extreme weather events. In Houston, Texas following Hurricane Harvey, businesses including [Motiva Enterprises](#), the largest oil refinery in the U.S., were forced to shut down completely for days.<sup>xviii</sup>



Source: [www.ceres.org/investorwatertoolkit](http://www.ceres.org/investorwatertoolkit)



## Business Opportunities

The 2030 Water Resources Group estimated that it would take between \$50 and \$60 billion annually over two decades to close the gap between water supply and demand, depending on the level of demand management.<sup>xix</sup> As the globe faces challenges of water availability and quality, new technologies and markets are emerging around innovative solutions to address them.

### Water and wastewater treatment technologies & infrastructure

The water and wastewater treatment industry represented a market of about \$172 billion in the U.S. in 2017.<sup>xx</sup> Access to clean water and sanitation globally is one of the UN's Sustainable Development Goals (SDGs), making it a priority opportunity for investment. Opportunities exist for water system engineering and operating companies like [American Water](#) and [Veolia](#), water equipment providers like [Xylem](#) and [DuPont](#), and investors who provide infrastructure finance. In places of water stress, costly treatment options like large-scale desalination are becoming more feasible—even critical—in some parts of the world. The global desalination market is expected to grow 10% annually between 2019–2024.<sup>xxi</sup> While most water and wastewater treatment is done at utility-scale levels, there are also growth opportunities for point-of-use treatment systems like [Zero Mass Water](#)'s hydropanel technologies. Rainwater capture and water reuse systems will also see growth markets in many areas.

### Growth market opportunities

- Water and wastewater infrastructure development & finance
- Treatment systems/technologies
- Water efficiency, metering, and management technologies
- Small-scale, point-of-use treatment systems
- Drought-tolerant seeds
- Smart irrigation systems for agriculture
- "Water-smart" consumer products
- Water efficiency technologies
- Water "footprinting" and strategy consulting for corporations
- Water rights acquisition
- Aquaculture and mariculture

### Digitization & data applications

A host of digitization innovations are enabling better monitoring, management, and use of water. Applications range from watershed management and utility infrastructure management to agricultural, industrial, and residential applications. Companies like [Schneider Electric](#) offer smart water metering technologies while others like [Dropcountr](#) and [Aquatic Informatics](#) deliver data management and analytics solutions for utilities.

### Agriculture technologies

Precision agriculture—including water efficiency, soil monitoring, targeted planting and fertilizing, and runoff reduction technologies—hold promises for improving agricultural yields while using less water and improving farm resilience to drought. Water efficiency technologies for farmers include drip irrigation, use of satellites and high resolution aerial imagery to pinpoint water-stressed areas, and water pump monitors. Additionally, there is a growing market for agricultural data and analysis, ranging from soil temperature to humidity to precipitation measurements to better understand water needs and planning<sup>xxii</sup>; [Microsoft](#)'s Ag-Analytics platform is one example. Drought-tolerant seeds and less water-intensive crops will also be in demand by farmers as water scarcity increases.

### Water rights

Some investors who anticipate a world of future water scarcity are investing in water rights acquisition. In a recent example, a 2018 *Wall Street Journal* article highlighted an investment by the Harvard University endowment to purchase California vineyard land and its associated water rights.<sup>xxiii</sup> Water rights acquisitions can be prescient investments, but may also carry potential for conflict with other users in a resource-scarce world.

### "Water-smart" consumer products

Some consumer goods companies are looking to adapt products for use in a water-constrained environment. "Water-smart" products may include dishwashers, laundry machines, showers, and toilets that use less water. A new class of water-conscious consumer products is also growing, including new shampoos and conditioners that are easier to wash out of hair in the shower, as well as "dry shampoos" for clothes to limit the frequency of washing.<sup>xxiv</sup> Through its "Water<Less" initiative, [Levi Strauss](#) has reduced the use of water in their denim manufacturing process, but also has launched a marketing campaign encouraging customers to wash their jeans less frequently after purchase.

### Corporate water reduction strategies

Many Fortune 500 companies are looking at their water footprints and investing in corporate water sustainability. For example, [Nestlé](#) launched its "Caring for Water" initiative in 2018, contributing to the goal of zero environmental impact by 2030.<sup>xxv</sup> [Microsoft](#) intends for its Silicon Valley Campus to be the first tech center to carry the Net-Zero Water Certification.<sup>xxvi</sup> Several water partnerships and coalitions have emerged in recent years to share best practices and pursue collective action, including the [CEO Water Mandate](#), [2030 Water Resources Group](#), and the [Alliance for Water Stewardship](#).

### Innovation hubs

"Blue tech" startup accelerators like [Imagine H2O](#), [BlueTech Incubator](#), and the [Techstars Sustainability Incubator](#) are creating opportunities for new technologies to emerge. Israel and Singapore are two countries making a mark for themselves as hubs for water technology innovation.

### CEO Water Mandate

The CEO Water Mandate is a voluntary set of principles developed by the UN Global Compact and endorsed by 160+ companies like [Coca-Cola](#), [Ford](#), [Microsoft](#), [General Mills](#), and [GlaxoSmithKline](#). Signatory companies agree to continuous improvement in six areas of water stewardship:

- Direct Operations
- Supply Chain & Watershed Management
- Collective Action
- Public Policy
- Community Engagement
- Transparency

Source: <https://ceowatermandate.org/>

## Takeaways for MBAs

1. Water will become a more critical material issue across industries in coming years, creating both significant risks and business opportunities.
2. Global water demand is expected to exceed supply by 40% in many areas by 2030, with the potential to create tensions between communities' drinking water needs and commercial uses. Water availability varies greatly by region. The risk of water constraints depends not only on available supply (ie, how water-rich the geography is) but also the concentration and growth of demand from both residential and commercial/industrial users.
3. Businesses need to be proactive in assessing their water risks. Corporations are likely to face increased pressure from consumers, NGOs, and investors to demonstrate transparent water stewardship. Similarly, investors should comprehensively assess water risk exposure in their investment portfolios.

## Further Reading

[Charting Our Water Future: Economic Frameworks to Inform Decision-Making](#), 2030 Water Resources Group, McKinsey & Co., 2009.

[Investor Water Toolkit](#), Ceres, 2020.

[The Business Case for Water Stewardship](#), CEO Water Mandate, UN Global Compact.

["Ripple effects: Why water is a CFO issue,"](#) Deloitte, 2012

*Corporate Water Strategies* (book), Will Sarni, Earthscan 2011.

[Overcoming Barriers to Effective Corporate Water Risk Management](#), CDP, 2017.

[High and Dry: Climate Change, Water, and the Economy](#), World Bank Group, 2016.



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- <sup>i</sup> <https://www.unwater.org/water-facts/scarcity/>
- <sup>ii</sup> <http://reports.weforum.org/global-risks-report-2020/>
- <sup>iii</sup> [https://www.usgs.gov/special-topic/water-science-school/science/where-earths-water?qt-science\\_center\\_objects-0#qt-science\\_center\\_objects](https://www.usgs.gov/special-topic/water-science-school/science/where-earths-water?qt-science_center_objects-0#qt-science_center_objects)
- <sup>iv</sup> [https://www.mckinsey.com/-/media/mckinsey/dotcom/client\\_service/sustainability/pdfs/charting\\_our\\_water\\_future/charting\\_our\\_water\\_future\\_full\\_report\\_ashx](https://www.mckinsey.com/-/media/mckinsey/dotcom/client_service/sustainability/pdfs/charting_our_water_future/charting_our_water_future_full_report_ashx)
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- <sup>vi</sup> <https://www.sacbee.com/news/california/water-and-drought/article31396805.html>
- <sup>vii</sup> <https://www.thebalance.com/hurricane-harvey-facts-damage-costs-4150087>
- <sup>viii</sup> <https://coast.noaa.gov/data/digitalcoast/pdf/econ-report.pdf>
- <sup>ix</sup> <sup>ix</sup> <https://www.wsj.com/articles/alphabet-dips-its-toe-into-infrastructure-investing-11567076404>
- <sup>x</sup> <https://www.abc.net.au/news/rural/2019-06-04/drought-and-low-water-allocation-impacts-cotton-harvest/11172966>
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- <sup>xii</sup> <https://sustainablebrands.com/read/behavior-change/us-consumers-experts-give-businesses-a-c-for-water-conservation>
- <sup>xiii</sup> <https://www.bizjournals.com/charlotte/news/2019/04/01/new-state-order-on-duke-energys-coal-ash-cleanup.html>
- <sup>xiv</sup> <https://www.bloomberg.com/news/articles/2019-06-28/chemours-says-dupont-s-liability-estimates-spectacularly-wrong>
- <sup>xv</sup> <https://www.northbaybusinessjournal.com/home/9858926-181/rhys-vineyards-mendocino-vineyard-water-rights-penalty>
- <sup>xvi</sup> [https://www.mlive.com/news/flint/2014/10/general\\_motors\\_wont\\_use\\_flint.html](https://www.mlive.com/news/flint/2014/10/general_motors_wont_use_flint.html)
- <sup>xvii</sup> <https://www.cnn.com/2016/08/15/california-drought-costs-to-top-600-million-dollars.html>
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