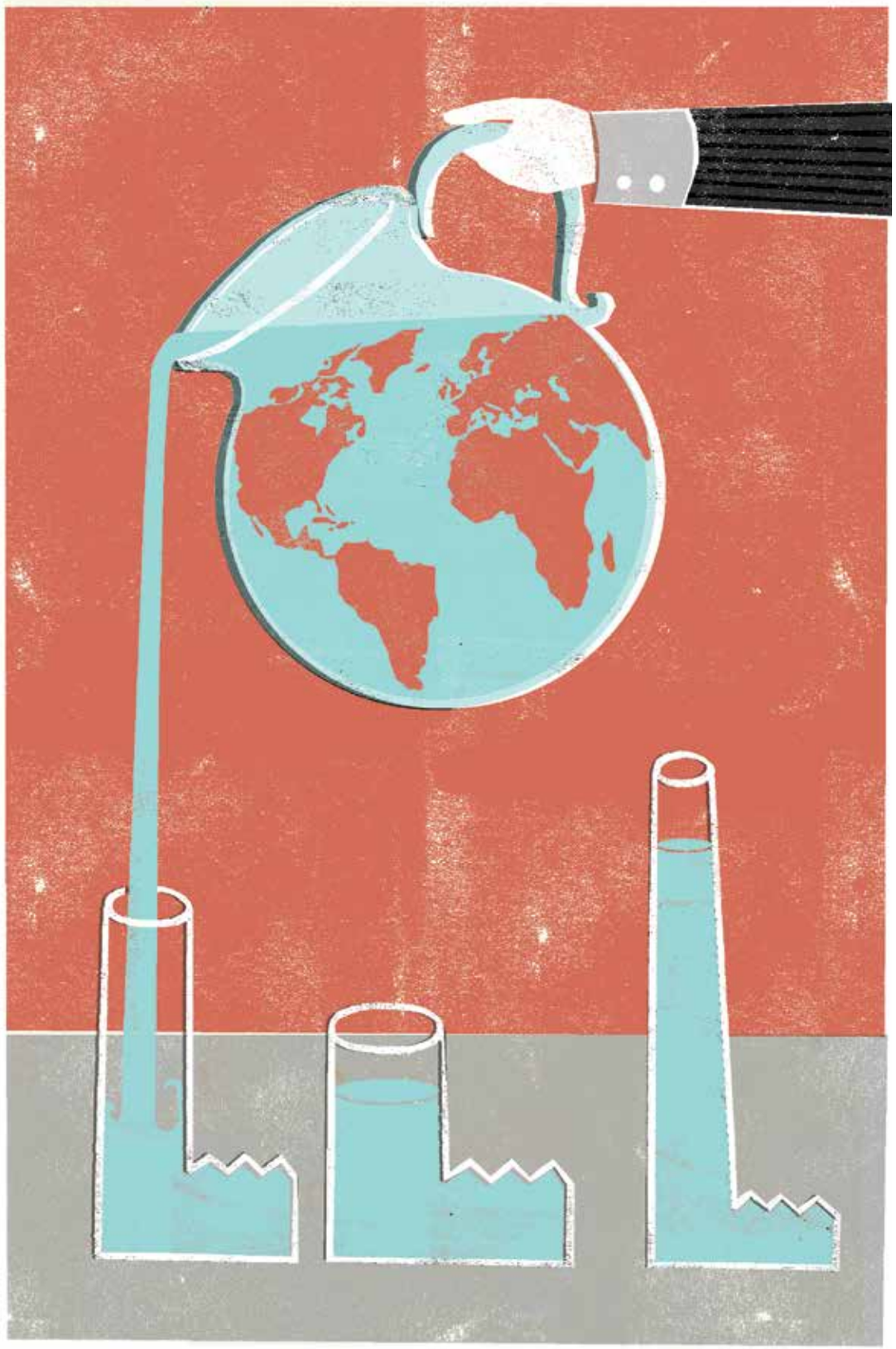


Putting water in the mainstream of your business strategy

Joseph Place, Paolo R. Dutto and Valeria Casula

In the past, water as a resource worried only a few industries. This has rapidly changed due to the scarcity of water around the world, especially in the emerging markets. Companies now need a clear view on the role water plays in their value creation and what they can do about it. In this article the authors explain how a company can address the water challenge in a systematic, strategic and effective way.

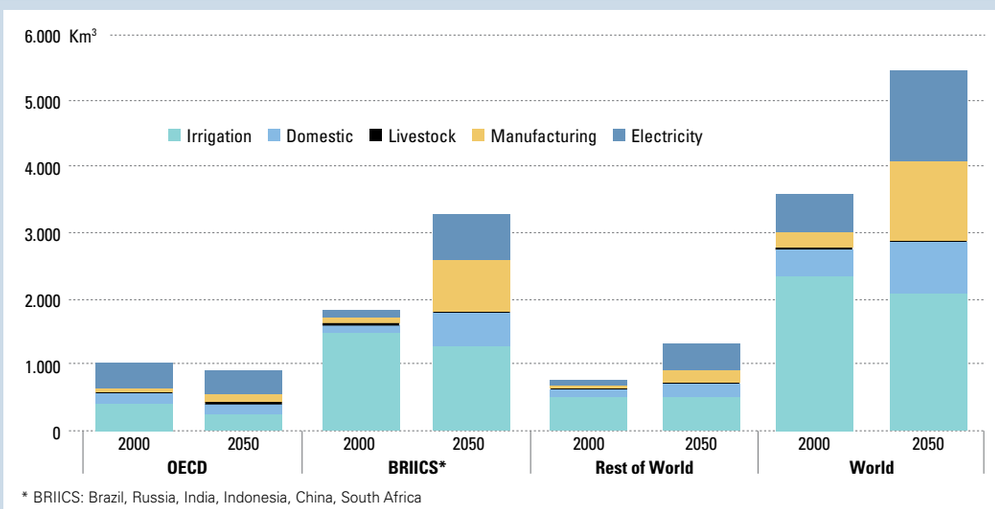
All companies use water. And all companies create wastewater. Water is mission-critical for many industries such as agriculture (to irrigate crops), pharmaceuticals and food & beverage (to act as an ingredient), assembled products, chemicals and mining (to serve as process water, for example for cleaning and cooling) and power generation (to drive turbines). In the oil and gas industry, water that is produced along with the fossil fuel is a major environmental, social and technical concern.

In the past, water as a resource worried only a few water-intensive or highly polluting industries. Today it is affecting all industries. Water scarcity is increasing rapidly, as populations grow larger and richer, and as climate patterns change. The International Water Management Institute (IWMI) and the Organisation for Economic Co-operation and Development (OECD) forecast that withdrawals for non-agricultural sectors will more than double by 2050, especially in emerging markets. Competition for water between sectors will increase, while population growth may further increase water demand for agriculture (see Table 1).

Physical scarcity is only the beginning. As Dr Mark Mulligan at King's College London has demonstrated, there is plenty of physically available and technically accessible water in most of the world – the primary issue is its inefficient use and unfair distribution. Assigning water rights is a promising public policy instrument but often politically nightmarish. Water has also become a major geopolitical issue, leading the OECD Secretary-General to warn that "without major water policy changes, we risk high costs to economic growth, human health, and the environment."

All these issues are increasing the water-related regulatory pressure on companies across the world (see Table 2). It is little wonder that in recent years water has raced up the corporate agenda. But the role of water in a company is highly complex and diverse, with risks often localized or varying over time. An Arizona summer is very different to a

Table 1 **The evolution of global water demand by region and application**



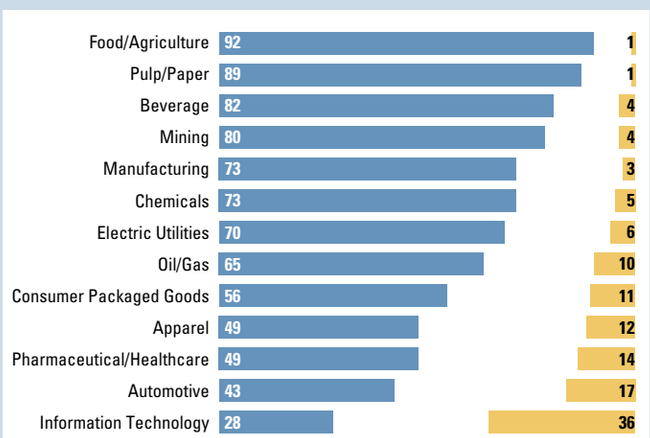
* BRIICS: Brazil, Russia, India, Indonesia, China, South Africa

Source: "The Water Challenge: sharing a precious commodity," OECD, 2012

Malaysian rainy season. Regulations may suddenly change in the wake of a political or environmental scandal. Then there's the "water we cross": rivers, lakes and seas for transportation, or groundwater for the extractive industries. Are desalination plants a long-term solution or a short-term fix that will cause problems down the line? Moreover, a company might be exposed upstream in its supply chain: perhaps a new dam in East Asia threatens crop suppliers. In addition to this, societal and political responses to pressures around water vary greatly between countries. In many Gulf States lawns are often watered in 50-degree heat while aquifers deplete rapidly. Meanwhile in parts of Germany, for instance, people have started saving so much water that the municipal governments regularly have to flood sewers due to lack of drainage.

Clearly it is increasingly critical for companies in any industry to understand the strategic relevance of water to their business. Mismanagement of the water challenge may increase the level or volatility of operating costs, even for the entire life cycle of an asset (e.g. a factory) since some technical decisions affecting water use are locked-in in its design. Mismanagement may harm a company's reputation with its customers, local communities or government. At

Table 2 **The impact of future water scarcity by sector**



Percentages refer to the share of experts who estimate the sector will need to change (blue) or will not need to change (yellow) its operations or business model as a result of water shortages over the next 10 years:

Source: "Coming Era of Water Scarcity", Circle of Blue, 2010

the same time, changing water economics are combining with new technologies and regulations to create opportunities for value creation, i.e. new markets for products, services and processes that reduce water use and pollution.

In this article we will explain how a company can address the water challenge in a systematic, strategic and effective way.

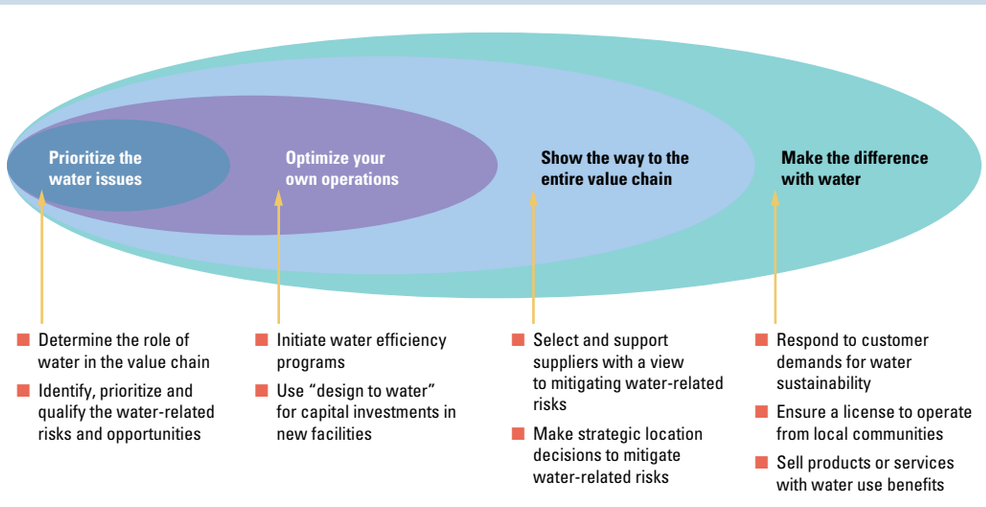
A framework for the strategic management of water

A number of organizations, such as the Water Footprint Network and the International Organization for Standardization (ISO), have established guidelines on water accounting and some initial standards, often with a sustainability perspective. These have greatly improved companies' understanding of water issues, such as the huge scale of water use by suppliers upstream in their supply chain. There is also great interest and involvement in this space from non-governmental organizations such as the World Wildlife Fund (WWF) and the Pacific Institute. For example, the WWF and the Germany-based development finance company DEG have designed a practical tool to help finan-

cial institutions understand water risks in their investment portfolio. In addition some companies, such as Coca-Cola, SABMiller and Unilever, are emerging as leaders in managing the water impacts of their operations, products and supply chains, based on their experiences across the world.

Despite these commendable efforts, there is still a need for a broadly applicable framework that makes sense for the diverse activities of most global businesses. Indeed the strategies open to a company depend on its industry, corporate strategy and product/service portfolio, ranging from improving the productivity of water treatment and distribution to reducing water intensity of life-cycle processes and final products. A structured, often semi-bespoke approach is needed to secure a robust analysis of the risks, opportunities and issues, without getting lost in the detail, and then to translate these results into specific strategies and actions. Table 3 presents a four-phase approach to doing exactly that. Below we will detail each of these phases.

Table 3 **A four-phase approach to developing a global water strategy**



Source: Arthur D. Little analysis

Phase 1: Prioritize the water issues

The first phase in developing a global water strategy is to identify and prioritize the water-related risks, opportunities and issues for the company.

The first phase in developing a global water strategy is to identify and prioritize the water-related risks, opportunities and issues for the company. This is done in four steps:

a. Determine the role of water in the company's value chain. This involves making a footprint of water use and pollution throughout the company's supply chain, within its own operations and by the products it brings to market. By analogy with the carbon footprint, a water footprint in essence reveals how much water is used by each of the substantive activities throughout the value chain – such as in producing the main raw materials bought by a company. Crucially, however, it should also understand the impact of water use in the geographies where these activities take place, considering, for example, water scarcity as well as the ability of local communities to deal with water scarcity and pollution (e.g. through robust infrastructure). For selected high-impact areas, it may be helpful to do a benchmark with other companies or industries.

b. Identify the key water-related risks relevant to the business. Relevant risks may be of a physical or operational nature, linked, for example, to water quality, security of supply or the cost of wastewater disposal. Other risks may be linked to existing or emerging regulations and litigation and to company reputation (for example if the company's activities lead to insufficient environmental flows or inadequate access to water services for the local community).

c. Identify the key water-related opportunities. The most obvious opportunities are associated with the reduction of costs and risks. Other opportunities may reside in the development and marketing of products, processes or services for water management. Still other benefits may be linked to the brand value and credibility deriving from a proactive approach to tackling water issues.

d. Prioritize and qualify the risks and opportunities. By assessing the relative impact of all identified risks and opportunities, one can identify the "hotspots", i.e. the areas presenting the highest risks and biggest opportunities. The assessment is done on the basis of impact-adjusted water

use (for risks) or an initial high-level financial analysis (for costs or product opportunities). For the hotspots, a more refined quantitative and qualitative analysis can be made to get a real grip on the specific issues involved. Table 4 highlights a number of issues in three example industries.

Table 4 **Examples of water hotspots in selected industries**

	Exploration	Development	Operations	Distribution (Export)
Upstream oil & gas	■ Groundwater environmental safety	■ Water efficiency and environmental safety in asset design and construction ■ Groundwater environmental safety	■ Reduction or better management of produced water ■ Groundwater environmental safety	■ Safety of the "water we cross" (river crossings, internal water lanes, sea-lanes and their fragile environments)
	Supply Chain	**Operations**	**Products**	**Distribution**
Assembled products	■ Raw materials environmental records and availability ■ Supply chain resilience to future reduced water availability	■ Improvement in water efficiency of manufacturing plants	■ Sell water management benefits of products – understand where this is a buying factor	■ Safety of the "water we cross" (internal water lanes, sea-lanes and their fragile environments)
Pharmaceuticals	■ "License to operate" through engagement with communities and government: – in the vicinity of manufacturing operations – where key raw materials originate ■ Disposal of COD-rich waters and connection with other industries			

Source: Arthur D. Little analysis

Phase 2: Optimize your own operations

The second phase in developing and implementing a global water strategy is to improve water management performance within the company's own operations. It starts by initiating water efficiency programs. To that effect some companies, especially in the food & beverage industry, are experimenting with innovative incentives such as a risk-weighted internal water price to drive performance.

In many industries water use or pollution is "locked in" for the lifetime of an asset due to the asset's poor initial design. Therefore every new capital investment should be designed around water performance in order to reduce water consumption and increase water reuse. We call this "design-to-water".

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In general, water efficiency programs and design-to-water aim to:

- Improve operating margins.
- Reduce the risk of interruption of supply and thus improve the robustness of operations.
- Reduce environmental, social, regulatory and political risks.
- Increase the company's reputation and "right to operate" both with the local communities and the end customer.

The insert below describes how the oil & gas industry manages the serious water challenges it faces.

Managing the water challenge in the oil & gas industry

As oil and gas extraction and processing are becoming more challenging, the oil & gas industry requires more process water and generates more wastewater. The water risks to which it is exposed are primarily of a physical, reputational and regulatory nature:

- Physical:
  - Droughts can limit water availability, thus confronting oil refiners with higher shipping costs, non-availability of feedstock and production constraints.
  - The production of oil from shale and sands requires vast amounts of water, i.e. two to five barrels of water per barrel of refinery-ready oil.
  - Likewise, the production of shale gas requires pressurized water to initiate and propagate fractures in hydrocarbon-bearing rocks, which may affect the quality of the water table.

- Reputational:
  - Oil spills polluting surface and groundwater can cause reputational risks to oil & gas companies and engineering, procurement and construction (EPC) contractors.
  - Local communities' concerns about wastewater could affect or even stop the expansion of oil and gas processing facilities.
- Regulatory:
  - Federal and state governments in the US are likely to increase their oversight of potentially water-contaminating chemicals used for deep shale natural gas drilling.
  - The US Congress is currently debating the regulation of fracturing.
  - New regulatory requirements for managing tailing ponds will increase the costs of oil sands extraction in Alberta, Canada.

In order to address these risks, the water management initiatives of oil & gas companies and EPCs focus on the optimization of water consumption, treatment and recycling along the value chain:

- In development:
  - Reduce water used during hydro-testing activities in onshore plant projects.
  - Design oil fields in order to be able afterwards to recycle and reuse produced water and flow-back water.
  - Develop technologies that are able to enhance well productivity and reduce produced water.
  - Develop additives for hydraulic fracturing that do not pose risks to local sources of drinking water.
- In production:
  - Recycle water in oil sands operations.

  - Reuse the wastewater at oil fields.
  - Dispose of the water that cannot be recycled in underground aquifers for permanent storage.
- In refining:
  - Reuse the water produced by chemical reactions at GTL (gas-to-liquid) plants.
  - Improve water reuse and recycle in refineries.
  - Build emergency ponds to prevent breakdowns due to heavy rains, and reuse water.
  - Reduce the oil content of discharges.

The third phase is to extend the company's span of attention to its entire value chain, in particular upstream toward its suppliers.

Phase 3: Show the way to the entire value chain

The third phase is to extend the company's span of attention to its entire value chain, in particular upstream toward its suppliers. Depending on the industry, over 80 or 90 % of a company's water footprint – and probably the majority of its exposure to water risks – may be outside its direct operations. Such risks could relate to the health impacts of effluents produced by contract manufacturers, to the impact of droughts on the yield of key crop-derived raw materials, or to emerging pollution regulations affecting disposal of products following use. Furthermore decisions made today on locating facilities and developing supply chains can "lock in" water risks for the long term.

As a consequence, leading companies include the water challenge in their long-term corporate strategy and planning. They make sure that they understand where the key risks lie over, for example, the next decade, and they make strategic decisions to mitigate these. For example they may site operations or select suppliers in less water-risky locations. Furthermore they put in place specific actions to support their suppliers' own water strategy development. The insert below shows in more detail how a company in the pharmaceutical industry addressed the water challenge.

Managing the water challenge at a global pharmaceutical company

A blue-chip pharmaceutical company recognized that its long-term competitive position is predicated on retaining and building its "license to operate" in every country. A key aspect of this is managing shared resources such as water. Moreover, as a healthcare company, it would be even more vulnerable than other companies to reputational damage were its water use or pollution to cause health problems for local communities.

Responding to this insight, the company conducted a water footprint to understand the water use and impacts in its operations, supply chain and products. The results were startling: 78 % of its water use was in its supply chain and 18 % in using its products. There were few acute risks in product-level water use, which was spread out very widely across the world. More importantly, several of its most water-intensive raw materials were produced in areas of water scarcity and poor water infrastructure. A substantial portion of this related to one product made from agricultural raw materials. Competition for the water could pose a serious risk to the product if production of that raw material were constrained.

The company is now putting in place a program of activity to partner with the farming communities producing these raw materials, to optimize the water used and reduce any pollution of the local water supplies. Meanwhile it is working with the suppliers on restructuring options to produce the raw materials in a more efficient, robust and cost-effective way for the long term.

Phase 4: Make the difference with water

A company's water performance can be a source of competitive differentiation. How it is realized depends on the industry and company concerned. Some fast-moving consumer goods companies or utilities identify demand for water sustainability from consumers or corporate customers. Other companies in process industries view active local water stewardship as a route to increasing water availability for communities and thus maintaining a "license to operate" in vital markets.

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Still other companies sell products or services whose benefits affect water use: everything from process equipment through dishwashers to cleaning services. They make sure that water-related risks and opportunities are reflected in their product portfolio. They incorporate water-related opportunities into their new product development roadmap and R&D strategy. They look into novel ways to price or deliver such products and services, tailoring them to the specific social, environmental and regulatory context of particular markets.

This level of commitment requires detailed work, incorporating water risk into the heart of corporate strategy, changing how engineering, capital planning and R&D operate, and working in partnership with host countries and local communities. The insert below shows an example of a partnership between a water service provider and a mobile network operator.

Example of a partnership in water provision

A water service provider (WSP) can operate and invest in the maintenance and expansion of its water supply infrastructure only if it is able to efficiently collect the payments due from its customers. In a number of African markets mobile network operators (MNOs) and WSPs recognized the potential of mobile payments (m-payments) for improving the efficiency of payments collection.

From a WSP point of view m-payments can provide cost savings related to bill handling, more timely payment of bills and increased collection rates, thus improving its cash flow, profitability and ability to invest. Following the introduction of such a solution, a WSP in Uganda reported 33 % growth in monthly revenue collections.

For an MNO the solution is an opportunity to grow revenues through the transaction fee and to improve customer loyalty through an improved service offering. Reducing customer churn is a major driver of MNO profitability.

While the use of m-payments tends to be limited to customers with household water connections, MNOs and WSPs are investigating how m-payment solutions could be integrated with prepaid metering and public standpipe solutions. This would strengthen the business case for WSPs to maintain and invest in this mass-market infrastructure.

Insights for the Executive

Water is mission-critical for many industries but its scarcity is increasing rapidly as populations grow larger and richer, and climate patterns change. The gold rush on water has already begun in many areas of the world. All businesses will need to conserve, and many will make a market in conservation. Inescapably, water will become a strategic factor for most companies.

The most far-sighted companies recognize that not only will they have to manage water efficiently behind their factory gate, but also that their actions should span the entire value chain – from their suppliers to their products and customers. By doing so, first they will improve operational efficiency and, therefore, master costs. Second, they will reduce short-to-medium-term risks, ranging from water supply availability to regulatory requirements. Third, they will safeguard their long-term sustainability.

Of course the range of possible approaches varies significantly across industries and companies. Nonetheless they should all start with the prioritization of the water issues they are confronted with, then optimize their internal operations, then show the way to the entire value chain, and ultimately make the difference with water. Tomorrow's leaders in water productivity are getting into position today. The companies that are able to manage their water impact will significantly save costs and demonstrate their right to operate.

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