Chapter 27

Closing the execution gap: How industry can lower its water use and help tackle global water scarcity

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Keywords: business, climate, Ecolab, industry, technology, water, water management, water scarcity, water stewardship, water stress

27.1 THE NEW NORMAL: CHALLENGES AND MEGATRENDS

When we think of global water scarcity, we may think of major cities facing 'Day Zero' when the taps run dry. Recent examples include Sao Paulo, Brazil (population 12 million) which came within days of running out of water; Chennai, India (7 million) which had to resort to shipping in drinking water on special trains; and Cape Town, South Africa (3.8 million) which seriously considered towing in icebergs from Antarctica.

While these local crises are alarming, the reality is that on a global level chronic water scarcity (Figure 27.1) has already become 'the new normal'. Two billion people now live in water-stressed areas while almost 850 million – one out of every nine people on earth – have no access to safe drinking water (UN Development Programme, 2019; UN Environment Programme, 2016). According to projections, if humanity keeps using water at the current rate, the world will face a 40% freshwater deficit by 2030, while global demand for water is estimated to increase 40–85% depending on the sector by 2050, due to population and economic growth (2030 Water Resources Group, 2009; World Business Council for Sustainable Development, 2020). Overshadowing all is climate change, the water effects of which are expressed in phenomena like droughts, excessive rains, receding glaciers, and sea level rise.

27.2 THE EXECUTION GAP

The challenge to companies is simple: to limit their water use by using smart water management practices. Unfortunately, the majority of companies seem to fall into an 'execution gap' where their desire to meet this challenge is not matched by their ability to use water sustainably.

DOI: 10.2166/9781789060676_0295

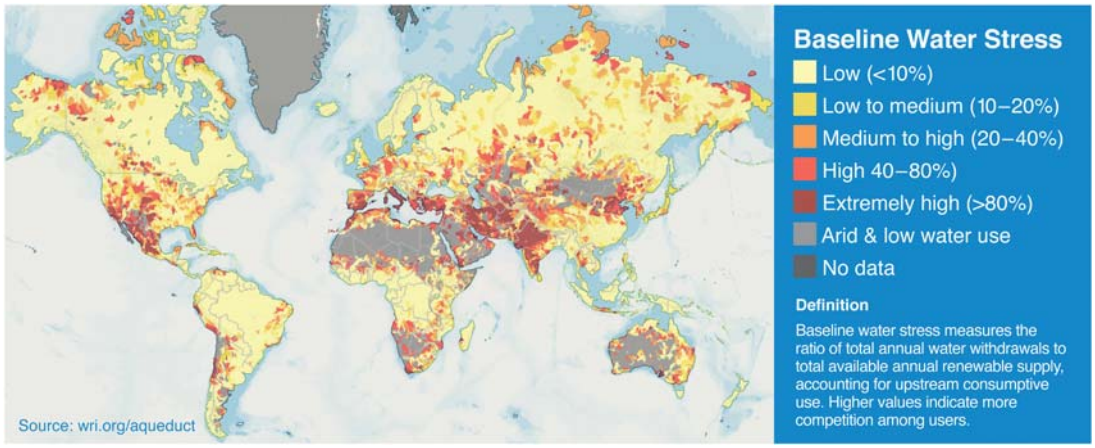

Figure 27.1 Water scarcity affects all parts of the world, including high-, middle- and low-income countries and regions. (*WRI Aqueduct*, 2020)

In a growing number of regions, companies understand the challenges of water scarcity because they are already feeling its effects. One luxury hotel chain in Pune, India, was forced to truck in water at a significant cost when the municipality cut its water supply drastically in response to a drought. Even in places with ample water, industries are reaching the limits of available supplies. For example, when a well-known food producer added a string cheese line to its plant in upstate New York – a water-rich region known for cheese-making – on some days it consumed up to 80% of the water supply of the nearby town, to the point that residents were banned from watering their lawns and washing their cars.

Given the extent of their 'water risk', one might expect businesses to be scrambling to mitigate their exposure. In fact, good intentions abound: Ecolab's 2017 survey (with GreenBiz) revealed that 75% of companies with revenues over one billion dollars have corporate water-reduction goals. However, the survey also revealed that 82% of these companies lack the capabilities to achieve them (Ecolab, 2017). As a result, over the past four years, corporate water use has been trending up, not down, and according to the Carbon Disclosure Project almost 50% more companies reported higher water withdrawals in 2018 (Carbon Disclosure Project, 2018; Greenbiz, 2017). Again in 2019, 88% of companies surveyed said they intended to tackle water issues over the next three years, but half had no plans for how they would make that happen (Ecolab, 2019a). In short, the gulf between corporate water goals and actual water use represents an execution gap between intentions and accomplishments.

27.3 BRIDGING THE GAP: PRACTICAL STEPS TOWARD SMART WATER MANAGEMENT

Although achieving corporate water targets may seem daunting, there are specific actions companies can take to make real strides towards sustainable water use. As shown in Table 27.1 below, these actions are directed at solving problems related to: (1) the under-valuation of water; (2) the site-specific nature of water use; (3) the challenge of identifying appropriate technologies; and (4) the need to look 'beyond the fence-line' for the most efficient, collaborative solutions. The following sections describe solutions industries have developed and implemented to address each of these problems.

Table 27.1 Challenges to smart water management and available solutions.

Problem	Solution	Available Tools
Water is underpriced, which means it is hard to find sufficient ROI for water-related investments.	Determine the full value of water	Ecolab Water Risk Monetizer (Ecolab) WRI Aqueduct (WRI)
Across-the-board, corporate level goals fall short because of water's inherently local nature	Set context-based goals; focus on shared water challenges at the local level Develop a water-energy footprint assessment to understand site-level water issues.	Ecolab Smart Water Navigator (Ecolab)
Users aren't aware of technical solutions to help them reduce, reuse and recycle water.	Deploy the right technology to manage the needs of critical water circuits.	Ecolab Smart Water Navigator (Ecolab)
Water is a shared resource, but not enough companies look beyond the fence-line for collaborative solutions.	Develop mature water stewardship practices and adopt appropriate measurements to support continuous improvement	AWS Standard 2.0 (Alliance for Water Stewardship)

27.3.1 Determining the real value of water

Determining the real value of water to a business is the key to making the business case for improved water use, which is often a prerequisite for implementing any smart water management practices. The 'real value' must be determined because, in general, the price paid for water as a commodity doesn't begin to reflect the full value of water to an industry.

Furthermore, the market price of water does not always reflect its availability. According to the 2017 Global Water Intelligence Tariff Survey, a cubic meter of water in water-rich Amsterdam cost $6.25, while it cost only $1.35 in water-stressed Sao Paulo (Global Water Intelligence, 2017). The truth is that water in Sao Paolo is scarce, but that scarcity isn't factored into its price. Since few companies will invest in a resource they see as plentiful and inexpensive, when water is scarce but cheap, a traditional approach to calculating return on investment won't justify much investment in water conservation and reuse.

To capture the real value of water in 'dollars and cents' Ecolab developed the Water Risk Monetizer, a publicly available online tool designed to describe the full value of water to an enterprise's facilities, not only in terms of its cost but also its impact on productivity and the risk of shortage (Ecolab, 2019b). For instance, a dwindling water supply may mean a higher water bill and/or production interruptions due to lower water quality and availability, which may also pose process and product quality challenges. Furthermore, in response to shortages government may impose usage restrictions while communities may turn against companies they perceive as selfish water-guzzlers. Once these risks are factored in, water is no longer a low-value proposition.

Companies enter information into the Water Risk Monetizer describing local factors including water availability, quality, pricing, and environmental impacts, for one or more of their facilities. Based on its publicly available methodology, the tool then generates a dollar figure representing water risk for each location, helping decision-makers understand which of their facilities are at risk, so they can allocate investment dollars more effectively. As an example, Microsoft used the Water Risk Monetizer to model

water use at their San Antonio data center. The full, risk-adjusted value of water to that facility was 11 times higher than its retail price reported on the water bill.

This higher value calculated by the Water Risk Monetizer demonstrated a significantly elevated risk level to the facility, prompting Microsoft to invest preemptively in using recycled instead of potable water at its San Antonio facility, where it is now saving 58.3 million gallons of potable water and more than $140,000 USD annually – and it has lowered its impact on the surrounding community (Ecolab, 2019c). Such examples are increasingly important as cooling a typical data center takes millions of gallons of water per year, data centers must be located near users (to combat the challenge of latency), and with the growth in data traffic, in the coming years thousands of new data centers will be needed, many located in water-scarce regions.

27.3.2 Setting context-based goals

Since all water use is local, water solutions must be local, too. This is where corporate water policies often stumble. Too often, water goals are set in similar ways to carbon reduction goals, but water is not carbon. It doesn't matter *where* you reduce carbon emissions since CO_2 emitted anywhere in the world has the same impact on the Earth's atmosphere. Watersheds, on the other hand, are not interconnected, so saving water at your plant in Los Angeles won't make more water available to your plant in Beijing. Whether you are by a river or a coastline, in a floodplain or a desert, where you are ultimately determines how you should use water. Precipitation patterns and soil composition, even the built environment and degree of pollution all factor into the determination of optimal water use.

Given that variability, broad-brush corporate water goals are insufficient to guide action. The solution is setting context-based goals formulated for specific facilities, taking into account the local challenges in the watersheds in which they operate. To facilitate this process, the publicly available Ecolab Smart Water Navigator allows companies to sort and filter their facilities by location, water stress, and current management practices, so they can identify the actions that will generate the best return on investment (ROI) in locations where these actions will make the greatest difference (Ecolab, 2019d).

Based on a 13-question assessment, the Smart Water Navigator places each facility on the '*Water Maturity Curve'*, which visualizes how well it manages water (Figure 27.2). For instance, a facility at the beginning of its journey is 'Untapped', while one with fully mature practices is 'Water-smart'. For each facility, the tool generates a practical guide to get to the next level. Once users implement the proposed steps, they can repeat this process until they reach the top level.

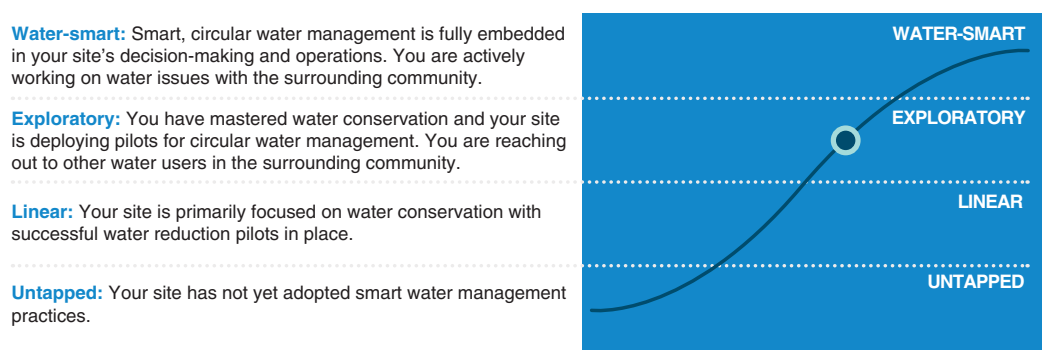

Figure 27.2 The water maturity curve. (*Source: Ecolab, 2019d*)

By way of illustration, Digital Realty, a large data management company, used the Smart Water Navigator to analyze each of its water-cooled facilities in different regions. They identified 14 'at-risk' locations where improved water management would have the greatest impact. Based on that holistic approach, the company is now employing enhanced water stewardship and water management technologies to improve its water resiliency, strengthen its monitoring and measurement capabilities and reduce water consumption.

27.3.3 Using technology to its full potential

Once the real value of water is known and context-based goals have been set, it's time to design and implement technical solutions to meet the targets. This was the situation at Archer Daniels Midland (ADM), one of the world's largest food and agriculture companies, when they adopted ambitious sustainability goals that included reducing water usage 15% by 2018, and energy and greenhouse gas emissions 15% by 2020.

Starting in 2012, ADM worked with Ecolab to review water use at a number of locations and determined that they could make the greatest strides by improving water quality monitoring and control technology to better manage their cooling towers, boilers, and wastewater treatment facilities. ADM adopted Ecolab's 3D TRASAR™ technology which uses ultraviolet light to continuously monitor chemical concentrations and contaminants in water, so they can be corrected in real time. This helps reduce scale formation, corrosion, and biofouling in installation such as cooling towers, boilers, and chillers. As a result, the equipment works more efficiently, requiring less water and energy. It also helps plants to reuse and recycle water.

By implementing similar technology in over 200 individual projects around the world, ADM saved 2.3 billion gallons of water, equivalent to the annual drinking water needs of 7.95 million people. And because water must be pumped, heated, cooled, and treated, it also saved 159,000 million British Thermal Units (MMBTUs) of energy and reduced CO_2 emissions by 70 million pounds.

This improved water quality monitoring and control technology was also used in the hotel in Pune, India, which was able to replace the drinking water in its cooling system with wastewater treatment plant effluent, as well as the Microsoft data center in San Antonio, which was better able to maintain the quality of its recycled water for reuse.

Even more improvements in water management can be achieved when big data is deployed to analyze performance data in real time. Ecolab3D, a new, cloud-based digital platform, supports analysis of multiple information streams, including water quality data, financial data, lab results, and other third-party information. These richer data sets can be combined with advanced analytics, including artificial intelligence and machine learning, to allow operators to detect previously invisible trends, signal potential problems, and fix issues before they arise.

27.3.4 Developing mature water stewardship practices

Water stewardship is the capstone of a sustainable corporate water approach. It is among the criteria to reach the Ecolab Smart Water Navigator's 'Water-smart' top level as well as a requirement for many sustainable water use certifications. In short, since watersheds are the basic unit of water distribution, mature water management must happen at the watershed level to be truly sustainable. In addition, to addressing water use 'inside the fence-line' of their facilities, companies must collaborate with stakeholders in their watershed – communities, farmers, and even other industries.

While there is no 'one-size-fits-all' solution, a logical first step is for each company to learn about other stakeholders' concerns, sharing knowledge and best practices to develop solutions to shared problems. On a local level this can involve working with farmers around a facility and engaging with the local water district or town government. An example of this type of engagement on a broader scale is the California Water Action

Collaborative (CWAC, 2019). Founded in 2014, CWAC brings together dozens of non-governmental organizations, agricultural producers, investors, and global companies to address challenges to the state's water supply, including drought, population growth, aging infrastructure, and climate change.

Stakeholders can even share process water. For example, Ecolab's plant in Garyville, Louisiana, draws water from the Mississippi, pre-treats it, and sends 30% of the treated water to a neighboring plant that makes superabsorbent polymers for diapers. The polymer plant returns the used water to Ecolab for treatment and discharge back to the Mississippi, cleaner than when it started.

Water stewardship also means rebuilding the natural environment's capacity to purify and supply water, using 'nature-based solutions' to restore hydrological features including rivers, flood plains, wetlands, aquifers, and related ecosystems. Ecolab's Garyville plant has worked with The Nature Conservancy for many years to restore the upstream Loch Leven wetlands which feed into the Mississippi River. The project aims to restore 10,000 acres of wetlands, add 12.1 billion gallons of water storage capacity and recharge the underlying aquifer, offsetting the Garyville plant's total consumptive water use. In a similar project, Ecolab worked with the World Wildlife Fund to restore wetlands along the Yangtze River near its plant in Taicang, China, just north of water-stressed Shanghai. Both the Garyville and Taicang plants are certified under the stringent Alliance for Water Stewardship (AWS) Standard.

27.4 CONCLUSION: BECOMING WATER-SMART

Companies can thrive in a water-scarce world by adopting water-smart tools and practices. Business alone can't be expected to stave off a global water crisis: government has a role to play in formulating smart policies, providing modern infrastructure, and creating a regulatory framework that rewards sustainable water use practices. But, since business uses 20% of all water globally and up to 59% in certain regions, the corporate sector can make a very significant impact.

It is within the power of individual businesses to reduce the amount of water they use to produce their products, saving water while reducing energy usage and greenhouse gas emissions. Wherever companies use more water to produce comparable products (Figure 27.3), opportunities exist for them to close the

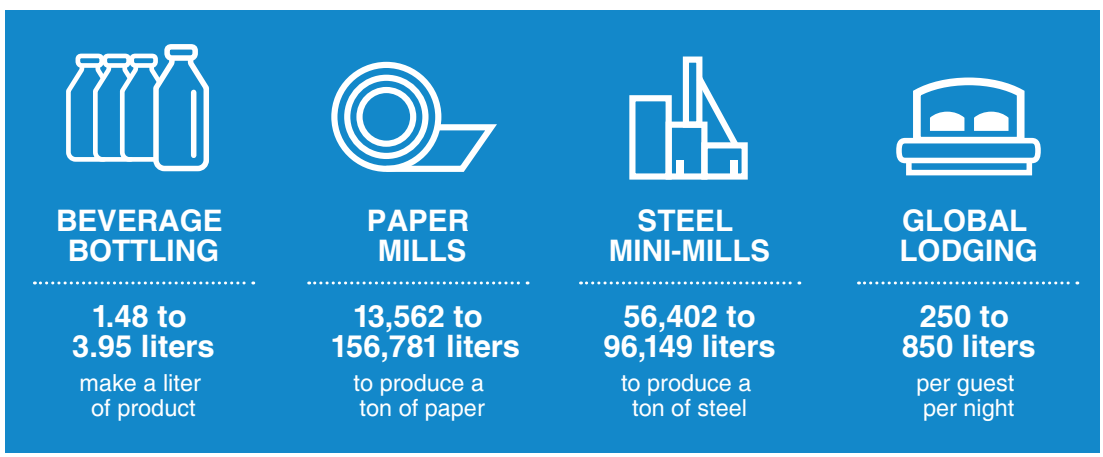

Figure 27.3 Wide performance disparities exist within industrial sectors indicate opportunities for progress in water management.

execution gap, become water-smart, and enhance their economic bottom line while protecting communities and the environment.

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