

The Ceres Aqua Gauge:

A FRAMEWORK FOR 21ST CENTURY WATER RISK MANAGEMENT

A Ceres Report

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Ceres is a U.S.-based coalition of investors, environmental groups, and other public interest organizations working with companies to address sustainability challenges such as climate change and water scarcity. Ceres directs the Investor Network on Climate Risk, a group of more than 100 U.S. and European institutional investors and financial firms that collectively manage over \$10 trillion in assets. www.ceres.org

The World Business Council for Sustainable Development (WBCSD) is a CEO-led, global coalition of some 200 companies advocating for progress on sustainable development. Its mission is to be a catalyst for innovation and sustainable growth in a world where resources are increasingly limited. The Council provides a platform for companies to share experiences and best practices on sustainable development issues and advocate for their implementation, working with governments, non-governmental and intergovernmental organizations. www.wbcsd.org

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HOW TO USE THIS REPORT

This report introduces experts and newcomers alike to the Ceres Aqua Gauge™—a new framework for assessing corporate management of water risk. The report provides a broad overview of how competing freshwater demands and limits to supply are beginning to affect corporate financial performance in a range of industrial sectors.

The report also identifies trends in corporate and investor responses to emerging water issues—and explains how investors can identify holdings in their portfolios more likely to be exposed to water-related risks. Finally, it identifies the critical challenges companies face in managing water-related risks and the key elements of effective 21st century corporate water management.

The Ceres Aqua Gauge itself is available as an Excel spreadsheet that can be downloaded from www.ceres.org/aquagauge.

The report is intended for several audiences:

- **Portfolio managers and analysts** seeking to better understand water-related risks and to mitigate potential exposure to such risks in their equity portfolios
- **Corporate governance specialists** at pension funds and asset management firms interested in engaging portfolio companies with regard to their management of water-related risks and opportunities
- **Investment advisors** whose clients are seeking to integrate consideration of water and other sustainability-related risks and opportunities into their investment strategies
- **Financial and environmental, social, and governance (ESG) data providers** wishing to provide their clients with more robust analytics related to corporate management of water risks and opportunities
- **Corporations** seeking to develop more robust water management strategies and to engage the investment community

The report is organized as follows:

- **Chapter 1** identifies global water trends that may pose potentially material risks to the financial health of companies and investment portfolios, and discusses corporate and investor responses to these issues to date.
- **Chapter 2** describes the Ceres Aqua Gauge and how it can be used to assess individual companies.
- **Chapter 3** identifies the key challenges facing corporate managers with respect to water, and details the four categories of corporate activities—measurement, management, stakeholder engagement, and disclosure—that together constitute a comprehensive approach to addressing water risks and opportunities.
- **Chapter 4** lays out a process to help investors prioritize those holdings more likely to face water-related risk based on their sector and geographic exposure.
- **Appendix A** provides the full definitions of the water risk management activities contained in the Aqua Gauge.
- **Appendix B** specifies relevant third-party resources for companies and investors, and provides a short glossary of water-related terms.

FOREWORD FROM CERES

As never before, the centrality of water to our needs for food, power, fuel and fiber is taking center stage in a crowded, environmentally-stressed world. Key industries and companies are feeling the threat directly. For example:

- The French government recently banned the practice of shale oil and gas fracturing, largely due to concerns over the process's impacts on water quality. The new law not only blocks future development but revokes existing permits—effectively stranding significant investments by a number of companies including oil producer Tereos, which saw its share price plunge 20 percent in the ban's wake.
- When record-setting drought devastated Texas' cotton crop and adverse weather also lowered China's output this year, apparel retailer Gap Inc., which relies heavily on cotton, slashed its annual profit forecast by 22 percent in anticipation of significantly higher cotton prices.
- After years of exploration and investment in a large gold mine in El Salvador, Canadian firm Pacific Rim was denied the final permit for the project in 2009 due largely to farmer complaints that its operations were drying up local rivers. Pacific Rim is now seeking \$77 million from the Salvadoran treasury to compensate for lost investments and profits.

Population pressures and climate change exacerbate water risks and their accompanying bottom-line impacts. Some companies are taking action to recognize and act on these risks, but many are not. And so today, with this report, we unveil the Ceres Aqua Gauge.

The Aqua Gauge is both an assessment framework and a roadmap for where modern water management must go. It builds upon *The Ceres Roadmap for Sustainability*—defining investor expectations for corporate sustainability performance for the 21st century.

And it's an ongoing effort we hope you'll be a part of. The Ceres Aqua Gauge reflects the best thinking of our report partners as well as of dozens of companies, investors and non-governmental organizations involved in the project.

Investors need and want this tool, to assist in managing risk, seizing opportunities and catalyzing companies to action. Some companies are already demonstrating leading practices, outlined in Chapter 3, from Nestlé with its customized water risk maps to Rio Tinto's work to put a financial value on water used in its mining operations. These companies are positioning themselves for greater operational certainty, improved resource and market access, and overall competitive advantage by moving ahead more aggressively on water management.

Because business responses to water issues are evolving rapidly, the leading practices reflected in the Aqua Gauge should not be seen as definitive or static. With this report, Ceres seeks to establish the Aqua Gauge as a framework and tool that will be updated on a regular basis—and informed by ongoing stakeholder feedback—to reflect advances in 21st century water management.

To further ground the tool in the realities of investor and corporate decision-making, Ceres is developing a program to “road test” the Aqua Gauge with a broad range of investors and companies. To learn more, or to get involved, contact this report's co-author Brooke Barton at barton@ceres.org.

Water risks are urgent today and, given demographic and climate trends, can only grow increasingly more so. The Ceres Aqua Gauge is a tool to help manage these risks. But it is more than that—it is a roadmap for sustainable stewardship of our planet's water resources. We look forward to working with investors and companies to accelerate progress on this journey, to the benefit of ecosystems, communities and the economy as a whole.



Mindy S. Lubber
President, Ceres

FOREWORD FROM WBCSD

All businesses depend on and impact freshwater resources, creating both strategic risks and opportunities. To harness these opportunities, companies need to overcome a number of challenges. Research by the World Business Council for Sustainable Development (WBCSD) and UNEP-FI has identified limited communication between institutional investors and companies on this topic as a key barrier to progress. The opportunity to address this communication gap is what triggered the WBCSD's involvement in the Ceres Aqua Gauge, which we believe provides a framework to help catalyze more and better-informed conversations between the corporate and investment communities.

The water crisis gives rise to a complex set of issues for companies to manage: from securing and preserving access to sufficient quantities of high quality water and limiting production disruptions, to meeting ever-more stringent wastewater discharge standards and being seen as responsible partners in collectively managing water as a shared resource.

More and more corporations are taking stock of their exposure to water risk and developing mitigation strategies that go beyond their direct operations and address the entire value chain. At the same time, others are starting to seize the opportunities this challenge can present, for example, by providing solutions to improve the efficiency of water use in food production.

So water management, together with other environmental, social and governance factors, is at the core of business today and needs to be considered by the capital markets. Water risks can be financially material and their management can enhance long-term, sustainable company value. Companies without sound measures in place to manage water use sustainably are likely to suffer restricted access to capital, high loan rates and inflated insurance premiums.

The Ceres Aqua Gauge gives a broad, business-wide view of water risk management. It identifies opportunities and classifies leading corporate practices, while showing sensitivity to the fact that challenges facing individual companies require solutions tailored to their respective industry sectors and situations. Our hope is that the Aqua Gauge will ultimately benefit companies by helping translate water-related disclosures into real business value. We look forward to working with Ceres on maintaining this framework going forward.

A handwritten signature in blue ink, appearing to read 'B. Stigson'.

Björn Stigson
President, WBCSD

EXECUTIVE SUMMARY



Water-related risks are intensifying around the world, creating societal and business pressures alike. In just the past year, unprecedented droughts have hit water-intensive companies and supply chains in Russia, China and across the southern tier of the United States. Extreme floods have had severe economic impacts in Australia, Pakistan and the midwestern U.S.

Numerous industries—apparel, beverage, food, agriculture and electric power—felt the financial ripples from these events, whether in higher commodity costs, operational restrictions or reduced earnings.

Even as companies accelerate water efficiency and improved water resource management, these pressures are likely to worsen. Many regions are on course to suffer major freshwater deficits over the next two decades. According to a recent study led by McKinsey, the world may face a 40 percent global shortfall between forecast demand and available supplies by 2030. More than one-third of the world's population—roughly 2.4 billion people—live in water-stressed countries, and by 2025 that proportion is expected to rise by two-thirds.

These global shortfalls will hit hardest in regions such as East and Southeast Asia where significant investment is fueling unprecedented economic expansion. Growing competition for clean water between industry, agriculture and expanding populations in these and other regions is creating increasingly profound water-related risks—risks that many companies are not yet managing and many investors are not yet considering.

Investors are increasingly aware of these trends. More than 350 institutional investors collectively managing \$43 trillion in assets backed this year's Carbon Disclosure Project water survey sent to 408 of the world's largest companies. More U.S. investors than ever before are filing shareholder resolutions asking for water-related disclosure from companies in a broad range of sectors,

including food and beverage, oil and gas, and electric power. In addition to pressuring companies to improve disclosure, a number of prominent European institutional investors, including Norges Bank Investment Management, Robeco and Hermes Asset Management, have begun not only to assess water-related risk in their portfolios, but also to directly engage high-risk companies on how they are managing water issues.

But despite increasing corporate water disclosure, it remains challenging for investors to understand how well companies are managing their water risks and capitalizing on opportunities.

Currently, few rigorous tools are available to help investors answer the question, "How well are my portfolio companies managing water risk?" This report fills that gap by introducing the Ceres Aqua Gauge™—a robust framework and methodology to assess corporate water management practices.

Many regions are on course to suffer major freshwater deficits over the next two decades. According to a recent study led by McKinsey, the world may face a 40 percent global shortfall between forecast demand and available supplies by 2030.

INTRODUCING THE CERES AQUA GAUGE™

The Aqua Gauge is a flexible Excel-based tool and associated methodology that allows investors to scorecard a company's¹ water management activities against detailed definitions of leading practice.² Developed through a nine-month consultation process with representatives from over 50 investment and financial institutions, companies, conservation groups, and other organizations active on water-related issues, the Aqua Gauge builds on the foundation outlined by *The Ceres Roadmap for Sustainability*³—and like the *Roadmap* it focuses on governance and management, stakeholder engagement and disclosure.

The Aqua Gauge is neither a survey nor another channel of corporate disclosure. Its primary aims are to help equity investors *interpret and evaluate* the information provided by companies on their management of water issues, and to provide a framework to guide investor engagement and dialogue with companies.

Investors will need to apply the Aqua Gauge judiciously to companies in sectors and regions most vulnerable to water risks. Guidance on how to identify and prioritize companies for assessment is provided in **Chapter 4** of this report. A number of third-party data sets and tools already exist to help investors assess sector- or geography-based exposure to water risk (see **Appendix B**).

Beyond helping investors, the Aqua Gauge also benefits companies by giving them a complete picture of leading practice in water management, a resource to help inform and strengthen their own water management strategies, and a methodology for assessing their performance and progress.

DEFINING 21ST CENTURY CORPORATE WATER MANAGEMENT

In developing the Aqua Gauge, the authors conducted extensive interviews with water managers and sustainability executives across a wide range of water-intensive sectors. These sessions confirmed many aspects of the report team's initial thinking, while shedding further light on the complexities of managing water-related risks. The interviewees highlighted a number of overarching themes critical to assessing a company's response to water risks:

→ **Managing an issue as complex as water across a large multinational business requires robust governance and management systems, as well as operational and technical interventions.**

A natural primary focus of a company's approach to water management is in specific operational and technical interventions that directly affect water performance at individual sites. However, there are also a range of other business actions required to manage water issues—governance structures and lines of accountability, policies, and performance standards—that are critical and often overlooked. The Aqua Gauge emphasizes governance and management aspects of water stewardship and is designed to help investors and companies assess whether they have processes and capabilities in place to effectively manage water issues across multiple sites and extended value chains.

→ **Measuring corporate impacts on water resources and ecosystems is difficult.** While some companies regularly collect data on operational water use and wastewater discharges, translating those metrics into measures of local impact—on the water quality of the receiving body, on ecosystems and biodiversity, and on the people and other industries that depend on the shared resource—remains challenging. Company representatives attributed this difficulty to a lack of experience (citing partnerships with NGOs as an important resource) and to a paucity of data in many regions about the underlying conditions of the surface water and groundwater on which they depend.

1 The Aqua Gauge is aimed at companies whose operations, supply chains or products require significant water or have a significant impact on water quality. It is not intended for application to the water utility sector.

2 Throughout this report, the term "leading practice" is used instead of "best practice." Corporate water management is a dynamic area and today's "best practices" are quite likely to be tomorrow's standard operating procedure. In light of this, we have used the term "leading practice" to indicate an approach that is on the leading edge today with the understanding that it will likely evolve.

3 The Ceres Roadmap, published in March 2010, is a vision and practical roadmap for integrating sustainability into the DNA of business. It provides a comprehensive framework for sustainable business strategy and for accelerating best practices and performance. See: www.ceres.org/ceresroadmap

→ **Water management must take into account external factors.** Company representatives observed that many risks arise from external factors such as local regulatory and economic conditions, climate change and the impacts from other water users. The most efficient and low-polluting operation can still be at risk when other users, including factories, farms, or households, overuse or pollute the resource. Corporate responses must take these risks into account in formulating strategies, often in the form of watershed-based collaborations that effectively engage other stakeholders to improve the shared management of water.

→ **Companies need to undertake actions such as scenario planning to surface future risks, as well as assess their current impacts and risks.** Historical hydrologic records—dependable variations in average frequency, duration and intensity of droughts or flooding—may no longer be reliable as reference points for effective risk management. Changing climatic conditions and rapid alterations in land and water use in many regions means that water risk can no longer be managed through the rear view mirror, and forward-looking data sets and risk assessment approaches are required.

→ **Understanding value chain impacts and risks is essential.** In our interviews, companies made clear that effectively managing water risk meant widening the scope of risk assessment and management to their full value chain. For many sectors and companies, water risks in the supply chain or linked to customer use of the product is often as important, or more important, than what goes on within a company's four walls.

→ **Water risk management should not be considered in isolation from other sustainability issues.** While the focus of the Ceres Aqua Gauge is on water, many company representatives noted that water is just one of an increasing number of interconnected sustainability issues that businesses need to address. Some companies already recognize the linkages and trade-offs between water use and energy consumption (e.g., dry cooling systems use less water than wet systems, but generally increase energy requirements), but there are other important connections between water and biodiversity, food security, human rights, health and sanitation, among others. Understanding and managing these trade-offs and exploiting potential synergies should be an increasingly important part of a company's water strategy.

Building on these observations and real world examples of what leading companies are doing today and aspiring to do tomorrow, the Ceres Aqua Gauge brings together a broad range of leading corporate practices for dealing with the complex water management challenges of the 21st century. Outlined in **Chapter 3**, it covers four key categories of corporate activity—1) measurement, 2) management, 3) stakeholder engagement, and 4) disclosure—that comprise a comprehensive approach to addressing water risks and opportunities.





Designed to enable both rapid and more comprehensive analysis, the Aqua Gauge gives the investor the option to assess the company against:

- A short list, or “Quick Gauge,” of core management practices appropriate to the company's risk profile, and
- A comprehensive set of corporate-level practices that provide a more detailed picture of the company's management approach (**Table 1**).

Because the water-related risks faced by different sectors and companies vary greatly, so should the approach to managing those risks. Thus the Aqua Gauge allows the user to assess the practices most relevant to a particular company's water risk profile—reflecting whether the key risks occur in the company's direct operations, supply chain or products.

The most efficient and low-polluting operation can still be at risk when other users, including factories, farms, or households, overuse or pollute the resource. Corporate responses must take these risks into account in formulating strategies, often in the form of watershed-based collaborations that effectively engage other stakeholders to improve the shared management of water.

Table 1: Summary of Key Areas of Corporate Water Management Identified in the Aqua Gauge

Category	Subcategory	Description The Company:	Activity
 MEASUREMENT	Data Gathering	Collects and monitors data related to:	1.1 Its own regulatory compliance, water use, and discharge
			1.2 Its own environmental and social impacts on direct water sources
			1.3 External factors affecting direct water sources
			1.4 Stakeholder perceptions and concerns related to water issues
			1.5 Effectiveness of suppliers' water management practices
	Risk Assessment	Identifies and quantifies water-related risks for its:	1.6 Direct operations
			1.7 Supply chain
 MANAGEMENT	Governance	Sets accountabilities for water through:	2.1 Board of directors
			2.2 Senior management
			2.3 Public policy and lobbying positions
	Policies & Standards	Sets performance standards and goals through:	2.4 Publicly available water policy/statement
			2.5 Standards and goals on water withdrawals/consumption for direct operations
			2.6 Standards and goals on wastewater discharge for direct operations
			2.7 Plans to address local watershed risks
			2.8 Supplier standards and codes, procurement and contracting practices
	Business Planning	Integrates water in decision-making related to:	2.9 Business planning and capital allocation
			2.10 Product design and development
			2.11 Opportunity identification
 ENGAGEMENT		Engages with internal and external stakeholders on water-related issues:	3.1 Local communities
			3.2 Employees
			3.3 Suppliers
			3.4 Governments and regulators
			3.5 NGOs and community groups
			3.6 Other industries/companies/water users
			3.7 Customers
 DISCLOSURE		Discloses:	4.1 Water-related information
			4.2 Data and analysis related to water in financial filings/reports
			4.3 Audited/assured water-related data

HOW TO USE THE AQUA GAUGE

Investors

How investors use the Aqua Gauge will depend on a number of factors, including the investor's approach, style and goals. However, across the investment value chain the Aqua Gauge can benefit a range of decision-makers:

- **Portfolio managers and analysts** can use the Aqua Gauge to identify those companies better positioned to manage water-related risks and opportunities, using this analysis as a negative or positive factor in their investment decision-making process.
- **Governance specialists** at many pension funds and asset management firms already engage directly with their portfolio companies through correspondence, phone calls and meetings on questions of interest and concern. In this case, using the insights and messages developed from the Aqua Gauge as a basis for conversation with a company could provide clarity as well as potentially valuable leverage. The Aqua Gauge can also be a resource in assessing proxy proposals related to water.
- **Financial and ESG data providers** can incorporate elements of the Aqua Gauge into their own analyses, thereby providing their clients with more robust research and analytics on corporate responses to water risks.

Companies

Companies that seek to develop more robust water management strategies will also find value in the Aqua Gauge. Specifically, it can help with:

- **Self-assessment and strategy development.** Companies can use the Aqua Gauge to facilitate internal self-assessment, benchmarking against competitors, and as a resource for engaging key decision-makers and stakeholders within the company. These self-assessments help identify priorities for action and form the basis of a more comprehensive water management approach.
- **Investor communications and engagement.** Companies can use the tool to inform their communications with the investment community, and provide clarity that the company is appropriately managing its water risk. The Aqua Gauge can also inform how a company answers different investor-backed information requests, such as the CDP Water survey.
- **Supplier and industry engagement.** The Aqua Gauge is a helpful tool for building water management awareness and capacity with key suppliers and beneficial as a resource for supplier engagement or assessment. It also serves as a resource for industry-level initiatives, metrics and collaborations related to water management.

WHY WORRY ABOUT WATER?



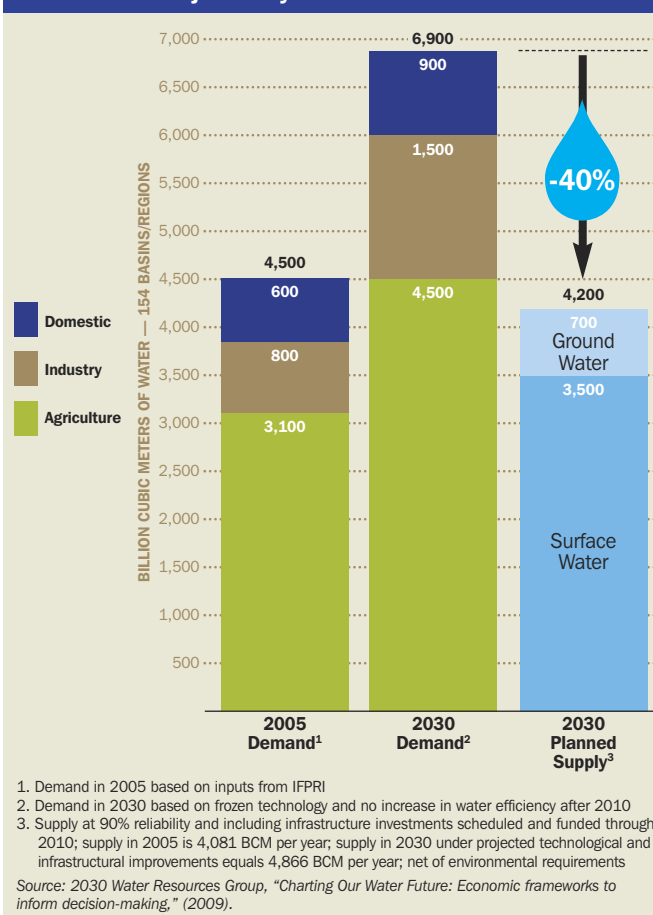
Pressure is mounting on the world's freshwater resources, both through increasing demand and supply degradation. These pressures will continue to increase in the years ahead as population growth, rapid industrialization and land-use change create more water demands for food, fiber, and energy production—all as climate change is bringing additional stress on global freshwater supplies.

Even with accelerated investment in efficiency and improved water resource management, many countries and continents are on course to suffer major freshwater deficits in the next two decades. A recent study led by McKinsey estimates that by 2030 global water demand will outpace supply by 40 percent (**Figure 1.1**). This shortfall will hit all corners of the world, including the southwest United States, Australia, Africa and east and southeast Asia. Asia's water risks are especially troublesome due to its vast population and economic growth (**Figure 1.2**). Investors, who have been sinking large amounts of capital into the region, should be especially sensitive to this trend.

The rising global population (estimated to grow from seven to nine billion by mid-century) together with economic growth in emerging markets will mean burgeoning demand for both potable water and food. Agriculture now accounts for roughly 70 percent of global water use, but as dietary changes in developing countries raise demand for water-intensive foods such as meat and dairy, this proportion will grow yet higher. Without efficiency gains, agricultural water demand is expected to grow by 45 percent by 2030—or an additional annual 1,400 m³ of water per year.³

Increasing water demand by the power and energy sectors is another growing competitive pressure. Many forms of electric power require massive amounts of water for cooling, with the sector accounting for 41 percent of total water withdrawals⁴ in the United States and

Figure 1.1: Global Fresh Water Demand Gap Projected By 2030

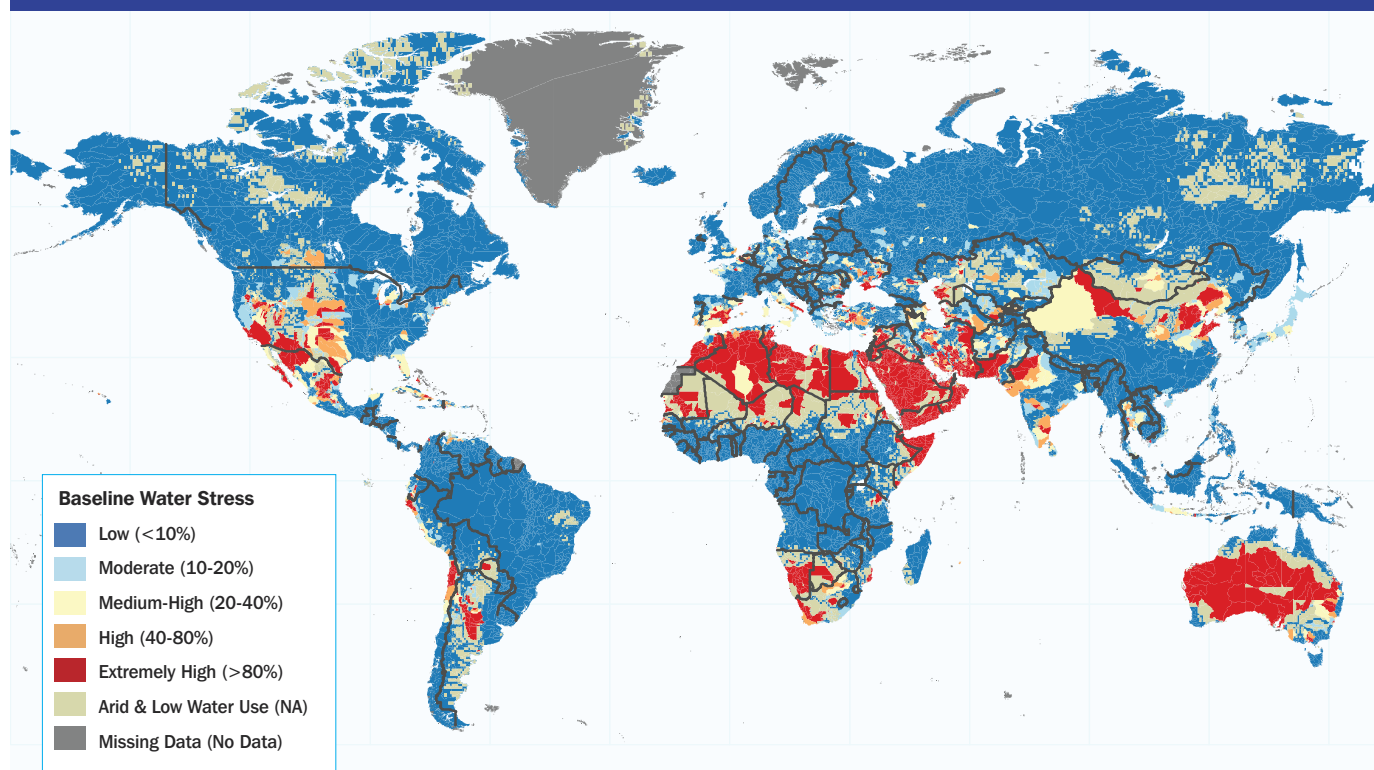


3 2030 Water Resources Group, "Charting Our Water Future: Economic frameworks to inform decision-making," (2009).

4 Withdrawal is defined as the volume of water removed from a body of freshwater and later returned—in the case of electric power generation, after being used to cool turbines.

5 J.F. Kenny et al., "Estimated use of water in the United States in 2005," *U.S. Geological Survey Circular 1344* (2009). European Commission, "Water Scarcity and Drought First Interim Report," November 2006: 4, http://www.ec.europa.eu/environment/water/pdf/1st_report.pdf.

Figure 1.2: Global Baseline Water Stress



Ratio of freshwater withdrawal relative to annual renewable freshwater supply

Source: World Resources Institute (2011). *Aqueduct Water Risk Atlas*. Available at: <http://insights.wri.org/aqueduct/atlas>, accessed October 19th 2011

44 percent in the European Union.⁵ The water intensity of fuel production is also on the rise. In 2009, only five percent of the world's liquid fuels came from water-intensive "unconventional" sources such as biofuels, oil sands and shale oil. By 2035, the U.S. Energy Information Administration predicts, that number could double or even triple, depending on global oil prices.⁶

WATER QUANTITY AND QUALITY AT RISK

Water risks associated with changing climatic conditions, droughts and flooding are becoming more severe. In 2010 and 2011, many parts of the world experienced unprecedented extreme weather: extensive droughts hit Russia, Ukraine, China, and the southeastern and western United States; extreme floods were experienced

in Australia, Pakistan and the U.S. Midwest. Warming temperatures are creating pressures on major economies that depend on snowcap storage and glacier melt for predictable spring and summer water supplies. China, India and the western United States are all experiencing a loss of consistent river flows.

Many regions also rely on another source of water not immediately visible—aquifers, which are often seen as "renewable" resources. In many places, however, the rate of exploitation of these reserves far exceeds the natural recharge rate, leading to falling water tables. Satellite data show rapid groundwater depletion in key agricultural regions. Water storage in California's Sacramento-San Joaquin Basin has decreased by 31 km³ (just shy of the capacity of Nevada's Lake Mead) and the water table in the Indian states of Rajasthan, Punjab and Haryana is falling at an average rate of 17.7 km³ per year.⁷

6 U.S. Energy Information Administration, "Annual Energy Outlook 2011 With Projections to 2035," (2011): 62, [http://www.eia.gov/forecasts/aeo/pdf/0383\(2011\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2011).pdf).

7 "Trends Due to Surface Mass Variations from GRACE 2003-2009," last modified 2009, <http://www.nasa.gov/topics/earth/features/gracelm20091214.html>.

THE COST OF WATER: TOO MUCH, TOO LITTLE, TOO BAD

LEGEND



Too Much



Too Little



Too Bad



Marcal River, Hungary 2011

In October, a retaining wall of the tailings pond dam at the Ajka alumina plant suffered a burst that released an estimated 700,000 m³ of liquid waste. The disaster affected 15 square miles, killed 10 people, and injured 150. All life in local reaches of the Marcal River was extinguished and the Hungarian government has since spent US\$166 million on cleanup and reconstruction.⁸ The Marcal's link to the Danube river system meant that six other countries had to develop emergency response plans.⁹ In September 2011, the company was fined more than US\$636 million.¹⁰



Texas & Oklahoma, USA 2011

In the summer of 2011, Texas and Oklahoma suffered the worst drought conditions seen since the Dust Bowl. In Midland, the oil and gas capital of West Texas, less than 1/10th of an inch of rain fell between October 2010 and April 2011, leaving all three of the city's reservoirs less than 30% full.¹¹ Without rain, residents may have to raise US\$140 million for a new pipeline to bring in water from elsewhere.¹² Estimates put the cost of the drought and associated wildfires (including agricultural and livestock losses) at US\$5 billion.¹³



Mississippi & Missouri River Basins, USA 2011

Residents in the Mississippi and Missouri River watersheds grappled with flooding so severe that it led the Army Corps of Engineers to implement strategic levee breaches—designed to flood smaller cities in hopes of protecting more densely populated areas. This understandably controversial option had not been employed in a century. Estimated economic losses due to the flooding were US\$2-4 billion.¹⁴

8 Dimitar Kenarov, "Recalculation Normal in Hungarian Disaster Zone," *The New York Times*, June 8 2011, <http://www.nytimes.com/2011/06/09/world/europe/09iht-hungary09.html?pagewanted=all> and Dan Bilefsky, "Hungary Arrests Official, Citing Role in Red Sludge," *The New York Times*, October 11, 2010, <http://www.nytimes.com/2010/10/12/world/europe/12hungary.html>.

9 BBC News, "Hungarian Chemical Sludge Spill Reaches Danube," October 7, 2010, <http://www.bbc.co.uk/news/world-europe-11491412>.

10 BBC News, "Hungarian toxic chemical sludge spill firm fined," September 14, 2011, <http://www.bbc.co.uk/news/world-europe-14922301>.

11 Kate Galbraith, "A City Built on Oil Discovers How Precious its Water Can Be," *The New York Times*, April 21 2011, <http://www.nytimes.com/2011/04/22/us/22ttwater.html?ref=science>.

12 "Midland Looking At Alternative Sources Of Water" Robert Guaderrama, *CBS 7 News*, September 6, 2011, <http://www.cbs7kosa.com/news/details.asp?ID=28614>

13 Carey Gillam, "US Plains drought drags on as rains give only slight respite," *Reuters*, September 29, 2011, <http://www.reuters.com/article/2011/09/29/drought-usa-idUSN1E7801GQ20110929>

14 U.S. Department of Commerce, "Billion Dollar U.S. Weather/Climate Disasters," *National Climatic Data Center*, last modified June 17, 2011, <http://www.ncdc.noaa.gov/oa/reports/billionz.html>.



Russia 2010

The country experienced its worst drought in 50 years, with 27 regions declaring emergencies, and wildfires ravaging 600 square miles. Wheat production in Russia fell an estimated 33%, leading to a temporary export ban on wheat and dramatic rises both in barley and wheat prices. The impairment to Russia's growth was estimated at US\$12 billion; and shares in Carlsberg, Diageo, and Unilever were all adversely affected by the crisis.¹⁵



China 2010-2011

The country's rapid industrialization and urbanization have taken a toll on water quality. In one of China's leading economic centers, Chongqing, which sits on the banks of the Yangtze River, local officials estimate that dealing with the effects of chronic water pollution on local agriculture and public health will ultimately cost as much as 4.3% of the city's gross annual product.¹⁶ Large-scale pollution events are increasingly common in China: In June 2011, carbolic acid spilled into a river that supplies drinking water to Hangzhou, thereby knocking out supplies to more than half a million people in the suburbs and creating a run on bottled water in this city of 9 million.¹⁷ One month later, a manganese spill from a local plant left four million people in Sichuan Province without drinking water for over a week.¹⁸



China 2010-2011

China has also suffered from "too little" and "too much." Over the past two years the country has experienced two prolonged dry spells and frequent flooding. In 2010, droughts and floods together cost the country roughly \$22.5 billion.¹⁹ In June 2011, flooding in eastern and southern China killed 175 people and displaced 1.6 million, resulting in over \$5 billion in damages and a 20% reduction in vegetable output. Meanwhile, five million hectares of farmland in western China suffered the worst drought in 50 years.²⁰



Queensland, Australia 2010

The Queensland floods affected more than 70 towns and 200,000 people, ultimately leading to three-quarters of the state being declared a disaster zone. The impacts to the Australian economy included a loss of US\$32.5 billion (equivalent to 3% of GDP) and a reconstruction budget of US\$6.9 billion.²¹ Australian companies Virgin Blue and Bank of Queensland issued profit warnings directly attributed to the flooding, and their share prices dropped 5.9% and 4.9%, respectively.

15 BBC News, "Wheat Price Fears Hit Shares in Brewers and Food Firms," *BBC News: Business*, August 6, 2010, <http://www.bbc.co.uk/news/business-10892637>.

16 The World Bank and The Government of the People's Republic of China, "Cost of Pollution in China, Economic Estimates of Physical Damages," 2007, http://siteresources.worldbank.org/INTEAPREGTOPENVIRONMENT/Resources/China_Cost_of_Pollution.pdf.

17 Huang Jingjing, "Hangzhou Acid Spill Sparks Panic Water buying," *Global Times*, June 7 2011, <http://china.globaltimes.cn/society/2011-06/662492.html>.

18 Fang Xiao, "Pollution Causes Water Crisis for 4 Million in China," *The Epoch Times*, July 29 2011, <http://www.theepochtimes.com/n2/china-news/pollution-causes-water-crisis-for-4-million-in-china-59748.html>.

19 Taro Ichikawa, "Asia and The World: China Unprepared for Climate Disasters," *Global Perspectives*, Aug 21 2011, <http://www.global-perspectives.info/news/news.php?key1=2011-08-21 percent2020:05:25&key2=1>.

20 Chuin-Wei Yap, "China Floods Claim Victims, Crops," *The Wall Street Journal*, June 21 2011, http://online.wsj.com/article/SB10001424052702303936704576396853768579970.html?mod=dist_smartbrief.

21 "Flood Costs Predicted to Top A\$30bn," 18 January 2011, *The Australian*.

While problems related to too much or too little water are highly visible and frequently publicized, water quality is perhaps an even more severe issue. Freshwater resources are being degraded at an unprecedented pace. While water is in principle a renewable resource, heavy pollution can render sources “lost” until they can be returned to usable quality (typically, through natural processes or expensive technological treatment). In developing countries, 70 percent of industrial wastes enter lakes and rivers untreated,²² a problem underscored by the Chinese government’s June 2011 announcement that one-sixth of the country’s major rivers were so polluted that the water was no longer safe for agricultural, much less human, use.²³

Water pollution caused by agriculture is also accelerating in many parts of the world. In the United States, for example, an EPA study identified pollution from agricultural activities as the leading cause of water quality degradation in rivers and lakes and the second-largest cause of impairment to wetlands, estuaries and groundwater.²⁴ Water pollution from agriculture, particularly large industrial livestock farms, can be dangerous to both the ecosystems and human populations exposed.²⁵ In the Gulf of Mexico, an aquatic “dead zone” caused by agricultural runoff into the Mississippi River encompasses a 6,000-7,000 square mile area. The U.S. Geological Survey recently estimated that this dead zone could reach 9,400 square miles in 2011—its largest size since systematic monitoring began in 1985—due to record flooding along the Mississippi.²⁶

IMPLICATIONS FOR BUSINESS

There is growing evidence that these water trends are having serious financial impacts on various business sectors. A 2010 investor-backed survey sent to global companies found that 39 percent of 150 respondents had already experienced negative water-related impacts. They included disruption to operations from drought or flooding, declining water quality that required costly on-site pretreatment, increases in water prices, and fines and litigation relating to pollution incidents.²⁷



Water Impacts Versus Water Risks

A company’s water impacts and water risks are not one in the same. The term *impacts* refers to the volume and/or quality of water used or discharged (whether by their own operations and products, or the operations of suppliers) and how that use or discharge impairs the availability or quality of that water for other human uses and for ecosystems. These impacts may give rise to range of physical, regulatory or reputational risks with the potential for negative financial impact.

However, water *risks* can also arise for companies whose operations, suppliers or products have little to no impact on watersheds, simply because the local water source is over-allocated or damaged by other industries or users. Even companies demonstrating strong water and wastewater efficiency performance can face the risk of losing access to a water source or face higher costs for abundant clean water due to the actions of others.

Key Water Risks for Business

Physical water risks—or the lack or overabundance of water in a particular place and resulting impacts on water access and quality—are often the most obvious water challenges many companies will face. But water-related risks can also be caused by how water resources are regulated and allocated, as well as how key stakeholders—communities, customers and NGOs—view a company’s impact on the resource.²⁸

Water encompasses a potent mix of social and environmental values, and in most places its use is governed—capably or otherwise—by regulators. As pressure on supplies increases and underlying resources are degraded, regulators must make increasingly tough decisions on how local water supplies are to be allocated. This can be done through price increases, water access restrictions, or wastewater discharge permits, all of which have business impacts. Conversely, those businesses operating in areas with little or poorly enforced regulation may face even greater risks as a result of unfettered use or pollution.

22 World Water Assessment Program, *The United Nations World Water Development Report 3: Water in a Changing World* (London: UNESCO and Earthscan, 2009), <http://unesdoc.unesco.org/images/0018/001819/181993e.pdf>.

23 Ben Blanchard, “China gives bleak assessment of its battered environment,” *Reuters*, June 3 2011, <http://uk.reuters.com/article/2011/06/03/us-china-environment-idUKTRE7521FD20110603>.

24 U.S. Environmental Protection Agency, “Protecting Water Quality From Agricultural Runoff,” *EPA Factsheet* (841-F-05-001), March 2005, www.epa.gov/owow/NPS/Ag_Runoff_Fact_Sheet.pdf.

25 U.S. Environmental Protection Agency, “Rivers and Streams,” in: *2000 National Water Quality Inventory*, U.S. EPA (2002), 13-14.

26 Deborah Zabarenko, “Mississippi floods could mean huge Gulf ‘dead zone,’” *Reuters*, June 14 2011, <http://www.reuters.com/article/2011/06/14/us-deadzone-idUSTRE75D59220110614>.

27 Carbon Disclosure Project, “CDP Water Disclosure 2010 Global Report,” 2010, <https://www.cdproject.net/CDPResults/CDP-2010-Water-Disclosure-Global-Report.pdf>.

28 For a detailed discussion of water-related risks and their sector implications, see: Ceres, “Murky Waters: Corporate Reporting on Water Risk,” 2010, <http://www.ceres.org/resources/reports/corporate-reporting-on-water-risk-2010/view>.

WATER-RELATED RISKS & OPPORTUNITIES FOR KEY SECTORS



AGRICULTURE

In the summer of 2011, spurred by droughts and floods—as well as by rising oil prices, increased demand, and hedge fund speculation—the prices of wheat, maize, sugar, and coffee were at near-record levels; and dairy products, cooking oils, and cereals were selling at 20-50% above where they had been the previous year. Drought-related production losses in sugar and ethanol production from typically wet regions of Brazil led agribusiness company Bunge to report losses of US\$56 million.²⁹ Kraft, Starbucks, and Sara Lee all announced they would be raising prices to offset increased commodity spending.³⁰ Nestlé predicted an 8-10% rise in costs due to commodity price increases, and Unilever projected that costs could escalate by as much as 16% in 2011.³¹



AGRICULTURAL TECHNOLOGY

Food security in a world that will reach 9 billion people by 2050 will require a transformation in farming practices, including improved water efficiency. Companies such as Dupont, Monsanto, Syngenta and Bayer CropScience are researching and developing a range of products and techniques that could play a role in improving the productivity of water use in agriculture.

For instance, Indian company Jain Irrigation Systems expects its sales of micro drip systems—which help Indian farmers irrigate more efficiently in regions with declining water tables—to grow at more than 40% annually in the coming years.³²



APPAREL

Cotton hit its highest nominal price in the 140-year history of the ICE Futures exchange in 2010, due in part to catastrophic flooding and drought in key cotton-growing regions.³³ Cotton price increases threatened to end an era of inexpensive clothing from brands such as Next, H&M, and Zara. Next had to raise prices 5-8% while H&M shares fell 2.5% on reports of a quarterly gross margin that was below already-downgraded forecasts.³⁴

In 2011, a record-setting drought in Texas jeopardized over half of the state's cotton crop and adverse weather conditions also lowered China's cotton output. In anticipation of significantly higher prices, Gap Inc., which relies heavily on cotton, slashed its annual profit forecast by 22% during its Q1 2011 update.³⁵ Polo Ralph Lauren posted a 36% decline in net income in the first quarter, citing higher input costs as the primary driver.³⁶



CONSUMER PRODUCTS

With an eye toward increasing market share in developing economies, a number of consumer-products companies are developing innovative products that use less water. Unilever, for example, has developed detergents that require less water for every wash, and it has publicly set a target to provide 50 million households in water-scarce regions with such detergents by 2020. In total, the company hopes to reach 200 million consumers with reduced water-use products.³⁷

29 Bunge Limited, "Q4 2010 Earnings Call Transcript," *Morning Star*, February 10 2011, <http://www.morningstar.com/earnings/21927995-bunge-ltd-bg-q4-2010.aspx>.

30 Rich Neuman and Clifford Neuman, "Companies Warn That Higher Prices Are Looming," *The New York Times*, February 14 2011, <http://www.nytimes.com/2011/02/15/business/15prices.html?pagewanted=all>.

31 John Vidal, "High food prices are here to stay—and here's why," *The Observer*, July 17 2011, <http://m.guardian.co.uk/ms/p/gnm/op/view.m?id=15&gid=lifeandstyle/2011/jul/17/food-prices-rise-commodities&cat=environment>

32 G. Seetharaman, "Jain foresees micro-irrigation business growing twice as fast as food," *Daily News & Analysis*, January 19, 2011, http://www.dnaindia.com/money/report_jain-foresees-micro-irrigation-business-growing-twice-as-fast-as-food_1496312

33 Gregory Meyer, "Cotton Prices Poised to Boost Cost of Clothes," *Financial Times*, October 15 2010, <http://www.ft.com/intl/cms/s/0/c2835ec6-d880-11df-8e05-00144feabdc0.html#axzz1Sa9ek3z7>.

34 Anna Ringstrom and Veronica Ek, "H&M Squeezed by Cotton Prices and Asian Wage Rises," *Reuters*, June 22 2011, <http://www.ft.com/intl/cms/s/0/c2835ec6-d880-11df-8e05-00144feabdc0.html#axzz1Sa9ek3z7>.

35 Debarati Roy, "Texas Cotton Farmers Abandon Record Acres on Drought as Gap's Costs Rise," *June 30 2011*, <http://www.bloomberg.com/news/2011-06-30/texas-cotton-farmers-may-abandon-record-acres-because-of-drought.html>.

36 *Ibid.*

37 Unilever, "Products and Consumers," updated 2011, <http://www.unilever.com/sustainability/environment/water/consumers>.



ELECTRIC POWER

Large amounts of water are required to cool electric power plants and to generate hydroelectricity. When river levels drop or temperatures rise, power plants may find themselves forced to reduce or completely shut down generation. For example, in August 2011 the Tennessee Valley Authority had to cut power at three nuclear reactors because droughts and heat waves had reduced water flows and increased water temperatures in the rivers used to cool the company's plants. Similar problems in 2010 cost the utility US\$50 million in lost power production.³⁸ Recent droughts in China have led to decreased hydroelectric power availability, forcing power companies in Shanghai to ask malls and office buildings to close on hot days. The city has been suffering intermittent power outages since March 2011.³⁹



IT

Between 2000 and 2009, IBM's microprocessor plant in Burlington, VT, undertook a comprehensive water inventory to determine how it used water and where costs could be reduced. As a result, the facility was able to streamline operations and cut water use by 29%, saving \$740,000 each year in water bills. Adding to that figure the \$600,000 saved in chemical and filtration costs and the \$2.3 million saved in energy and electricity bills, IBM has saved \$4 for every \$1 lowered on its water bill.⁴⁰

In addition to its savings through efficiency, as part of its "A Smarter Planet" campaign IBM is developing a new business around water in order to apply the lessons from Burlington to cities, utilities, and other companies. IBM estimates the "smart water" market (IT driven part of the water sector) is worth \$15-\$20 billion a year.⁴¹



MINING

In 2009, after years of exploration and significant investment in a large gold mine on the Lempa River in El Salvador, Canadian firm Pacific Rim was denied the final permit for the project. The denial was largely the result of farmers' complaints that Pacific Rim's operations were drying up local rivers. Pacific Rim is now seeking \$77 million from the nation's treasury to compensate for lost profits and sunk investments.⁴²

In May 2011, a court in China's Fujian province ordered the country's biggest gold-mining company, Zijin Mining Group, to pay a criminal fine of US\$4.6 million for a 2.4 million gallon acid spill into the Ting river in July 2010.⁴³ Immediately after the spill, shares in the company were temporarily suspended from trading on the Hong Kong stock exchange.



OIL & GAS

In 2011, the French government banned the practice of hydro-fracturing—a process that extracts oil or gas by injecting a mix of chemicals and water at high pressure to forcibly fracture rock—largely due to concerns over the process' impacts on water quality. The new law not only blocks future development but also revokes existing permits—effectively stranding significant investments by a number of companies, including oil producer Tereos, which saw its share price plunge 20% in the wake of the ban.⁴⁴ South Africa currently has a moratorium on the controversial practice, as do the state of New York and the Canadian province of Quebec.

38 Pam Sohn, "River Temperature Forces Plant to 50 Percent Power," *Chattanooga Times Free Press*, August 4, 2011, <http://www.timesfreepress.com/news/2011/aug/04/river-temperature-forces-plant-to-50-percent/>.

David Flessner, "TVA Cuts Plant Output," *Chattanooga Times Free Press*, August 4, 2011, <http://www.timesfreepress.com/news/2010/aug/03/tva-cuts-plant-output/?print>.

39 Wu Yiyao and Li Xinzhu, "Power Shortages Hit Offices, Malls in Shanghai," *China Daily*, June 20, 2011, http://www.chinadaily.com.cn/bizchina/2011-06/20/content_12735856.htm.

40 Charles Fishman, "Why GE, Coca-Cola, and IBM Are Getting Into the Water Business," *Fast Company*, April 11 2011, <http://www.fastcompany.com/magazine/154/a-sea-of-dollars.html>.

41 Ibid.

42 Randal Archibold, "First a Gold Rush, Then the Lawyers," *The New York Times*, June 25 2011, <http://www.nytimes.com/2011/06/26/world/americas/26mine.html>.

43 Elaine Kurtz, "China's Zijin Mining Fined \$4.6M for Toxic Spill," *Bloomberg Businessweek*, May 4 2011, <http://www.businessweek.com/ap/financialnews/D9N0GH4G0.htm>.

44 Financial News Network Staff, "Tereos Resources Plummets 20% After French Ban on Fracking," *Financial News Network*, June 15 2011, <http://www.fnno.com/story/news-corner/331-tereos-resources-plummets-20-after-french-ban-fracking-trg/news-corner>.

Water resource constraints can also put companies in conflict with other local water users and communities. Tensions sparked by real or perceived inequities in water use can escalate quickly and put a company's goodwill for operating in a community, region, or even country in question. Such reputational risks are already increasing as people become more aware of their legal rights to access water, particularly in the developing world. The United Nations recently recognized access to "safe and clean drinking water and sanitation" as a fundamental human right, and many companies are now being directed to recognize and respect this right.⁴⁵ Governments also play a role in creating reputational risk for businesses, particularly if they do not provide adequate water and associated services to local communities.

Corporate Responses

Many companies are recognizing and responding to these issues. Forty-one percent of respondents to a 2009 Global CEO Survey conducted by PwC said they anticipated that freshwater scarcity would have a negative impact on their company's long-term success. Some companies have already begun taking action to assess and address their own water risks and to raise the visibility of corporate water management in international forums. The UN's Global Compact has made this a specific focus through its CEO Water Mandate, through which more than 70 corporate signatories have committed to a broad range of water sustainability practices.

Another example of businesses' efforts to respond to water risks and opportunities is the work done by the World Business Council for Sustainable Development and its members to develop a range of corporate water management resources—among those, a free tool designed to help businesses identify operations in water-scarce regions.⁴⁶ A growing number of large companies are also supporting and piloting efforts to develop new standards and protocols, such as the Water Footprint Network's Global Water Footprint Standard, for measuring the water footprints and impacts of companies and products.⁴⁷ Efforts are also under way within the beverage, mining and oil and gas sectors to define industry-specific water stewardship principles and water accounting standards.

INVESTOR RESPONSE TO WATER RISK

Due to these escalating business impacts, water-related risks and opportunities are becoming a bigger focus among global investors. Most of investors' interest to date has been in seeking increased disclosure from companies on their water use and associated risks.

A telling sign is mainstream investors' strong support of the Carbon Disclosure Project's Water Initiative. In 2011, 354 investors collectively managing \$43 trillion in assets backed the Initiative's second annual survey. The survey was sent to 408 of the world's largest companies, asking them to disclose more information on water-related risks, opportunities, management approaches and performance.

Investors are also seeking stronger disclosure in companies' financial filings. In 2010, the U.S. Securities and Exchange Commission (SEC) released formal disclosure guidance in response to repeated investor petitions organized by Ceres. The guidance requires publicly traded companies to disclose to their investors all financially material climate-related risks, including those linked to water availability and quality.⁴⁸

Investors are also pressing companies directly to act on water-related issues. Prominent European institutional investors, including Norges Bank Investment Management, Robeco and Hermes Asset Management, have begun not only to assess water risk in their portfolios but to directly engage those companies seen as exposed to higher risks.

Some of these investor engagements have been instigated through shareholder resolutions, particularly in the United States. In each of the last four years, investors have filed over 30 water-related shareholder resolutions, which direct companies to conduct water risk assessments, disclose operations or assets facing water risks, and address water risks in operations and supply chains. The resolutions have been filed primarily with oil and gas, electric power, and food and beverage companies.

Development banks are also boosting their focus on water issues. The World Wide Fund for Nature (WWF) is collaborating with the German development bank DEG to develop and implement a tool for assessing and quantifying portfolio level water risks.⁴⁹ The International

45 For more on this topic see: Institute for Human Rights & Business, "More Than a Resource: Water, Business and Human Rights," August 2011, http://www.ihrb.org/pdf/More_than_a_resource_Water_business_and_human_rights.pdf.

46 See Appendix B for more details.

47 See: Arjen Hoekstra, Ashok Chapagain, Maite Aldaya and Mesfin Mekonnen, *The Water Footprint Assessment Manual: Setting the Global Standard*, (Earthscan, 2011).

48 Through Ceres' Investor Network on Climate Risk, over 40 institutional investors asked the SEC to provide better guidance to companies on disclosure of key ESG issues, including climate change and water scarcity. The SEC's guidance is available at: <http://www.sec.gov/rules/interp/2010/33-9106.pdf>

49 For more details, see Appendix B.

Finance Corporation (IFC) recently revised its environmental performance standards to increase due diligence on the water impacts of projects financed through IFC's loans.⁵⁰ This step has the potential to spur the 72 private-sector financial institutions that have adopted the Equator Principles to integrate a broader set of water risk considerations into project finance decisions involving \$10 million or more in value.

Wall Street is also increasing its scrutiny of water risk. Investment banks continue to issue water-themed reports, including those by UBS, Citi, and HSBC. Bloomberg and other financial information providers have increased coverage of water-related issues in response to increased market demand for water-related indicators. Bloomberg has announced plans to launch a water-focused data service that would provide supply-and-demand models, water data, and news and briefings on water scarcity.

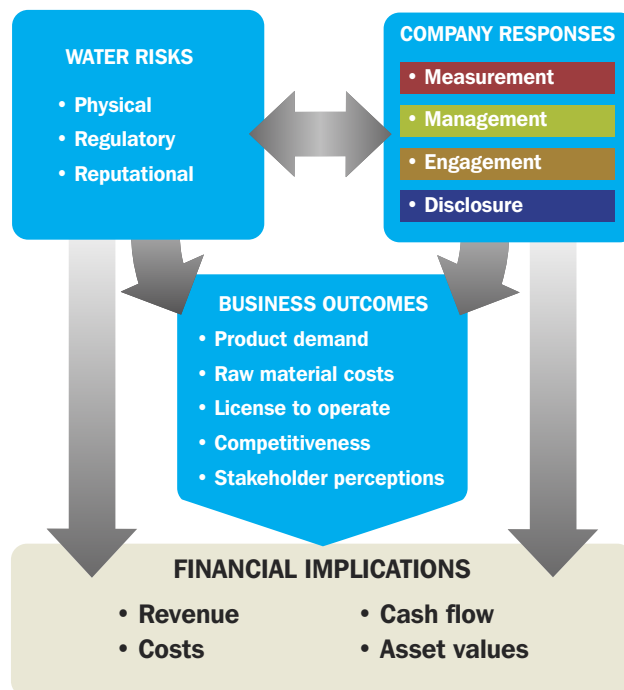
THE CHALLENGE FOR INVESTORS

Despite increasing awareness and action from asset owners, asset managers and data providers on water-related issues, numerous challenges remain in integrating water considerations into investment analysis and decision-making. As **Figure 1.3** makes clear, several stages are involved in understanding and assessing water-related financial risk in listed equities.

Assessing corporate water risk exposure is challenging for several reasons. First, typical accounting methods (such as those used for greenhouse gas emissions) do not translate well to water. Water is a local resource and the impact of its use depends on not just the quantity but the type, quality and even timing of use. Despite such complexities, a number of groups are working to bring greater clarity and standardization to corporate water use accounting.⁵¹

Second, it can be a challenge for investors to understand the potential business outcomes linked to improved water performance and the resulting financial implications. A key difficulty is that water—largely due to its nature as a public good—is often highly subsidized and therefore undervalued and underpriced as an economic input in most markets. This makes the financial costs of purchased water, or of water rights generally, insignificant to most companies and therefore to investors. Focusing solely on costs, in other words, will mean missing the risks of business

Figure 1.3: Understanding Financial Exposure to Water Risk



interruptions, increased capital costs, and other water-related impacts to which companies are exposed.

Third, quantifying corporate exposure to water risks remains difficult. However, investors have access to an increasing range of third-party data sets and tools to help inform their assessment of corporate water risk exposure from both a geographic and sector perspective. While these tools are in various stages of development, they will increasingly enable investors to overlay corporate operations against geographic regions of water risk, thereby providing a clearer picture of the range of risks—physical, regulatory, reputational—that a company might face (see **Appendix B** for more detail on these tools).

While analyzing sector- and geography-based water risk exposure is a key first step, it is critical that investors understand the activities the company is undertaking to address and mitigate water risks. To date, there has been little in the way of rigorous tools to help investors analyze and compare the quality of corporate water management. This report, through the introduction of the Ceres Aqua Gauge (described in **Chapter 2**), seeks to meet this need with a robust evaluation framework and methodology.

⁵⁰ See <http://www.ifc.org/ifcext/policyreview.nsf/Content/Home>

⁵¹ The CEO Water Mandate, together with the Carbon Disclosure Project, the Global Reporting Initiative, World Resources Institute, and PwC are currently developing a set of Water Disclosure Guidelines that aim to offer common corporate water disclosure metrics and provide guidance on the disclosure needs of different stakeholders. See: http://www.unglobalcompact.org/Issues/Environment/CEO_Water_Mandate/

INTRODUCING THE CERES AQUA GAUGE™



The Ceres Aqua Gauge is an assessment framework for investors seeking to understand how individual companies are positioned to manage water-related risks and opportunities. This chapter introduces the framework in a summary manner; for further information the reader is referred to more detailed descriptions and guidance notes available on the Ceres website: www.ceres.org/aquagauge

The Ceres Aqua Gauge is a flexible Excel-based framework and associated methodology that allow investors to scorecard a company's management of water risk against detailed definitions of leading practice.⁵² Developed through a nine-month consultation process with representatives from some 50 companies, financial institutions, conservation groups, and other organizations active in water-related issues, the Aqua Gauge builds on the foundation laid by *The Ceres Roadmap for Sustainability*—and like the Roadmap it focuses on governance, management, stakeholder engagement, and disclosure (**Box 2.1**).

The Aqua Gauge is neither a database nor another survey or channel of corporate disclosure. Its primary aim is to help equity investors *interpret and evaluate* the information disclosed by companies on their management of water issues and to provide a framework to guide engagement and dialogue with companies.

The Aqua Gauge also benefits companies by giving them a complete picture of leading practice in water management, a resource to help inform and strengthen their own water management strategies, and a framework for engagement with investors. Companies may also find the Aqua Gauge a helpful tool for building water management capacity with suppliers and as a resource for industry-level initiatives, metrics, and collaborations related to water management.

Investors will need to apply the framework judiciously to those companies in sectors and regions more likely to

Box 2.1: The Ceres Roadmap for Sustainability

The Ceres Roadmap is both a vision and a practical roadmap for integrating sustainability into the DNA of business—from the boardroom to the copy room. It analyzes the drivers, risks, and opportunities involved in making the shift to sustainability, and it details the strategies and results of companies that are taking on these challenges. The *Roadmap* provides a comprehensive framework for sustainable business strategy and for accelerating the implementation of best practices and improving performance. For more information, see www.ceres.org/ceresroadmap.

face water risk. A number of third-party data sets and tools exist or are in development to help assess sector or geographic water risk exposure (see **Appendix B** for a list) and additional guidance on how to identify and prioritize companies for assessment is provided in **Chapter 4**.

STRUCTURE OF THE TOOL

The Aqua Gauge provides a corporate-level view on water risk management, and it divides associated activities into four key areas: 1) measurement, 2) management, 3) stakeholder engagement, and 4) disclosure. Each of these four areas is further subdivided into specific management activities, as detailed in **Table 2.1**.

52 The Aqua Gauge is meant to be applied to companies whose operations, supply chains, or products require significant amounts of water or have a significant impact on water quality. It is not intended, however, for application to the water utility sector.

Designed to enable both rapid and comprehensive analysis, the Aqua Gauge gives the investor the option to assess a company against:

- A short list, or “Quick Gauge,” of core management practices appropriate to the company’s risk profile; and
- The full Aqua Gauge—a comprehensive set of corporate-level practices that provide a more detailed picture of the company’s management approach.

In addition to specifying leading practice, the Aqua Gauge identifies two “staging posts” on the journey to leading practice, in order that investors can assess a company’s progress (**Box 2.2**).

The Aqua Gauge does not explicitly distinguish leading practice by sector. In general, the definitions of leading practice are intended to be sufficiently broad to allow individual companies to put in place the precise responses appropriate to their circumstances. However, to aid analysis, the Aqua Gauge does indicate which risk mitigation practices are most relevant for companies facing water risks along different parts of their value chain. For instance, for companies likely to have higher water impacts and risks in their supply chain (processed food companies for example), management actions

Box 2.2: Evaluating a Company’s Progress With the Aqua Gauge

For each management activity in the Aqua Gauge, investors can assess a company’s progress against four stages:

- **No Action:** No evidence that the company has taken action in this area.
- **Initial Steps:** Action has been taken but the company is only beginning to implement the practice.
- **Advanced Progress:** Action has been taken and good progress toward leading practice has been made, but gaps still exist in the company’s approach.
- **Leading Practice:** Action is consistent with what leading companies are doing, and are aspiring to do, in this area.




The full descriptions of initial steps, advanced progress, and leading practice for each area of the Aqua Gauge can be found in **Appendix A**.

relevant to the supply chain are prioritized. Similarly, the Aqua Gauge designates those water management practices most critical for companies facing water risks in their direct operations or their products.

Table 2.1: Key Areas of Corporate Water Risk Management Identified in the Aqua Gauge

3 2 1 0	1. MEASUREMENT	SPECIFIC RELEVANCE
	Data Gathering <i>The company collects and monitors data on:</i>	<i>Management practice most relevant for companies with significant water risks & impacts in their:</i>
1.1	Its own regulatory compliance, water use, and discharge	Direct Operations
1.2	Its own environmental and social impacts on direct water sources	Direct Operations
1.3	External factors—such as economic and social development, impacts of other users, climate change and public policy—affecting direct water sources	Direct Operations
1.4	Stakeholder perceptions and concerns related to water issues	Relevant for All
1.5	The effectiveness of suppliers’ water management practices	Supply Chain
	Risk Assessment <i>The company identifies and quantifies:</i>	
1.6	Water-related risks in direct operations	Direct Operations
1.7	Water-related risks in the supply chain	Supply Chain

Table 2.1: Key Areas of Corporate Water Risk Management Identified in the Aqua Gauge

	2. GOVERNANCE & MANAGEMENT	SPECIFIC RELEVANCE
	Governance & Accountability <i>The company:</i>	<i>Management practice most relevant for companies with significant water risks & impacts in their:</i>
2.1	Clarifies board responsibilities for oversight of water	Relevant for All
2.2	Involves senior executives directly in management of water-related issues	Relevant for All
2.3	Aligns public policy positions and lobbying with water stewardship goals	Relevant for All
	Policies & Standards <i>The company:</i>	
2.4	Has a publicly available water policy and recognizes the importance of water to the business	Relevant for All
2.5	Sets performance standards and goals on water withdrawals/consumption for direct operations	Direct Operations
2.6	Sets performance standards and goals on wastewater discharge for direct operations	Direct Operations
2.7	Requires direct operations to develop plans to address local watershed risks	Direct Operations
2.8	Addresses sustainable water management in supplier standards and codes, and in procurement and contracting practices	Supply Chain
	Business Planning <i>The company:</i>	
2.9	Considers water in business planning and investment decision-making	Relevant for All
2.10	Considers water in product design and development	Products
2.11	Identifies water-related business opportunities	Products
	3. STAKEHOLDER ENGAGEMENT	SPECIFIC RELEVANCE
	<i>The company:</i>	
3.1	Requires engagement with local communities on water-related issues at existing or potential new direct operations	Direct Operations
3.2	Engages with employees on water issues	Relevant for All
3.3	Works with suppliers to help them improve water management	Supply Chain
3.4	Engages openly with local, regional and national governments to advance sustainable water policies and management	Relevant for All
3.5	Engages with NGOs and community organizations on water issues	Relevant for All
3.6	Engages with other industries/companies/water users	Relevant for All
3.7	Educates customers to help them minimize product impacts	Products
	4. DISCLOSURE	SPECIFIC RELEVANCE
	<i>The company:</i>	
4.1	Makes water-related information publicly available	Relevant for All
4.2	Includes water data and analysis in published financial filings/reports	Relevant for All
4.3	Provides third-party assurance or audits water-related information	Direct Operations

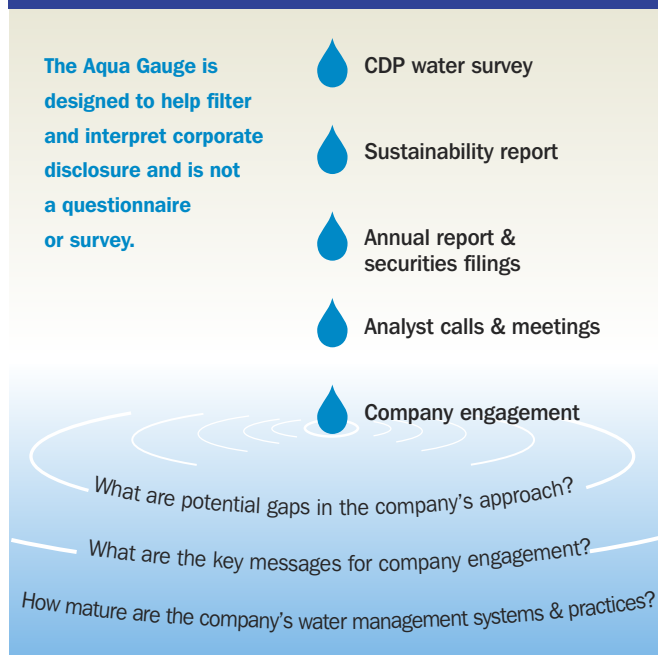
COMPLETING THE AQUA GAUGE

The Aqua Gauge is meant for use with information already in the public domain, although some investors will find it beneficial to acquire additional information through direct engagement with companies and quarterly analyst calls. At present, many companies have limited disclosure on water issues. However, thanks to growing investor requests for water-related disclosure coming through initiatives such as the Carbon Disclosure Project's water survey, this situation is expected to improve over time (*Figure 2.2*).

Once an investor has identified portfolio companies in sectors or geographies more likely to be exposed to water-related risks (see *Chapter 4*), the Quick Gauge level in the tool should be used as a first step in identifying potentially weaker performers. The Quick Gauge walks the user through a short set of questions to assess if the company has implemented a core set of basic water management practices.

For the investor wishing to develop a more detailed and robust picture of a single company's water management approach, the full Aqua Gauge framework can then be deployed. In this case, the Aqua Gauge will produce a scorecard (*Figure 2.3*) indicating those areas where the company is more or less advanced, thus identifying points of investor engagement and potential corporate improvement.

Figure 2.2: Completing the Aqua Gauge Tool



DEFINING “LEADING PRACTICE”

In assembling definitions of “leading practice,” as well as those of “advanced progress” and “initial steps,” the authors have interviewed a variety of practitioners, leading companies and non-governmental organizations. The leading practice definitions reflect insights from these interviews and real world examples of what leading companies are implementing today and aspiring to do tomorrow (for descriptions of each of the leading practice areas and examples of companies already implementing them, see *Chapter 3*).

Companies seeking to achieve leading practice across the Aqua Gauge face a moving target. As water risk itself and the required business responses evolve, so too must the definition of leading practice. At present the Aqua Gauge reflects the best thinking of the organizations that the authors have engaged, but we anticipate that the tool will be updated on a regular basis.

INTERPRETING COMPANY ASSESSMENTS

The Aqua Gauge provides a broad view of the management of water risks and opportunities across a business. Because water gives rise to a complex set of issues, and the responses by companies are necessarily just as complex, there is no one-size-fits-all approach. Companies need to choose the solutions relevant to the sectors they are in and the situations they face. Nonetheless, there are some management practices that make good sense whatever the company or situation, and the Aqua Gauge identifies and classifies these approaches.

Investors should be able to assess companies based on information in the public domain. This creates a challenge in that many companies do not yet publish sustainability reports or provide information on how they are managing environmental issues such as water. In some cases, much good work may be happening behind closed doors. Either way, the answer is to increase and further standardize disclosure by companies in relation to water—as well as to other environmental, social, and corporate governance issues.

The Aqua Gauge is not designed to deliver a single numerical assessment. In reality, achieving leading practice across all areas of the Aqua Gauge is neither feasible nor cost-effective for most companies. However, the tool should raise the level of conversation between investors and companies and bring clarity to both parties as to the importance, or relative unimportance, of certain elements.

Figure 2.3: Example Scorecard from the Aqua Gauge

Category	Subcategory	Description The Company:	Activity	Company Performance
MEASUREMENT	Data Gathering	Collects and monitors data related to:	1.1 Its own regulatory compliance, water use, and discharge	
			1.2 Its own environmental and social impacts on direct water sources	
			1.3 External factors affecting direct water sources	
			1.4 Stakeholder perceptions and concerns related to water issues	
			1.5 Effectiveness of suppliers' water management practices	
	Risk Assessment	Identifies and quantifies water-related risks for its:	1.6 Direct operations	
			1.7 Supply chain	
MANAGEMENT	Governance	Sets accountabilities for water through:	2.1 Board of directors	
			2.2 Senior management	
			2.3 Public policy and lobbying positions	
	Policies & Standards	Sets performance standards and goals through:	2.4 Publicly available water policy/statement	
			2.5 Standards and goals on water withdrawals/consumption for direct operations	
			2.6 Standards and goals on wastewater discharge for direct operations	
			2.7 Plans to address local watershed risks	
			2.8 Supplier standards and codes, procurement and contracting practices	
	Business Planning	Integrates water in decision-making related to:	2.9 Business planning and capital allocation	
			2.10 Product design and development	
			2.11 Opportunity identification	
ENGAGEMENT		Engages with internal and external stakeholders on water-related issues:	3.1 Local communities	
			3.2 Employees	
			3.3 Suppliers	
			3.4 Governments and regulators	
			3.5 NGOs and community groups	
			3.6 Other industries/companies/water users	
			3.7 Customers	
DISCLOSURE		Discloses:	4.1 Water-related information	
			4.2 Data and analysis related to water in financial filings/reports	
			4.3 Audited/assured water-related data	

Company Performance: Leading Practice Advanced Progress Initial Steps No Action

A common practical reason why most companies, especially smaller companies, will not achieve leading practice in every area of the Aqua Gauge is lack of capacity. They may not have the time, budget, and human resources to take action across the board. Rather, they should focus their available resources on the priorities and core management activities of the Aqua Gauge and ensure that the approaches in these areas are consistent with leading practice.

It should be noted that companies lacking in geographical diversity, or limited in their portfolio of products and range of customers, might be more vulnerable to changes in their operating environments. While the tendency for many investors has been to engage large and relatively diversified companies on issues such as water, in reality the greater risks within many investor portfolios are often in smaller and more specialized companies.

USING THE INSIGHTS FROM THE AQUA GAUGE

Investors

How the investor chooses to use the Aqua Gauge will depend on a number of factors, including the investor's approach, style and goals. However, across the investment value chain the Aqua Gauge can benefit a range of decision-makers:

- **Portfolio managers** and analysts can use the Aqua Gauge to identify those companies better positioned to manage water-related risks and opportunities, using this analysis as a negative or positive factor in their investment decision-making process.
- **Governance specialists** at many pension funds and asset management firms already engage directly with their portfolio companies through correspondence, phone calls and meetings on questions of interest and concern. In this case, using the insights and messages developed from the Aqua Gauge as a basis for conversation with a company could provide clarity as well as potentially valuable leverage for the investor. The Aqua Gauge can also be a resource in assessing proxy proposals related to water.
- **Financial and ESG data providers** can incorporate elements of the Aqua Gauge into their own analyses, thereby providing their clients with more robust research and analytics on corporate response to water risk.

Companies

Companies that seek to develop more robust water management strategies will also find value in the Aqua Gauge. Specifically, it can help with:

- **Self-assessment and strategy development.** Companies can use the Aqua Gauge to facilitate internal self-assessment, benchmarking against competitors, and as a resource for engaging key decision-makers and stakeholders within the company. These self-assessments help identify priorities for action and form the basis of a more comprehensive water management approach.
- **Investor communications and engagement.** Companies can use the tool to inform their communications with the investment community, and provide clarity that the company is appropriately managing its water risk. The Aqua Gauge can also inform how a company answers different investor-backed information requests, such as the CDP Water survey.
- **Supplier and industry engagement.** The Aqua Gauge a helpful tool for building water management awareness and capacity with key suppliers and beneficial as a resource for supplier engagement or assessment. It also serves as a resource for industry-level initiatives, metrics and collaborations related to water management.

THE ELEMENTS OF 21ST CENTURY CORPORATE WATER MANAGEMENT



For many companies, robust water management will be critical to achieving competitive advantage in the 21st century. This chapter details four categories of corporate activities—measurement, management, stakeholder engagement, and disclosure—that together constitute a comprehensive approach to addressing water risks and opportunities.

In developing the Ceres Aqua Gauge, the authors conducted extensive interviews with water managers and sustainability executives at companies in a range of sectors. These interviews confirmed many aspects of the team's initial thinking, while helping to shed further light on the complexities of managing water-related risk. Company executives highlighted a number of overarching themes critical to assessing a company's response to water issues:

→ **Managing an issue as complex as water across a large multinational business requires robust governance and management systems, as well as operational and technical interventions.**

A natural primary focus of a company's approach to water management is in specific operational and technical interventions that directly affect water performance at a site. However, there are also a range of other business actions required to manage water issues—governance structures and lines of accountability, policies, and performance standards—that are critical and often overlooked. The Aqua Gauge emphasizes governance and management aspects of water and is designed to help investors and companies assess whether they have the processes and capabilities in place to effectively manage water issues across multiple sites and extended value chains.

→ **Measuring corporate impacts on water resources and ecosystems is difficult.** While some companies regularly collect data on their operational water use and wastewater discharges, translating those metrics into measures of local impact—on the water quality of the receiving body, on ecosystems and biodiversity, and on the people and other industries that depend on the shared resource—remains challenging. Company representatives attributed this difficulty both to a lack of experience (citing partnerships with NGOs as an important resource) and to a paucity of data in many regions about the underlying conditions of the surface and groundwater on which they depend.

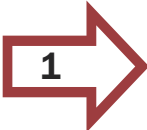
→ **Water management must take into account external factors.** Company representatives observed that many risks arise from external factors such as local regulatory and economic conditions, climate change and the impacts of other water users. The most efficient and low-polluting operation can still be at risk when other users, including factories, farms, or households, overuse or pollute the resource. Thus corporate responses must take these risks into account by formulating strategies (often in the form of watershed-based collaborations) that effectively engage other stakeholders to improve the shared management of water.

→ **Understanding value chain impacts and risks is essential.** In our interviews, companies made clear that effectively managing water risk means widening the scope of risk assessment and management to their full value chain. For many sectors and companies, water risks in the supply chain, or those linked to customer use of the product, can often be as least as important as what goes on within a company's four walls.

→ **Water risk management should not be considered in isolation from other sustainability issues.** While the focus of the Aqua Gauge is on water, it is just one of an increasing number of interconnected sustainability issues that businesses need to understand and address. Some companies already recognize and understand the linkages and trade-offs between water use and energy (e.g., dry cooling systems use less water than wet systems but

generally increase energy requirements); and there are also other important connections between water and, for example, biodiversity, food security, human rights, and health and sanitation. Understanding and managing such trade-offs and exploiting potential synergies should be an increasingly important part of a company's strategy.

Building on these observations and real-world examples of what leading companies are implementing today and aspiring to do tomorrow, the Aqua Gauge brings together a broad range of potential actions to deal with the complexities of managing water in the 21st century. As detailed below, the Aqua Gauge is structured to reflect four categories of corporate activity—measurement, management, stakeholder engagement, and disclosure—that constitute a comprehensive approach to addressing water risks and opportunities.



MEASUREMENT

The adage that a business cannot manage what it doesn't measure certainly holds true with respect to water. Company executives interviewed as part of this study repeatedly underscored the need to base water management strategies on data that reflect both current and projected water-related performance, impacts, and risks. They noted that water risks result from a company's (or its suppliers') water use and pollution, as well as from external factors—reflecting other water users' actions, the decisions of regulators, economic development patterns, and growing climate variability. Collecting the data necessary to assess water risk therefore involves much more than simply evaluating the efficiency of operational water use or wastewater discharges.

3 2 1 0	MEASUREMENT
Data Gathering	
<i>The Company collects and monitors data on:</i>	
1.1	Its own regulatory compliance, water use, and discharge
1.2	Its own environmental and social impacts on direct water sources
1.3	External factors—such as economic and social development, impacts of other users, climate change and public policy—affecting direct water sources
1.4	Stakeholder perceptions and concerns related to water issues
1.5	The effectiveness of suppliers' water management practices
Risk Assessment	
<i>The Company identifies and quantifies:</i>	
1.6	Water-related risks in direct operations
1.7	Water-related risks in the supply chain

Interviewees also made a clear distinction between gathering water-related data and actually translating the data into metrics or decision-support tools that allow them to identify and quantify risks. Thus the Aqua Gauge differentiates between these two areas, identifying not only the broad types of data that a business should be collecting but also the approaches it can take to assess risk.

Data Gathering

A first step for all companies is to gather and regularly monitor data on facility regulatory compliance and indicators of eco-efficiency (such as water use and wastewater discharge). Beyond that, companies need to understand how their water use and pollution affect the water supply and quality of receiving water bodies—and the implications for broader ecosystems and the health and livelihoods of communities that share the water resource. This can be a complex task, and a first step is assessing from which natural sources (surface water bodies or aquifers) a facility is drawing its water, and into which bodies its wastewater is (or might be—in the case of a spill) discharged.

Understanding and monitoring external risk factors such as climate change, economic and social development, public policy, and the impacts of other users is also important. Companies can gather data on these trends from external (and therefore generalized) data sets, and resources (many of which are detailed in **Appendix B**). However, companies may also need to seek out facility-level sources for such data from facility managers, regional government and other local stakeholders.

Company reputation and stakeholder perceptions of the company's commitment to strong water management are also important data points. Companies are encouraged to monitor and proactively seek out the views of their most important stakeholders on this topic.

Gathering data from and about key suppliers is also critical for those companies whose suppliers have water-intensive operations or that rely on water-intensive raw materials. It is important that such data provide insight into how each supplier is managing its impacts and risks. Compliance and eco-efficiency data—for example, data on how much water a particular supplier uses—will be more meaningful if paired with information on the overall quality of a supplier's water risk management practices.



ASSESSING FACILITY IMPACTS AND RISKS

As the world's largest food company, Nestlé has an extensive multinational manufacturing base that in 2010 used 144 million cubic meters of water. To assess water risks across its 450 global facilities, the company relies on a set of analytical tools to help local managers understand both their own water use, and how local demographic trends and physical conditions might affect water resources it relies on.

Nestlé has combined third-party geo-spatial data into a customized water risk map. The map allows the company to determine which of its sites are in areas where water resources are already under stress and competition for water is severe, as well as areas where such conditions are likely to worsen.

Nestlé pairs this global water risk map with information gathered by the company's Water Resources Review (WRR) program to determine the sustainability of water management practices in a given site's watershed. The WRR takes factors both internal and external to the company into account, focusing on water quantity, water quality, regulatory compliance, site protection and stakeholder relationships. The program also covers the impacts of Nestlé's direct operations and indirect impacts related to transportation (e.g., pipelines and storage tanks), water treatment, and wastewater processes. So far, the WRR has been deployed at 88 of the company's bottled water sites and is now being rolled out at the company's food-processing factories.

The combination of external data and Nestlé's WRR process has enabled the company to identify risks and key issues in water resources at the local level, resulting in targeted action plans to ensure each facility's sustainable water use. The results of these efforts have been consistent reductions in water withdrawals over the past decade; since 2000, Nestlé has reduced water withdrawals by 32% even while production volume grew 73%. The company hopes to reduce water consumption by another 10-15% over the next five years.

Risk Assessment

Once in possession of the necessary data, the next step is analysis, and a number of tools are available to help businesses assess their exposure to different indicators of water risk. For example, the World Business Council for Sustainable Development's Global Water Tool provides a platform for companies to track how much water each of its facilities is using and to map facilities against geographic data on water scarcity and other relevant metrics. Several other tools and approaches are being developed, including the water-footprint concept and an approach to lifecycle analysis that reflects water-related impacts.⁵³ Ideally, these broad-based tools are then paired with "bottom-up" data and analysis at the site level to paint a meaningful picture of overall risk exposure.

It was underscored in our interviews that companies should look not only at *current* impacts and risks but also pursue actions such as scenario planning in order to discern *future* risks. Historical hydrologic records—which depict variations in frequency, duration and intensity of droughts or floods—are no longer seen as useful reference points for risk management. Climate change and rapid alterations in land and water use in many regions mean that water risk can no longer be managed through the rear-view mirror; forward-looking data sets and risk assessment approaches are required.



POSITIONING FOR A WATER-CONSTRAINED FUTURE

In 2009 PepsiCo, with the NGO Forum for the Future, undertook a scenario-planning exercise looking at potential environmental and social risks and opportunities facing the company out to 2030. With respect to water, the exercise brought to light potential constraints on future water availability in key countries and markets, with implications for PepsiCo's food and beverage plants and its agricultural supply chain.

This risk assessment helped inform the company's core water-related performance goals, which are underpinned by a commitment to respect water as a fundamental human right. The company's goals include:

- ▶ Improving water use efficiency by 20% by 2015
- ▶ Striving for "positive water impact," returning more water to the environment than its operations consume in water-stressed areas
- ▶ Working with agricultural suppliers to promote farming practices that protect water, the climate, land and biodiversity

At the operational level, PepsiCo is working to meet its water efficiency goal through the company's Sustainable Engineering Guidelines, which provide guidance on water use reduction and plant process design and management, as well as site selection;

and the ReCon tool, a diagnostic for understanding plant water and energy use and creating strategies to reduce them. These efforts are reinforced at the corporate level through a capital expenditure filter that reviews key water (and other sustainability) risks and opportunities associated with projects linked to capital requests greater than \$5 million. As of 2010, the company had improved its water use efficiency by 18% against its 2006 baseline.

Beyond driving plant-level efficiency, the company is prioritizing watershed-level interventions in highly stressed regions, with a focus on projects and collaborations that return water to the surrounding watershed and communities. To this end, PepsiCo has worked with The Nature Conservancy on a pilot project that identified watershed restoration priorities at sites in Mexico, the U.S., India, China and the U.K.

The company is also looking beyond its direct operations to its agricultural supply chain, and working with suppliers to deploy novel water-saving technologies like the "i-Crop" tool. i-Crop is a web-based crop management system developed with Cambridge University that enables farmers around the world to monitor, manage and reduce their water use and carbon emissions, while maximizing potential yield and quality.

53 See Appendix B for a list of resources on water risk assessment.

2

MANAGEMENT

The Aqua Gauge identifies three sub-categories of activity that a company can take to manage water-related issues—governance and accountability, policies and standards, and business planning.

 MANAGEMENT
Governance & Accountability <i>The Company:</i>
2.1 Clarifies board responsibilities for oversight of water
2.2 Involves senior executives directly in management of water-related issues
2.3 Aligns public policy positions and lobbying with water stewardship goals
Policies & Standards <i>The Company:</i>
2.4 Has a publicly available water policy and recognizes the importance of water to the business
2.5 Sets performance standards and goals on water withdrawals/consumption for direct operations
2.6 Sets performance standards and goals on wastewater discharge for direct operations
2.7 Requires direct operations to develop plans to address local watershed risks
2.8 Addresses sustainable water management in supplier standards and codes, procurement and contracting practices
Business Planning <i>The Company:</i>
2.9 Considers water in business planning and investment decision-making
2.10 Considers water in product design and development
2.11 Identifies water-related business opportunities

Governance & Accountability

Robust governance of sustainability begins with board oversight and commitment, followed by management systems and processes that integrate consideration of key sustainability issues—including those related to water—into day-to-day decision-making. It is this chain of accountability stretching from the boardroom to the factory floor that drives home the importance of achieving strong sustainability performance. For companies with significant water risks, water should be overseen alongside other priority sustainability issues at the board level as part of a relevant committee.

It was underscored in our interviews that at the executive management level, a committee (or a relevant representative on that committee) should have explicit oversight of all critical water-related issues, and there should be clear lines of responsibility between the committee and responsible site-level personnel. Driving better performance on water may also require realignment of financial incentives. Some businesses have established links between remuneration or incentive pay and sustainability scorecards, and water should be part of any such scorecard for senior executives and key managers.



DRIVING DOWN SUPPLY CHAIN IMPACTS

In 2001, the Nike Water Program was created to evaluate and reduce the water quality impacts of roughly 50 of the dyeing and finishing facilities that supply Nike's contract factories. Full compliance requires participating supplier facilities with wastewater volume greater than 50 m³ per day to demonstrate wastewater quality that meets all local/national discharge standards or BSR Water Quality Guidelines, whichever are stricter.

Since then, the program has grown to enroll more than 500 supplier facilities and subcontractors, which produce or process materials used to manufacture Nike-branded apparel, footwear and equipment, and Nike affiliate brand product. The program has also been strengthened with the implementation of *H2O Insight*, an online data collection system that requires participating suppliers to report detailed production and water management data in addition to water volume and quality data. The Water Program today continues to set limits on a variety of water quality indicators (including pH, biochemical oxygen demand, and suspended solids, for example). Lab test results for these indicators are managed through a third party and uploaded through the online reporting system into a central clearinghouse-style database that allows Nike to track progress facility-by-facility and year-by-year. The results are also used to identify instances of non-compliance and prioritize action by suppliers.

Because most of Nike's material suppliers also process textiles for other retailers and brands, the company recognizes that its efforts to collect data and work toward improved supplier performance will also benefit the broader industry. To that end, Nike is releasing the *H2O Insight* system to the industry and encourages other brands to leverage this powerful tool to gain insight into their own supply chain water use and impact, and to work toward greater sustainability, traceability and visibility into their impacts on water resources.

Beyond regulated environmental impacts, many textile manufacturing processes continue to pose burdens on water resources through the discharge of unregulated and persistent chemical compounds. In recognition of these impacts, the company recently announced a goal to achieve zero discharge of hazardous chemicals from its supply chain by 2020.

Nike acknowledges that it will be challenging to meet this commitment, but the company's aim is to reach its goal through innovation, the application of green chemistry, and collaboration both with the chemicals industry and Nike's counterparts in the footwear and apparel industry.

Another critical aspect of oversight is ensuring that the company responsibly advances and discloses its public policy agenda with respect to water. As a first step, the company's public policy positions and lobbying should be made consistent with its own stated water stewardship goals. The company should then seek over time to explicitly align corporate policy positions with internationally recognized water stewardship and economic development goals. Where appropriate, the company could also play an active role in developing trade association policy positions that encourage strong water stewardship practices.

Policies & Standards

Setting policies, performance standards and targets helps companies raise awareness of water as an issue and help them achieve better and more consistent performance.



LINKING EMPLOYEE COMPENSATION & WATER PERFORMANCE

Like most companies, Danone performs evaluations of its employees against a range of corporate and individual objectives to determine the size of bonus-compensation packages. In 2008, Danone amended this bonus system to include environmental and social criteria for evaluating its top 650 managers. By 2010, the bonuses of over 1,000 of the company's top executives were determined through this system.

The new bonus system rewards performance across three sets of indicators: 1) organizational objectives, which are mainly economic goals of the company and unit; 2) business drivers, which are the individual objectives that each employee must achieve based on the particulars of his or her responsibilities; and 3) sustainability indicators, which are the goals defined for the company or unit on environmental and social targets—water use efficiency, for example.

Environmental and social targets are defined by each Danone subsidiary and are then ratified at the corporate level. Once the target has been ratified at the corporate level, it becomes a performance objective for the relevant executives of the subsidiary. All subsidiaries have quantitative water reduction goals for their sites, and in 2010, the company successfully improved water efficiency at its industrial sites by 11%, resulting in an overall efficiency gain of 41% from 2000.

Recognizing the importance of water through an explicit water policy (or as part of a broader environmental or sustainability policy) is a critical first step. Such a policy should be publicly available and specify clear goals and guidelines for action. Companies may also recognize their responsibility to respect the human right to water and sanitation, ideally as part of a comprehensive human rights policy.

Many companies set quantified targets for improvements in water use, wastewater discharge, or both. However, in our interviews, company executives observed that target-setting is not simple and the same approach is unlikely to be suitable for all businesses. Some companies, for example, have set “stretch” targets in order to drive innovation and accelerate their performance, while others prefer to set relatively modest targets and stimulate changes in more gradual ways. The Aqua Gauge does not specify the type of target that companies should set, but it emphasizes that targets should be differentiated by location or risk level such that facilities or business units facing higher levels of water risk are motivated and have the resources to meet more aggressive targets.

Many companies limit the scope of their water performance objectives to operational and technical interventions that reduce water use and pollution within their facilities. However, a growing number of leading companies have come to recognize the need to take broader action on risks related to the water sources they depend on and share with others. Thus the Aqua Gauge emphasizes that companies should require facilities to develop plans that address external risks to their water source. Such plans might include the engagement of key local stakeholders (including government) and the support of local projects and collaborations that improve conditions for the watershed(s) supplying or affected by those facilities.

Interviews with companies that had water-intensive supply chains identified improving supplier performance as a major opportunity. Addressing water impacts and risks in supply chain performance begins with establishing supplier policies. These policies, codes, and standards are only effective, however, when they are integrated into RFP processes, vendor selection criteria, procurement practices, and ongoing supplier

THE COCA-COLA COMPANY

PLANNING FOR SOURCE WATER PROTECTION

In response to the growing strain on freshwater sources in many parts of the world, The Coca-Cola Company has established a standard that requires each of its 900-plus bottling plants to develop formal plans by 2013 to help protect the sources of water in their area of operation. Each plant must form a water resource management team, work with water resource experts to complete a source vulnerability assessment that inventories risks to source waters (and the surrounding community's water source if different than the plant's), and create and implement a formal source water protection plan that is updated at least every five years.

The protection plans address critical water challenges at a watershed level, from hydrological vulnerabilities to local government management capacity. Often these plans include company engagement with local government, water agencies, communities, other industry, agriculture and NGOs as partners in addressing water challenges.

Coca-Cola believes that this system is important both to maximizing business value, contributing to the sustainability of the surrounding community and ecosystem and protecting its reputation. The standard serves several purposes:

- **Risk management.** The standard aims to ensure that risks to water supplies are properly identified, assessed and mitigated.

- **Quality assurance.** The standard protects product quality by ensuring that water inputs are managed at the same high level as all other ingredients.
- **Sufficiency of supply.** The standard ensures that water sources are sufficient to sustainably support surrounding communities, current Coca-Cola production, and projections for future growth.

While the program has been successful, with 44% of plants completing source vulnerability assessments and 3% of plants developing source water protection plans as of August 2011, the initiative has also presented challenges:

- **Implementation.** Rolling out a new standard to so many facilities has required a massive training effort. To help meet that need, Coca-Cola developed an online training program, available in multiple languages, that takes employees through guidance documents and certification exams. To date, over 8,000 courses have been completed through the program.
- **Governance.** Because observance of the standard is mandatory, performance and progress must be monitored. Coca-Cola re-trained audit teams and drafted protocols to help them effectively assess performance against the new standard.

engagement. Through these processes, companies and their suppliers can define and commit to performance standards and goals related to water use and/or wastewater. Ideally these standards will ensure suppliers meet and exceed local compliance requirements in many regions, and will also encourage suppliers to in turn set similar standards for their own suppliers.

Business Planning

Beyond improving performance over the short term, the integration of water into business planning decisions is crucial to a company's long-term ability to deal with water issues. Concretely, this means finding ways to incorporate water risks and opportunities into key decisions related to capital investments and siting, mergers and acquisitions, enterprise risk management systems, as well as systematic planning and budgeting.

A critical challenge for all businesses in attempting such integration is to recognize a proper value for water within the business. The cost of water is different than its value; water is too often undervalued economically and most companies do not count water as a significant

operating cost. The value of water to a business is most often apparent when it is constrained or unavailable—with a result that the opportunity cost for the business can be many times the direct costs. Moreover, the broader values of water—its environmental, social, cultural and in some areas, religious value—are rarely considered and increasingly will need to be recognized by companies and regulators alike.

Product impacts are a significant concern for many companies. For some sectors—heavy manufacturing, for instance—the emphasis is necessarily on redesigning products from a life-cycle perspective, with an eye to reducing cradle-to-grave water impacts by replacing or modifying water-intensive materials and/or processes used to make those products. For sectors whose products can have either a positive or negative impact on water use or pollution once they are in the hands of consumers—for chemicals, appliances, or cleaning products, for instance—the emphasis must be on guiding research and development towards new products or services that better compete in increasingly water-stressed markets.



ACCOUNTING FOR THE VALUE OF WATER

Rio Tinto owns and manages more than 110 mining and mineral-processing operations around the world located in six geographical regions across seven different climate zones. Each operation has its own water challenges: some are located in water scarce environments where increasingly they compete with other water users; others need to manage surplus water resulting from storms; others have water quality problems that can affect the operation's production or increase its costs.

In the past, Rio Tinto managed water as an environmental issue rather than as a significant business asset with an economic value. The total value of water was often not appreciated until water was no longer available, or the operation was unable to discharge surplus water, or water had become a community concern.

Since 2005, Rio Tinto has adopted a more strategic approach that accounts for the social, environmental and economic aspects of water management. In developing the new water strategy, it was identified that although the company's senior management understood conceptually that improved water performance reduced operating costs and helped minimize risks, existing financial approaches failed to capture this linkage because water was often undervalued. The company struggled to put a dollar price, for example, on the "drought-proofing" opportunity that an investment in water efficiency technology provides to an operation in a water

scarce environment, or on the cultural value of a water resource to indigenous people. Theoretically, it was possible to incorporate environmental and social costs and benefits of water impacts in the sorts of net present value (NPV) calculations Rio Tinto used to make investment decisions, but the company knew it would not be easy.

To address this gap, Rio Tinto worked with experts from the Sustainable Minerals Institute at the University of Queensland (Australia) to develop a risk management framework for incorporating the monetary and non-monetary value of water into company decision-making. The resulting framework assesses the level of threat or opportunity associated with a difficult-to-value water issue. The framework, which can be used in NPV analysis and is inclusive of monetary and non-monetary expressions of water value, will be tested within the company starting in 2012.

Other approaches are also being piloted. The company's bauxite operation in Australia's northern region has developed a water sourcing hierarchy that values the sustainability of water taken from the deep Great Artesian Basin and compares it to more easily recharged shallow sources in the region. Another Rio Tinto business has applied a cost-benefit analysis methodology that incorporates the social, environmental and economic costs and benefits to help determine which water management options are the most sustainable in the long-term.

3

STAKEHOLDER ENGAGEMENT

Given the shared nature of water risk and the complex mix of political, social, and environmental values involved, company executives interviewed cited stakeholder engagement as vital in managing water issues. Stakeholder engagement can help companies understand their key water-related impacts, identify risks, and develop innovative solutions to water challenges. To be most effective, companies should recognize that meaningful stakeholder engagement is a two-way street requiring not only communication of the company's views, but also the intention to listen and respond to stakeholder concerns.



STAKEHOLDER ENGAGEMENT

The Company:

- | | |
|-----|---|
| 3.1 | Requires engagement with local communities on water-related issues at existing or potential new direct operations |
| 3.2 | Engages with employees on water issues |
| 3.3 | Works with suppliers to help them improve water management |
| 3.4 | Engages openly with local, regional and national governments to advance sustainable water policies and management |
| 3.5 | Engages with NGOs and community organizations on water issues |
| 3.6 | Engages with other industries/companies/water users |
| 3.7 | Educates customers to help them minimize product impacts |

The Ceres Aqua Gauge identifies several stakeholder groups that should be engaged in managing water issues as relevant:

Local Communities

Companies are intrinsically linked to local communities; they often provide their workforce, share the same water supplies and may be customers for the company's products. The health and sustainability of a local community's water supplies are therefore vitally important to companies and, in some cases, underpin their social license to operate. Companies should thus establish formal policies and appropriate processes for engaging the community about water issues and concerns, and for consulting them in advance of siting or expanding their operations. As part of any consultation process, companies should especially seek to ensure that representatives of all groups within a community that may be affected by a company's operations are involved.

Employees

A company's workforce will often be among the first people affected by changes in the local watershed. Engaging employees, educating them on water-related issues, and encouraging them to be involved in local water management are therefore crucial. Employee engagement at the facility level can help draw attention to potential water issues before they become critical, secure employee buy-in for the company's approach to managing the issues, and spur more sustainable water management practices.

Suppliers

For some companies, supply chain issues may be the primary drivers of water-related risk. Besides setting performance standards for suppliers and monitoring their compliance, companies should engage and support suppliers—through training, technical assistance and financial incentives—to adopt sustainable water management practices. Companies can also support efforts by non-governmental associations (NGOs) or industry associations to improve the water management practices of smaller suppliers, such as farmers.



MITIGATING WATER IMPACTS IN CANADA'S OIL SANDS

For Canadian oil sands producer Suncor, water management has long been an area of focus and concern. Through operational improvements and capital investments in water efficiency and reuse, the company decreased its water use intensity 40% between 2003 and 2010. Nevertheless, the majority of Suncor's water use impacts and risks are related to the company's storage of mining-waste products, referred to as tailings, which traditionally have been disposed of in large ponds.

Each tailings pond that goes unreclaimed after mine closure is a liability—due to long-term operational costs related to monitoring and treating water—and as the company has grown, these liabilities have clearly mounted. At the same time, the water stuck within these tailings ponds represents an asset that could be recycled to offset freshwater use needed for mining operations.

Suncor has been researching, developing and testing its proprietary "TRO" tailings management process, which is expected to allow it to reclaim entire mine sites in a third of the time it now takes. The company plans to invest over \$1 billion by the end of 2011 to implement the TRO process across all of its operations and anticipates reducing the number of tailings ponds in operation at its current mine site from eight to only one—an 80% reduction in land area covered by tailings ponds. Additionally, the company expects to reduce the environmental liabilities associated with its tailings ponds.

Although Suncor has an existing goal to reduce water use by 12% on an intensity basis by 2015, it now believes that it can exceed this goal through further investments in freshwater reuse and access to the water "unlocked" from its reclaimed tailings ponds.

The company also sees opportunities for the oil sands industry to more quickly advance tailings cleanup and increase water reuse. In December 2010, Suncor and six other oil sands companies committed to share their existing research and technology, and to work to remove barriers to collaboration on future R&D projects related to tailings management. Suncor, for its part, is now sharing its TRO technology with industry competitors as well as university and government scientists so the environmental benefits of the innovation can be maximized.

Government

As water supplies become more stressed, governments and regulators will find it increasingly difficult to meet the needs of competing water users while also protecting the environment. By engaging regulators, companies can better track changing trends in the way their use of water is governed, as well as identify opportunities to help support more sustainable public management of water resources. Engagement on public policy issues is not without its own risks, such as public misinterpretation of corporate intent. Therefore companies should carefully plan coherent engagement strategies which are open, transparent and aimed at promoting sustainable water management overall rather than narrow corporate or industry interests.⁵⁴

NGOs/Community Organizations

International environmental and public health non-governmental organizations (NGOs) and campaign groups have long been active on a broad set of issues related to freshwater, and bring expertise and experience working with governments, communities, and other key stakeholders. In addition to these large organizations, which can exert considerable influence on the reputation of major companies, there are also many community-based organizations that play vital roles at the local level. Companies can benefit from the knowledge, expertise, and perspectives of NGOs and community groups and gain insight into and build capacity for managing water risk through dialogue, consultation, and in some cases, strategic partnerships with these organizations.

Other Industries/Water Users

Within a given region or watershed, collaborative action between industry and other water users can be critical to addressing problems related to the health of the shared water resource. On a broader scale, companies can benefit by leading or supporting efforts to work within or across industries to collaboratively address water risks and impacts. Many industries have come together to collectively address sustainability (including water) issues stemming from the nature of their products and processes (e.g. BonSucro, a global multi-stakeholder non-profit organization dedicated to reducing the environmental and social impacts of sugar cane production).

54 The CEO Water Mandate has published a set of guidelines for companies in order to help them responsibly plan and undertake engagement in public water policy. See: http://www.unglobalcompact.org/Issues/Environment/Environment_Guidance_Material.html#ceo_water_mandate.

COLLABORATING TO ADDRESS WATER RISKS IN AGRICULTURE

In 2009, the global brewing company SABMiller, in partnership with the World Wide Fund for Nature (WWF) and the German international development agency GIZ, calculated water footprints for the company's operations and suppliers in Peru, Ukraine, Tanzania and South Africa. One of the goals of the effort was to determine which part of the beer value chain (agriculture, processing, brewing, bottling, or waste disposal) was most water-intensive. The assessment showed that in all four countries agriculture (primarily the cultivation of barley, corn and hops) accounted for over 90% of the water embedded in SABMiller's products.


Beyond understanding where water was used across the value chain, SABMiller and its partners conducted watershed risk assessments in each of the four countries to determine the current status and health of relevant watersheds and water infrastructure, any risks the existing situation posed to the company, and trends in supply and demand (such as climate change and social and economic development) that would affect those risks over the next 20 years. A more detailed, business risk assessment was also conducted that established the potential costs of these risks and the relative cost-benefit of numerous risk mitigation options.

Using these analyses as the business case for action, SABMiller, WWF and GIZ developed appropriate risk mitigation plans with farmers in stressed watersheds. For example, the project is tackling the water efficiency of agricultural suppliers of hops and barley for *Kilimanjaro*, one of Tanzania's most popular beer brands. The project partners are working with farmers to educate them on the value of water conservation (introducing more efficient irrigation techniques and technologies) and providing incentive-based programs for farmers to reduce their water impacts.

These mitigation plans also include efforts to engage regulators and governments to support and participate in efforts to improve local water management. In Tanzania, for example, the partnership is undertaking a program of targeted communications with senior government officials to raise the importance of water resource management. In South Africa it is working with key stakeholders in the Gouritz basin to establish a robust water monitoring system in collaboration with the Department of Water Affairs and other government agencies.

Customers

For many companies, customer product use may represent the bulk of the water consumption and pollution impacts associated with their products. Therefore engaging customers—to educate them about water issues and help them minimize the product's impacts on their local water resources—should be a part of any stakeholder engagement strategy.



Within a given region or watershed, collaborative action between industry and other water users can be critical to addressing problems related to the health of the shared water resource.

4

DISCLOSURE


The company executives interviewed for this study recognized that communicating what they are doing to manage water issues is an important way to build relationships with key stakeholders and a critical part of the process for determining impacts and identifying solutions.

DISCLOSURE
<i>The Company:</i>
4.1 Makes water-related information publicly available
4.2 Includes water data and analysis in published financial filings/reports
4.3 Provides third-party assurance or audits water-related information

The Aqua Gauge builds on this approach by encouraging companies to make water-related information readily available to stakeholders. Specifically, companies should disclose information, both qualitative and quantitative, related to water (including risks, opportunities, management approach, water use, discharge, and impacts). Typical channels for communicating water-related information include but are not limited to: the company’s sustainability or corporate social responsibility report; its response to the Carbon Disclosure Project’s water survey; financial reports and filings; and investor and analyst meetings and calls.

In addition to providing stand-alone information on water, the Aqua Gauge encourages companies to include water and other sustainability metrics in mainstream financial reporting, a practice aligned with the emerging trend of integrated financial reporting.⁵⁵

Finally, companies seeking to demonstrate leadership in water disclosure will verify relevant disclosures, such as data on the company’s direct water use/discharge and impacts, as well as data on the company’s performance relative to any goals on water usage, through an appropriate and independent third party.



ADDRESSING WATER IMPACTS IN THE PAPER INDUSTRY

The Mondi Group, an international paper and packaging company based in South Africa, in recognition that its milling operations can significantly impact surrounding aquatic ecosystems, has made water one of its three critical focus areas. Between 2005 and 2010, the company reduced effluent load (chemical oxygen demand) by 34%, and emissions to water of adsorbable organic halogens (chlorine, fluorine, bromine, and iodine associated with bleaching processes) by 63%.

In 2010, to better understand Mondi’s relationship to and dependence on water resources, the company began systematically analyzing its operational water use. It assessed water consumption at all facilities and compared this data to water scarcity data sets using the WBCSD Water Tool to determine how facility consumption was affecting the local watershed. This year, Mondi is conducting water impact assessments that incorporate historical river flows, lake and

aquifer levels, and water quality violations, social and ecological impacts, and future water availability scenarios to paint a broader picture of Mondi’s interactions with local watersheds.

Mondi is also working to support well functioning wetlands, which in South Africa play a critical role in ensuring sufficient supply of water for the company’s facilities, as well as for its plantations. Through a partnership with the largest NGO conservation groups in South Africa, Mondi is assessing the health of all significant wetlands on land it manages, and strengthening its wetland sustainability practices. These include improved wetland burning regimes and the control of alien invasive plants, as well as the wise use of wetland resources by neighboring tribal communities for cattle grazing and subsistence agriculture. It has almost completed the process of removing all of its commercial trees on, or close to, riparian or wetland areas, which encourages the recovery of natural freshwater.

55 The International Integrated Reporting Committee is working to develop a globally accepted integrated reporting framework, see: <http://www.theiirc.org>.

PRIORITIZING HOLDINGS FOR ASSESSMENT



This chapter lays out a process to help investors identify and prioritize holdings in their portfolios that are more likely to be sensitive to water-related issues. This prioritization process, which looks at both industry sector and geography, can then inform which portfolio companies should be evaluated against the Ceres Aqua Gauge.

Water issues typically manifest themselves in local and complex ways. Large companies do not usually operate in a single watershed; even those that do are linked to other watersheds as a result of their supply chains or the markets they serve. For a given multinational company, the task of identifying and quantifying the financial impact of potential water risks across hundreds of sites and potentially thousands of suppliers is difficult.

Such a task is magnified for asset managers and portfolio investors, who are faced with the challenge of understanding the water risks facing the hundreds (or even thousands) of companies they hold.

This chapter suggests a systematic approach for flagging and prioritizing those holdings in an investment portfolio that are more likely to face the most significant water issues—that is, those holdings for which use of the Aqua Gauge is likely to be most relevant.

A SYSTEMATIC APPROACH

An effective prioritization process needs to enable rapid identification of those companies likely to face material water risks and opportunities. While a broad set of variables are theoretically relevant in determining a company's exposure to water-related risk, the process









suggested here takes a simplified approach, using two independent sets of questions in order to help the investor identify priorities within the portfolio:

- **Sector exposure:** How water-intensive or polluting is the sector (in general) and where in the value chain (e.g., facilities, suppliers or products) might water risks and impacts exist?
- **Geographic exposure:** Does the sector or company have a particular reliance (either through key markets, locations of facilities or suppliers) on regions with water issues?

Prioritization by Sector

Almost all companies are potentially exposed to water issues, regardless of the industry they are in or the production methods they employ. However, certain industries encounter significant water-related challenges, either through their sizable demand (requiring large quantities of water, extremely clean sources of water, or both) or through their wastewater discharges. **Figure 4.1** highlights some of the sectors regularly cited as those most likely to face significant water risks. In each case, we describe the likely water issues in that sector and suggest further reading for those seeking more detail.

Figure 4.1: Water Issues in Key Sectors

SECTOR		KEY WATER ISSUES	FURTHER READING
Agribusiness & Food		<ul style="list-style-type: none"> • Water as a direct input; quality and quantity • Water use and runoff in agricultural production 	<ul style="list-style-type: none"> • <i>Chief Liquidity Series 1, Agribusiness</i>, UNEP-FI • <i>Weeding Risk: Financial Impacts of Climate Change and Water Scarcity on Asia's Food and Beverage Sector</i>, HSBC & World Resources Institute
Beverage		<ul style="list-style-type: none"> • Water as a direct input; quality and quantity • Water embedded in the agricultural supply chain 	<ul style="list-style-type: none"> • <i>Murky Waters: Corporate Reporting on Water Risk</i>, Ceres
Chemicals		<ul style="list-style-type: none"> • Process water for cooling and heating • Spills • Impacts of customer product use 	<ul style="list-style-type: none"> • <i>Murky Waters</i>, Ceres
Electric Power		<ul style="list-style-type: none"> • Cooling water requirements; quantity and temperature • Water for hydroelectricity • Wastewater discharge 	<ul style="list-style-type: none"> • <i>Chief Liquidity Series 2, Power Sector</i>, UNEP-FI • <i>Over Heating: Financial Risks from Water Constraints on Electric Generation in Asia</i>, HSBC & World Resources Institute • <i>The Ripple Effect: Water Risk in Municipal Bonds</i>, Ceres
Metals & Mining		<ul style="list-style-type: none"> • Acid mine drainage • Water for cooling and processing • Dewatering of mines • Tailings ponds 	<ul style="list-style-type: none"> • <i>Scoping Paper on International Water Issues</i>, ICMM • <i>Mine the Gap: Connecting Water Risks & Disclosure</i>, WRI • <i>Chief Liquidity Series 3, Extractives</i> (forthcoming), UNEP-FI
Oil & Gas		<ul style="list-style-type: none"> • Spills • Disposal of produced water • Water needs for extraction, upgrading and refining 	<ul style="list-style-type: none"> • <i>Murky Waters</i>, Ceres • <i>Chief Liquidity Series 3, Extractives</i> (forthcoming), UNEP-FI
Textiles & Apparel		<ul style="list-style-type: none"> • Water embedded in supply chain inputs (e.g., cotton, leather) • Wastewater associated with finishing, dyeing and milling 	<ul style="list-style-type: none"> • <i>Clean by Design: Responsible Sourcing for the Textile Industry</i>, Natural Resources Defense Council
Semiconductors		<ul style="list-style-type: none"> • Large quantities of pure water needed for cleaning wafers • Wastewater management 	<ul style="list-style-type: none"> • <i>Watching Water: A Guide to Evaluating Corporate Risks in a Thirsty World</i>, JP Morgan Global & WRI • <i>Murky Waters</i>, Ceres

The World Wide Fund for Nature (WWF) and German investment bank DEG have identified a list of sectors likely to incur water risk.⁵⁶ We have used this list as the basis for **Figure 4.2**, with the sectors categorized into high, medium and low priority.⁵⁷

This list reflects a broad characterization of these sectors and individual companies could face quite different risks, depending on their geographic exposure, what they produce or sell and where they sit within the value chain. In general:

- **Primary-resource producers** (in mining or agriculture, for example) face risks involving the direct use and pollution of water.
- **Processors** (e.g., in the food industry) and **assemblers** (in manufacturing) tend to be exposed more through the supply chain than their own operations, assuming that those operations are well managed.
- **Consumer-brand owners** are more exposed to reputational risks.
- **Retailers** and other intermediaries generally have lower risks than other participants in the same supply chain, but may also face reputational risks.

Prioritizing by Geography

Water risks manifest themselves as a result of a set of specific circumstances linked to a particular geography. Water issues for businesses in a specific location will be driven by supply and demand and, ultimately, the way in which this balance is managed. Factors affecting supply include, among others, drought, flooding, climate change, pollution and quality of water governance. Demand will be driven by the local environment/ecosystem as well as the social and economic conditions in the area.

It is critical to recognize that the situation is not static. Freshwater resources in many watersheds are increasingly constrained due to rising demand (from a growing population and its desire for goods and services) and varying supply (because of changing patterns of precipitation linked to climate change and rising levels of pollution). Regulators and policymakers therefore have a difficult task in determining how increasingly scarce freshwater resources are to be used and how the conflicting needs of different users and stakeholders are to be met.

The complex nature of local water situations makes it hard to specify from a distance which set of circumstances will create the greatest risks. Classifying

Figure 4.2: High, Medium and Low Priority Sectors

Industry	Risk Profile
Agriculture (plant & animal products)	High
Beverage producers	High
Biomass power production	High
Chemicals	High
Clothing & apparel	High
Electric power production (gas, coal, oil, nuclear)	High
Food producers (incl. tobacco)	High
Food retailers	High
Forestry & paper	High
Freshwater fishing & aquaculture	High
Hydropower production	High
Mining	High
Oil & gas	High
Pharmaceuticals & biotechnology	High
Technology hardware & equipment, semiconductors	High
Water utilities and services	High
Construction & materials	Medium
Gas distribution & multi-utilities	Medium
Manufacturing of: industrial goods, household goods, home construction, personal leisure goods	Medium
Media (printed)	Medium
Real estate	Medium
Transportation (industrial and personal)	Medium
Travel & leisure (non-transportation)	Medium
Financial services, banks, insurance	Low
General retailers (non-food) & storage (warehousing)	Low
Health care & services	Low
Industrial support services, professional service firms, administration, wholesale, trade, education, arts	Low
Media (non-printed)	Low
Renewable power production (e.g. wind, solar)	Low
Salt water fishing and aquaculture	Low
Software & computer services	Low
Telecommunications	Low

Source: WWF/DEG

⁵⁶ The sector definitions are taken from the Industry Classification Benchmark (ICB) developed by Dow Jones and FTSE, and *Nomenclature générale des activités économiques dans les Communautés Européennes (NACE)*, an industry classification taxonomy developed by the EU.

⁵⁷ The WWF/DEG Water Risk Filter will help companies and investors to undertake a more detailed water risk assessment covering all relevant elements of water risk and will be released online in early 2012.

Figure 4.3: Countries with watersheds likely to be exposed to water issues

HIGH PRIORITY		MEDIUM PRIORITY	
Countries* with watersheds facing average water scarcity (the ratio of water consumption to availability)** >3 over the period 1996-2005.		Countries* with watersheds facing average water scarcity (the ratio of water consumption to availability)** between 2-3 for the period 1996-2005.	
Country	Watersheds	Country	Watersheds
Australia	Ashburton, Blackwood, De Grey, Eyre Lake, Fortescue, Gascoyne, Murchison, Murray, Ord	Algeria	Chelif
Chile	Limari, Loa	Botswana	Limpopo
China	Dalinghe, Huang He (Yellow River), Luan He, Tarim, Yongding He	Guinea	Gambia, Geba
India	Brahmani River, Cauvery, Damodar, Ganges, Godavari, Krishna, Indus, Narmada, Mahanadi, Mahi, Penner, Tapi	Guinea-Bissau	Corubal
Israel	Dead Sea	Mali	Senegal River
Jordan	Dead Sea	Mauritania	Senegal River
Mexico	Armeria, Bravo, Concepcion, Panuco, Santiago, Yaqui	Mozambique	Limpopo
South Africa	Doring, Groot-Kei, Groot-Vis, Limpopo	Pakistan	Indus
United States	Brazos, Colorado, Nueces, Salinas, San Antonio, San Joaquin, San Pedro, Verde	Peru	Chira
		Portugal	Guadiana
		Russia	Palyavaam
		Senegal	Gambia, Geba, Senegal River
		Spain	Guadalquivir, Guadiana
		Thailand	Chao Phraya

*Countries that had watersheds with both average water scarcity ratios between 2-3 and >3, are listed in the "High Priority" table.

**The average water scarcity ratio, also known as the average "blue water" scarcity ratio, is the ratio between the total blue water consumed in a watershed and the available blue water resources (taking into account environmental flow requirements).

Source: Hoekstra, A.Y. and Mekonnen, M.M., Global water scarcity: monthly blue water footprint compared to blue water availability for the world's major river basins, 2011, Value of Water Research Report Series No. 53, UNESCO-IHE, Delft, the Netherlands.

individual countries as definitively low or high risk may be over-simplifying and potentially misleading, especially for large countries, where water realities may differ substantially from one region to another.

However, there are clearly countries and watersheds where water issues are already prevalent and where many companies have already been affected. **Figure 4.3** outlines countries with watersheds having very high water scarcity. This list only reflects water availability and does not reflect water quality or regulatory/governance issues. As such, it is intended to be a rough guide only, providing the investor with a directional view on where water is likely to be a priority issue. For those seeking additional indicators and data sources, **Appendix B** provides a list of geographic water risk assessment resources.

For a given company, priorities are assigned by assessing the company's exposure to, or reliance on, these geographies. The complexity arises from the need to assess geographic dependence across three areas:

- **Direct operations:** Does the company have a significant number of (critical) facilities relying on water sources in any of the countries/watersheds listed?
- **Supply chain:** Does the company source a significant proportion of its inputs from the countries/watersheds listed?
- **Customers:** Does the company generate a large proportion of its revenue in any of the countries/watersheds listed?

For some companies, analyzing geographic dependence and answering the questions above may be a relatively straightforward task. For many companies, particularly those with complex supply chains or those relying on international commodity markets, the process to develop specific answers may be arduous. In general, however, a large and diverse range of company sites and a wide range of potential supply chain sources reduce the overall risk to the company and to the investor. The companies likely to face the greatest risks are those that are focused in a limited geographic area or are dependent on a few critical suppliers for key products (such as certain varieties of crops or complex products with only one source). Such risks may be easier to identify and analyze.

IDENTIFYING PRIORITIES

The matrix shown in **Figure 4.4** brings together the sector and geographic prioritizations to provide an overall assessment of which companies are likely to face higher risks and therefore should be subject to further review using the Aqua Gauge. Companies evaluated on their sector and geographic exposure will fall into three different categories (shown in the matrix as red, orange or green).

Figure 4.4: Prioritization Matrix

SECTOR	GEOGRAPHY		
	Low Priority	Medium Priority	Highest Priority
Highest Priority	Potential Priority	Priority Company	Priority Company
Medium Priority	Not Priority	Potential Priority	Priority Company
Low Priority	Not Priority	Not Priority	Potential Priority

High Priority Companies (Red)

Companies in high priority sectors and with exposure to high priority regions should immediately raise a flag for investors. This would apply, for example, to a mining company with significant operations in South Africa. In such a case, the investor should proceed directly to applying the Aqua Gauge as outlined in **Chapter 2**. Similarly, companies that combine a high

priority classification in one dimension with a medium priority in the other should also be flagged for further investor examination.

Medium Priority (Orange)

Companies classified as medium priority on both dimensions of the framework require further work to determine whether they warrant detailed review. Additional questions that could help the investor in this determination include:

- Is there evidence that the company has existing water issues or a track record of non-compliance?
- Has the company been excluded from existing sustainability indices or rankings on grounds of water performance/management?
- Is the company dependent on raw materials or commodities known to be water-intensive or to have significant water impacts?

If the answers to these questions are positive, the company should be prioritized for further assessment under the Aqua Gauge.

Note that companies in high priority sectors operating in low priority geographies should be subject to a full assessment using the Aqua Gauge unless there are clear reasons why such an analysis is not required. Conversely, for those companies in high priority geographies and that operate in low priority sectors, an assessment with the Aqua Gauge generally should not be necessary unless there are clear reasons why it would add particular insight or value.

Low Priority (Green)

Companies falling in the green segments of the matrix should not generally require analysis under the Aqua Gauge unless the company is facing a particular set of circumstances that the investor believes is driving significant exposure to water-related risks.

For all companies classified under the matrix, it should be noted that the intention of the process is to guide investor attention toward those companies that are more likely to face water-related risks. The prioritization process is not intended to serve as a proxy for a detailed risk assessment; it says nothing about the frequency, likelihood, or potential impact of water issues for these companies. Thus not all companies classified as high priority will face significant water risks, nor will low priority companies be immune to them.

DETAILS OF THE CERES AQUA GAUGE



The Ceres Aqua Gauge provides a corporate-level view on water risk management, and divides associated activities into four key areas: 1) measurement, 2) management, 3) stakeholder engagement, and 4) disclosure. Each of these four areas is then further subdivided into specific management activities that are detailed on the following pages.

For each activity in the Aqua Gauge, investors can assess a company's progress against four stages on the journey to leading practice.

- **No Action:** No evidence that the company has taken action in this area.
- **Initial Steps:** Action has been taken but the company is only beginning to implement the practice.
- **Advanced Progress:** Action has been taken and good progress toward leading practice has been made, but gaps still exist in the company's approach.
- **Leading Practice:** Action is consistent with what leading companies are doing, and are aspiring to do, in this area.

Within the Aqua Gauge, management activities of specific relevance to companies with water risk-exposed direct operations, supply chains, or products are indicated, to help guide the investor in assessing those management practices that are most critical to the company in question.

In addition, for each management activity it has been noted where the investor might look for this information (or where the company might disclose it) by indicating the most relevant CDP Water Survey questions or Global Reporting Initiative (GRI) indicators.

Please note that the Excel-version of this tool (available at www.ceres.org/aquagauge) includes a rapid assessment option (the "Quick Gauge") that can be used as a first step in identifying weaker performers. The Quick Gauge walks the user through a short set of questions to assess if a company has implemented a core set of basic water management practices, and through this process flags companies deserving of further analysis and engagement.

GUIDANCE FOR APPLYING THE AQUA GAUGE

- **Water is one of many critical environmental and social issues that can materially affect company performance.** The Aqua Gauge is specifically designed to help investors assess a company's response to water issues. Water management is not only a complex undertaking, but is also linked to a wide range of other business, environmental, and social issues. These include energy availability and use, biodiversity, food security, and human health. While this tool is focused on water, it is important to recognize that water should be managed in a way that optimizes performance across the full range of business issues so as to avoid undesirable or unforeseen impacts that could expose a company to greater risk.
- **Investors should ensure companies are managing the full range of water risks and identifying water-related opportunities.** Water risks and opportunities include not only the effects of water scarcity, but also those of water quality and excess water. Water quality can be critical for many businesses, but its importance is often only recognized when water of suitable quality is no longer available. Poor water quality can raise costs, degrade product quality, and potentially disrupt operations. An excess of water also poses risks to companies. Floods can arise not only because of extreme weather, but also from man-made developments and seawater ingress. Additionally, increasing demand for water globally can create opportunities for businesses to provide new products or services, differentiate themselves from competitors based on water efficiency, and/or re-engineer processes to save water, energy, and money.

→ **The Aqua Gauge is designed to be applicable to all sectors (with the exception of the water utility sector), but some management activities will be more important for certain sectors and geographies than others.** This tool is consistent with an enterprise risk management approach to setting priorities. Therefore, most activities identified in the tool should be relevant and considered for all sectors. Some companies may deem action on a particular area of the framework to be inapplicable to their circumstances or unjustified. Investors should ensure that such actions really are not relevant to the circumstances of the particular company. Each aspect of the framework has been labeled to indicate the part of the business to which a particular action is most relevant.

→ **Very few companies will attain “leading practice” on all management activities in the Aqua Gauge.** While there is at least one company that is achieving elements of every leading practice listed, attainment of leading practice is likely to remain an aspiration for many companies for some time yet. Moreover, investors should recognize that achieving leading practice in every aspect of the framework may not be appropriate, material, or cost-effective for some companies. An integrated approach to addressing material sustainability impacts and risks should help both companies and investors to correctly and efficiently prioritize action.

→ **The Aqua Gauge makes no specific reference to timescales and is applicable to both long- and short-term issues.** Some water-related risks and opportunities may materialize in the short term while others will only affect business in the long run. Regardless of timeframe, these issues require assessment now. In assessing risk, companies (and investors) should consider not only the current situation, but also how changes in the business environment, demands from society and changes in the environment itself could affect water-related risks and opportunities. For some companies, the timescales that should be considered may be relatively short, but for others, the risk may need to be considered over several decades.

→ **Where possible, this tool uses terminology that is consistent with common usage and with other tools and initiatives.** In particular, the terminology aligns with that used by the Ceres Roadmap for Sustainability, the World Business Council for Sustainable Development, the CDP Water Survey, and the UN’s CEO Water Mandate.

MEASUREMENT						
ACTIVITY	INITIAL STEPS	ADVANCED PROGRESS	LEADING PRACTICE	SPECIFIC RELEVANCE	GUIDANCE NOTES	DISCLOSURE REFERENCE
Data Gathering						
1.1 Collects and monitors data on the company’s own regulatory compliance, water use, and discharge	Company compiles and monitors data on regulatory compliance, water withdrawals, water consumption, and wastewater discharge for some of its direct operations.	Company compiles and monitors data on regulatory compliance, water withdrawals, water consumption, and wastewater discharge for all direct operations.	Company compiles and monitors data on regulatory compliance, water withdrawals, water consumption, water reuse/recycling, and wastewater discharge for all direct operations.	Direct Operations	<ul style="list-style-type: none"> • Direct operations include any facilities that are: <ul style="list-style-type: none"> - Majority-owned; - Operated by a joint venture of which the company holds a >50% stake; - Contractually required to follow the direction of the company; - An operation where the company has a significant shareholding; or, - In the company’s sphere of influence or control with respect to operational activities. • A well-founded omission of some facilities because they are not material should not preclude a company from achieving “advanced progress” or “leading practice” status. 	CDP Water Disclosure Q7.1, 7.2, 7.3, 8 GRI EN8, EN10, EN21

MEASUREMENT

ACTIVITY	INITIAL STEPS	ADVANCED PROGRESS	LEADING PRACTICE	SPECIFIC RELEVANCE	GUIDANCE NOTES	DISCLOSURE REFERENCE
Data Gathering						
1.2 Collects and monitors data on the company's environmental and social impacts on direct water sources	Company identifies key sources of water for some direct operations and tracks some data related to the company's environmental and social impacts on these sources.	Company identifies key sources of water for all direct operations and tracks a range of data related to the company's environmental and social impacts on these sources.	Company identifies all sources of water for all direct operations and tracks a range of data related to the company's environmental and social impacts on these sources.	Direct Operations	<ul style="list-style-type: none"> Environmental impacts include pollution, over-abstraction, redirection of natural watercourses (especially from one watershed to another), disruption to the timing and intensity of environmental flows, and related impacts on biodiversity and ecosystem health. Social impacts include the consequences of environmental impacts (e.g., changes in access to clean water, and related impacts on human health and well-being, costs to the local community, cultural or religious issues, etc), but also include other effects such as restrictions on access to water, costs and charges, impacts or limitations on other economic activities. 	CDP Water Disclosure Q7.4 GRI EN9, EN25
1.3 Collects and monitors data on external factors affecting direct water sources	Company identifies and tracks some external factors currently affecting the quality and availability of water sources for key facilities.	Company identifies and tracks a wide range of external factors affecting current and future sustainability of water sources for key facilities.	Company identifies and tracks a wide range of external factors affecting the current and future sustainability of all water sources upon which the company's direct operations rely.	Direct Operations	<ul style="list-style-type: none"> Potential factors and trends include, but are not limited to: <ul style="list-style-type: none"> - Climate change - Economic and social development - Public policy - Supply/treatment costs - Impacts of other users Sources for some of this data can be found in a number of the water risk assessment tools discussed in Guidance Note 1.6. However, companies may also need to seek out local sources for this data from facility management and/or local government and stakeholders. 	CDP Water Disclosure Q2.2
1.4 Collects and monitors data on stakeholder perceptions and concerns related to water issues	Company monitors attitudes and concerns of some key stakeholders on a proactive, but ad hoc basis.	Company monitors attitudes and concerns of some key stakeholders on a proactive and systematic basis.	Company monitors attitudes and concerns of all key stakeholders on a proactive and systematic basis.	All	<ul style="list-style-type: none"> The nature and quantity of data being tracked should be appropriate to the particular industry or geography. Stakeholders could include customers, NGOs, local communities (councils, chambers of commerce, other community leaders), etc. Proactive in this case implies actively seeking out stakeholder views directly and going beyond simply monitoring of the press. 	CDP Water Disclosure Q2.2, 1.2

MEASUREMENT

ACTIVITY	INITIAL STEPS	ADVANCED PROGRESS	LEADING PRACTICE	SPECIFIC RELEVANCE	GUIDANCE NOTES	DISCLOSURE REFERENCE
Data Gathering						
1.5 Collects and monitors data on the effectiveness of suppliers' water management practices	Company monitors public or third-party compiled information on the water management practices of some suppliers, including data on compliance, water use and discharges.	Company requests and assesses some information on water management practices (as well as compliance, water use, and discharges) from all direct or single source suppliers identified as water-intensive or likely to be a source of water risk.	Company requests, assesses, and monitors a range of information on water management practices (as well as compliance, water use, and discharges) from all direct or single source suppliers identified as water-intensive or likely to be a source of water risk.	Supply Chain	<ul style="list-style-type: none"> Leading practice requires assessment of suppliers against a recognized and comprehensive water management framework. One possible approach would be for companies to apply the Aqua Gauge framework to their suppliers. "Single source" suppliers are those that are the sole source of a particular raw material or purchased good for the company. 	CDP Water Disclosure Q3.3, 3.4
Risk Assessment						
1.6 Identifies and quantifies water-related risks in direct operations	Company uses third-party tools or data sets (or equivalent internal tools) to identify all direct operations located in areas of water scarcity.	Company uses third-party tools or data sets (or equivalent internal tools) to identify all direct operations in areas of potential water risk (including scarcity, quality, regulations or other factors).	Company combines recognized third-party tools or data sets (or equivalent internal tools) on water risk with own data on company's current water use and impacts, as well as potential future changes in water availability, quality, regulations and demand / competition to develop a detailed understanding of current and potential future water risks.	Direct Operations	<ul style="list-style-type: none"> There are various tools and methodologies that individual companies can use to diagnose and track risks, including one or more of the following: <ul style="list-style-type: none"> - WBCSD's Global Water Tool - GEMI's Local Water Tool - Integrated Biodiversity Assessment Tool (iBAT) - Water Footprint Assessment - WRI's Aqueduct - WWF/DEG Water Filter In some cases, companies may be using third-party tools or data sets or may have developed their own tools that combine elements of those listed above. 	CDP Water Disclosure Q3.1, 3.2, 4
1.7 Identifies and quantifies water-related risks in the supply chain	Company uses third-party tools or data sets (or equivalent internal tools) to identify direct suppliers and key raw materials sourced from areas of water scarcity.	Company uses third-party tools or data sets (or equivalent internal tools) to identify all material direct suppliers, major indirect suppliers and/or raw materials sourced from areas of water risk (including scarcity, quality, regulations or other factors).	Company uses data on all material direct suppliers, major indirect suppliers and key raw materials located in areas of current and future water stress, together with supplier data on water use, impacts, and management to develop a detailed understanding of current and future water risks in the supply chain.	Supply Chain	Some companies will have long and opaque supply chains. Some will find it extremely difficult to trace the origin of the commodities they source. Investors should recognize the nascent state of supply chain risk analysis when examining company actions in this area.	CDP Water Disclosure Q3.4, 4

MANAGEMENT

ACTIVITY	INITIAL STEPS	ADVANCED PROGRESS	LEADING PRACTICE	SPECIFIC RELEVANCE	GUIDANCE NOTES	DISCLOSURE REFERENCE
Governance & Accountability						
2.1 Clarifies board responsibilities for oversight of water	Board or board committee is occasionally briefed on water-related risks and opportunities.	Board or board committee has formal and explicit oversight of all significant water-related issues and is occasionally briefed on water-related risks and opportunities.	Board or board committee has formal and explicit oversight of all significant water-related issues and is regularly briefed on water-related risks and opportunities.	All	For briefings to be more than “occasional” they should be at least every year and be part of the pre-planned board schedule.	CDP Water Disclosure Q1.1a
2.2 Involves senior executives directly in management of water-related issues	Executive management committee or committee member has explicit oversight over strategic water management.	Executive management committee or committee member has explicit oversight of strategic water management and there are clear lines of responsibility between the committee and responsible site-level personnel.	Executive management committee or committee member has explicit oversight of all strategic water-related issues and there are clear lines of responsibility between the committee and responsible site-level personnel. Water is explicitly part of sustainability scorecarding for pay or incentive compensation of senior executives and key managers.	All	As part of “leading practice,” the sustainability component of compensation should ideally be linked to a set of key environmental and social performance measures, water being just one.	CDP Water Disclosure Q1.1a
2.3 Aligns public policy positions and lobbying with water stewardship goals	Company’s public policy positions and lobbying are consistent with its own stated water stewardship goals.	Company’s public policy positions and lobbying are consistent with both its own stated water stewardship goals and with internationally recognized water stewardship and development goals.	Company’s public policy positions and lobbying are consistent with both its own stated water stewardship goals and with internationally recognized water stewardship and development goals. Company also works to encourage wider (industry) adoption of policy positions consistent with internationally recognized water stewardship and development goals.	All	Internationally recognized water stewardship and development goals could include Integrated Water Resources Management (IWRM), the Millennium Development Goals, or the Ruggie Framework for Business and Human Rights	CDP Water Disclosure Q1

MANAGEMENT

ACTIVITY	INITIAL STEPS	ADVANCED PROGRESS	LEADING PRACTICE	SPECIFIC RELEVANCE	GUIDANCE NOTES	DISCLOSURE REFERENCE
Policies & Standards						
2.4 Has a publicly available water policy and recognizes the importance of water to the business	The company has an easily identifiable, publicly available policy on water that sets out clear goals and guidelines for action.	The company has an easily identifiable, publicly available policy on water that sets out clear goals and guidelines for action and has publicly demonstrated a commitment to water.	The company has an easily identifiable, publicly available policy on water that sets out clear goals and guidelines for actions and has publicly demonstrated a commitment to water. Company recognizes its responsibility to respect the human right to water and sanitation.	All	<ul style="list-style-type: none"> Public demonstration of a commitment to water could include for example: <ul style="list-style-type: none"> - Participation in the CEO Water Mandate or similar initiatives - Statements from senior decision-makers or board members A company's water policy may also be part of a wider commitment or policy on sustainability issues, but it should get specific mention if this is the case. Similarly, recognition of the human right to water may be recognized as part of a broader human rights policy. 	CDP Water Disclosure Q1.1a
2.5 Sets performance standards and goals on water withdrawals / consumption for direct operations	Company has set targets for reductions in water withdrawals / consumption at some facilities.	Company has set business-wide targets for reductions in water withdrawals / consumption for all facilities.	Company has set business-wide targets for reductions in water withdrawals / consumption for all facilities, and for facilities deemed high risk, has set more aggressive targets.	Direct Operations	<ul style="list-style-type: none"> Overall, absolute reduction targets are preferable, but targets set may be efficiency-oriented or absolute, based on relative risk facing specific facilities. Leading Practice requires more aggressive targets for high-risk sites than targets set for the business as a whole. 	CDP Water Disclosure Q1.1b, 1.1c
2.6 Sets performance standards and goals on wastewater discharge for direct operations	Company systematically meets or exceeds wastewater compliance requirements at all sites. Company has set a global wastewater standard that exceeds local regulatory compliance requirements for some facilities.	Company systematically meets or exceeds wastewater compliance requirements at all sites. Company has set a global wastewater standard that exceeds local regulatory compliance requirements for most facilities.	Company systematically meets or exceeds wastewater compliance requirements at all sites. Company has set a global wastewater standard at least equivalent to the most stringent regulatory wastewater standards faced by its facilities globally.	Direct Operations		CDP Water Disclosure Q1.1b, 1.1c

MANAGEMENT

ACTIVITY	INITIAL STEPS	ADVANCED PROGRESS	LEADING PRACTICE	SPECIFIC RELEVANCE	GUIDANCE NOTES	DISCLOSURE REFERENCE
Policies & Standards						
2.7 Requires direct operations to develop plans to address local watershed risks	Some facilities in areas deemed high risk are required to develop source water protection plans that address critical external water risks, and include plans to engage key local stakeholders and support projects that improve conditions for the watershed(s) supplying or affected by each facility.	All major facilities in areas deemed high risk are required to develop source water protection plans that address critical external water risks, and include plans to engage key local stakeholders and support projects that improve conditions for the watershed(s) supplying or affected by each facility.	All facilities are required to develop source water protection plans that address critical external water risks, and include plans to engage key local stakeholders and support projects that improve conditions for the watershed(s) supplying or affected by each facility.	Direct Operations		CDP Water Disclosure Q1.2
2.8 Addresses sustainable water management in supplier standards and codes, and in procurement and contracting practices	For major direct suppliers identified as water-intensive or likely to be a source of water risk, company has set a water use standard and/or a global wastewater standard. Supplier code of conduct or policy references water.	For major direct suppliers identified as water-intensive or likely to be a source of water risk, company has set a water use standard and a wastewater standard that meets or exceeds local compliance for that supplier's facilities. Supplier code of conduct or policy references water and company integrates supplier water performance into procurement and contracting practices for major contracts.	For major direct suppliers identified as water-intensive or likely to be a source of water risk, company has set a water use standard and a wastewater standard that meets or exceeds local compliance for that supplier's facilities. Company requires such suppliers to have their own water management program that imposes comparable standards on their own suppliers. Company systematically integrates supplier water performance into policies, procurement and contracting practices.	Supply Chain	<ul style="list-style-type: none"> Company procurement and contracting policies which might reflect water include Requests For Proposals (RFPs), vendor selection and re-assessment criteria, etc. 	CDP Water Disclosure Q1.2

MANAGEMENT

ACTIVITY	INITIAL STEPS	ADVANCED PROGRESS	LEADING PRACTICE	SPECIFIC RELEVANCE	GUIDANCE NOTES	DISCLOSURE REFERENCE
Business Planning						
2.9 Considers water in business planning and investment decision-making	Company considers water issues in major investments in areas identified as high water risk.	Company considers water issues in all major investments.	Company takes full consideration of water risks and opportunities, including well-founded values for water, in all major decisions, as well as systematic planning and budgeting. Water risks are integrated into the company's enterprise risk management system.	All	<ul style="list-style-type: none"> Major investment decisions could include, among others: acquisitions, capital investments, siting of facilities and contracts with major suppliers. Water is an undervalued resource. However, investors should recognize that reflecting the true value of water in decision-making is a complex undertaking. Simply including the explicit cost for water does not necessarily mean that the company is dealing adequately with the issue; in nearly all cases the value of adequate, clean water supplies to a business will be far in excess of the price it actually pays for that water. The value of water is itself only one of several ESG factors that should be considered in any major investment decision. 	CDP Water Disclosure Q1
2.10 Considers water in product design and development	Company assesses life-cycle water impacts of some products and has stated goal to reduce life-cycle use of water for selected products.	Company assesses life-cycle water impacts of key products and has systematic program to reduce the life-cycle water impacts of products with high impact or with significant use in water-stressed areas.	Company has program to assess life-cycle water impacts of all significant products and has systematic program to reduce the life-cycle water impacts of all significant products.	Product	While the consideration of water issues in product development is more important for some sectors than others, all businesses should consider the impact of their products and services on water, even if the conclusion is that there is no impact or risk.	CDP Water Disclosure Q5
2.11 Identifies water-related business opportunities	Company has publicly acknowledged the potential for water-related opportunities and has credible plan for future development.	Company has publicly acknowledged the potential for water-related opportunities and is demonstrably working to develop new business opportunities that address water issues.	Company has a clear strategy for identifying, funding, and launching water-related opportunities and has set goals related to revenue or profit from new business opportunities.	Product	Business opportunities can include new products and processes, as well as the benefits from better stewardship of water either in reduced costs, enhanced brand equity, improved stakeholder relations or other business benefits.	CDP Water Disclosure Q5

STAKEHOLDER ENGAGEMENT

ACTIVITY	INITIAL STEPS	ADVANCED PROGRESS	LEADING PRACTICE	SPECIFIC RELEVANCE	GUIDANCE NOTES	DISCLOSURE REFERENCE
3.1 Requires engagement with local communities on water-related issues at existing or potential new direct operations	Facility personnel consult with communities in advance of siting or expanding operations in full compliance with local regulatory requirements. Facility personnel work on external water projects that benefit local communities.	Facility personnel consult with communities in advance of siting or expanding operations as part of an established company process that meets or exceeds regulatory requirements. Facility personnel engage with communities on a systematic basis and are involved in external projects that contribute to local sustainable water management and/or access to water and sanitation.	Facility personnel consult with communities in advance of siting or expanding operations as part of an established company process that exceeds regulatory requirements in most locations, and is consistent with the intent of free, prior and informed consent (FPIC). Facility personnel engage with communities on a systematic basis and are involved in external projects that contribute to local sustainable water management and/or access to water and sanitation.	Direct Operations	<ul style="list-style-type: none"> Stakeholder engagement is a two-way process and requires both communication of company position and the intention to listen as well as respond to stakeholder concerns. Resources for stakeholder engagement include the AA1000 Stakeholder Engagement Standard and the International Finance Corporation's Stakeholder Engagement Principles and Handbook. 	CDP Water Disclosure Q1.2
3.2 Engages with employees on water issues	Company has taken some steps to engage and/or educate employees on water issues.	Company has a business-wide program designed to engage and educate employees, and encourage them to take ownership of water issues.	Company has a business-wide program designed to engage and educate employees, and encourage them to take ownership of water issues. Provides employees education and incentives to reduce their personal water footprint.	All	<p>Employee engagement could cover, among other things:</p> <ul style="list-style-type: none"> Why water is an important issue Water issues in the business (across factory, supply chain and customers) Water issues in the local environment/watershed What employees can do in the business and outside to make a difference 	CDP Water Disclosure Q1.2
3.3 Works with suppliers to help them improve water management	Advises and works with some direct suppliers to improve their water management.	Actively advises and works with key suppliers (or supplier groups) identified as water-intensive or likely to be a source of water risk to improve their water management. Works with or funds efforts by industry associations and NGOs to improve the water management practices of water-intensive, smaller suppliers	Actively advises and works with all key suppliers (or supplier groups) to improve their water management. Systematically works with or funds efforts by industry associations or NGOs to improve the water management practices of water-intensive, smaller suppliers.	Supply Chain		CDP Water Disclosure Q1.2

STAKEHOLDER ENGAGEMENT

ACTIVITY	INITIAL STEPS	ADVANCED PROGRESS	LEADING PRACTICE	SPECIFIC RELEVANCE	GUIDANCE NOTES	DISCLOSURE REFERENCE
3.4 Engages openly with local, regional and national governments or regulators to advance sustainable water policies and management	Takes steps to plan a coherent engagement strategy on water policy that is fully transparent and is aimed at promoting sustainable water management.	Engages on water-related public policy issues in watersheds deemed high risk. Engagement is in line with the business' overall engagement strategy on water policy, is fully transparent and is aimed at promoting sustainable water management.	Engages on water-related public policy issues in areas deemed high risk, as well as on a national or global level. Engagement is in line with the business' overall engagement strategy on water policy, is fully transparent and is aimed at promoting sustainable water management.	All	Engagement with regulators and governments should be pre-planned and follow a well-considered, coherent strategy. The CEO Water Mandate has published a set of guidelines for companies in order to help them plan and undertake engagement in water policy. See: http://www.unglobalcompact.org/Issues/Environment/Environment_Guidance_Material.html#ceo_water_mandate	CDP Water Disclosure Q1.2
3.5 Engages with NGOs and community organizations on water issues	Engages with NGOs and community organizations on an ad hoc basis to undertake specific actions on water.	Engages with NGOs and community organizations systematically, either on an informal basis (such as regular dialogue) or a formal basis (partnership), to undertake specific actions on water.	Engages formally (e.g. partnership, specific projects, etc) with NGOs and community organizations on water issues relevant to the company's core business/areas of operation.	All		CDP Water Disclosure Q1.2
3.6 Engages with other industries/ companies/ water users	Engages with other companies, users or industry efforts on an ad hoc basis to address water risks and impacts.	Supports or participates in efforts to work within or across industries to address water risks and impacts in some areas of the business, and engages with other users on an ad hoc basis.	Actively leads efforts to work within or across industries to address water risks and impacts. Collaborates with other companies and water users in key watersheds to drive improved stewardship within the watershed. Shares water-related tools and non-commercially sensitive information with others in industry or watershed.	All		CDP Water Disclosure Q1.2

STAKEHOLDER ENGAGEMENT

ACTIVITY	INITIAL STEPS	ADVANCED PROGRESS	LEADING PRACTICE	SPECIFIC RELEVANCE	GUIDANCE NOTES	DISCLOSURE REFERENCE
3.7 Educates customers to help them minimize product impacts	Makes information available to customers on how to minimize water impacts associated with the use of some high water impact/intensive products.	Systematically provides information to all customers on how to minimize water impacts associated with the use of highest water impact/intensive products. Has active program of education and engagement for most customers on the benefits of effective water management related to the company's products.	Systematically provides information to all customers on how to minimize water impacts associated with the use of all high water impact/intensive products. Has active program of education and engagement for most customers on the benefits of effective water management related to the company's products. Where relevant, provides mechanisms for product take-back to help customers responsibly manage end-of-life product impacts.	Product	Information provided to customers should highlight potential trade-offs with other factors (such as changes in energy consumption) as a result of changes in water use.	CDP Water Disclosure Q1.2

DISCLOSURE









ACTIVITY	INITIAL STEPS	ADVANCED PROGRESS	LEADING PRACTICE	SPECIFIC RELEVANCE	GUIDANCE NOTES	DISCLOSURE REFERENCE
4.1 Makes water-related information publicly available	Company discloses some qualitative and quantitative information related to water (use, discharge, impacts, management approach, etc.).	Company discloses comprehensive qualitative and quantitative information related to water (risks, opportunities, management approach, water use, discharge, impacts, etc.).	Company discloses comprehensive and forward-looking qualitative and quantitative information related to water (risks, opportunities, management approach, water use, discharge, impacts, etc.).	All	<ul style="list-style-type: none"> Channels for making data publicly available include, but are not limited to: <ul style="list-style-type: none"> - Sustainability/ CSR report - CDP Water Disclosure initiative - CEO Water Mandate Communication on Progress (relevant for signatories of the Mandate) - Company website - Annual report - Regulatory filings - Analyst meetings and presentations Quantitative information should ideally include the Global Reporting Initiative's core and additional indicators on water. Companies are encouraged to present data in a way that allows investors to assess performance of facilities in water-stressed or higher risk geographies vs. a corporate-wide average. While disclosure standards and metrics are changing and improving from year-to-year, where practical, companies should disclose how the metrics chosen compare to prior years and to other comparable companies. 	NA
4.2 Includes water data and analysis in published financial filings/reports	Company complies with minimum financial disclosure requirements relevant to water.	Company assesses materiality of all water-related risks in developing its securities filings or annual report.	Company integrates discussion of material water risks and opportunities, along with quantitative performance data and goals into its securities filings or annual report, demonstrating the linkages to strategy, governance and financial performance.	All	Integrated financial and sustainability reporting is a rapidly evolving trend. The International Integrated Reporting Committee is working to develop a globally accepted integrated reporting framework and is a good resource on the latest developments. See: http://www.theiirc.org	NA

DISCLOSURE

ACTIVITY	INITIAL STEPS	ADVANCED PROGRESS	LEADING PRACTICE	SPECIFIC RELEVANCE	GUIDANCE NOTES	DISCLOSURE REFERENCE
4.3 Provides third-party assurance or audits water-related information	Assurance on some data related to the company's direct water use / discharge and impacts is provided by an appropriate and independent third party.	Assurance on all data related to the company's direct water use/discharge and impacts is provided by an appropriate and independent third party.	Assurance is provided on all data related to the company's direct water use / discharge and impacts, as well as the company's performance relative to any goals, by an appropriate and independent third party.	Direct Operations		CDP Water Disclosure Q17.1

INVESTOR & CORPORATE RESOURCES ON WATER

INDUSTRY REPORTS

SECTOR	STUDIES & REPORTS
 Agribusiness & Food	<ul style="list-style-type: none"> • <i>Chief Liquidity Series 1, Agribusiness</i>, UNEP-FI • <i>Weeding Risk: Financial Impacts of Climate Change and Water Scarcity on Asia's Food and Beverage Sector</i>, HSBC & World Resources Institute
 Beverage	<ul style="list-style-type: none"> • <i>Murky Waters: Corporate Reporting on Water Risk</i>, Ceres
 Chemicals	<ul style="list-style-type: none"> • <i>Murky Waters</i>, Ceres
 Electric Power	<ul style="list-style-type: none"> • <i>Chief Liquidity Series 2, Power Sector</i>, UNEP-FI • <i>Over Heating: Financial Risks from Water Constraints on Electric Generation in Asia</i>, HSBC & World Resources Institute • <i>The Ripple Effect: Water Risk in Municipal Bonds</i>, Ceres
 Metals & Mining	<ul style="list-style-type: none"> • <i>Scoping Paper on International Water Issues</i>, ICMM • <i>Mine the Gap: Connecting Water Risks & Disclosure</i>, World Resources Institute • <i>Chief Liquidity Series 3, Extractives</i> (forthcoming), UNEP-FI
 Oil & Gas	<ul style="list-style-type: none"> • <i>Murky Waters</i>, Ceres • <i>Chief Liquidity Series 3, Extractives</i> (forthcoming), UNEP-FI
 Textiles & Apparel	<ul style="list-style-type: none"> • <i>Clean by Design: Responsible Sourcing for the Textile Industry</i>, Natural Resources Defense Council
 Semiconductors	<ul style="list-style-type: none"> • <i>Watching Water: A Guide to Evaluating Corporate Risks in a Thirsty World</i>, JP Morgan Global & World Resources Institute • <i>Murky Waters</i>, Ceres

WATER RISK ASSESSMENT TOOLS & FRAMEWORKS

TOOL	AUDIENCE	FUNCTION	DETAILS
GEMI Local Water Tool (LWT)[™]	Business	Helps companies understand current and emerging water impacts and risks as they relate to their operations, needs, and circumstances	In development. The GEMI Local Water Tool (LWT) [™] is an interactive, downloadable tool that helps companies conduct systematic assessments of their relationship to water in order to create site-specific sustainable water management strategies. It provides companies the ability to identify risks at a global level and then drill down to further evaluate water risks and opportunities to take action on a local level. Anticipated release: March 2012 www.gemi.org/localwatertool
Water Footprint Network's Water Footprint Assessment Standard	Business	Provides a methodology to help companies evaluate the water risks and impacts of a facility at a watershed level	Publicly available. The Water Footprint Assessment Standard helps companies identify the environmental conditions of the specific water bodies (i.e., river, lake, aquifer) on which they rely, the contribution of the company's water use to that stress, and the likely ecological and social impacts that are emanating from that stress. http://www.waterfootprint.org
World Business Council for Sustainable Development's (WBCSD) Global Water Tool	Business & Investors	Maps company facilities located in areas of water scarcity or stress and identifies "hot spots"	Publicly available. The WBCSD Global Water Tool allows companies and investors to compare a company's water use with validated water and sanitation availability information on both a country and watershed basis. The tool contains almost 30 external data sets, including access to water and sanitation, projected actual renewable water resources per inhabitant for 2025 and 2050, urban annual growth rates, areas of physical and economic water scarcity, desalinated water production, environmental water scarcity by basin, and biodiversity. The tool also allows companies to generate relevant GRI, CDP Water, DJSI and Bloomberg reporting indicators in addition to water inventories, risk and performance metrics. www.wbcds.org
World Resources Institute's Aqueduct (WRI)	Business & Investors	Generates maps providing geographical and sector-specific water risk context for companies and their investors	Publicly available. Aqueduct provides global maps including baseline water stress, water reuse, socio-economic drought, and projected change in water stress for the years 2025, 2050, and 2095 and for several IPCC climate change scenarios. Aqueduct also provides detailed water risk maps for specific basins, including the Yellow River Basin among others, that combine advanced hydrological data with geographically-specific indicators linked to economic, governance, and social factors. Companies and organizations can use the global maps to locate facilities and pinpoint locations threatened by current and projected water stress. Aqueduct can also be used by portfolio managers and market information providers to determine how many assets are located in water risky areas. All information is provided at a sub-basin level and collected by WRI. www.wri.org/aqueduct
WWF/DEG Water Risk Filter	Business & Investors	Quantifies water-related risks at the facility and portfolio level	In development. The Water Risk Filter uses the newest available scientific data sets with global coverage and company specific information to quantify all relevant water risks (physical, regulatory and reputational). A mitigation toolbox, providing a well-structured overview of potential mitigation responses and related case studies, will also be part of the online tool. Anticipated release: early 2012 http://wwf.panda.org/what_we_do/how_we_work/conservation/freshwater/water_management

GLOSSARY

This glossary includes a number of key water-related terms referenced in the report, as well as terms likely to be found in company disclosures. All definitions are sourced from “Water for Business: Initiatives Guiding Sustainable Water Management in the Private Sector” (WBCSD, IUCN, 2010).

TERM	DEFINITION(S)
Aquifer	Permeable water-bearing formation capable of yielding exploitable quantities of water.
Consumption (of water)	<p>The term water “consumption” is neither consistently defined nor consistently used. In general it is meant to represent an amount of water that was used but not returned to its proximate source. Water evaporated, transpired, incorporated into products, crops or waste, consumed by man or livestock, or otherwise removed from the local resource is often defined as “consumed.” In some cases water that is polluted to an extent prohibiting its use by others wishing access is termed “consumption.”</p> <p>Also referred to as consumptive water use.</p>
Direct water use	Refers to the water used by a consumer or producer (i.e., water used at home; water used for manufacturing and supporting activities). The term contrasts with “indirect water use.”
Ecosystem services	The benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious, and other non-material benefits. The classification of water as a provisioning service rather than a regulating service is debated, but this does not affect its general meaning.
Effluent	See water discharge.
Environmental flow	A concept related to the quality and quantity of water within any surface or subsurface water body that provides water flows sufficient to maintain ecosystem functions and the goods and services dependent on those functions.
Freshwater	Naturally occurring water having a low concentration of salts, or generally accepted as suitable for withdrawal and treatment to produce potable water.
Groundwater	Subsurface water occupying the saturated zone.
Indirect water use	The water used behind the products consumed by a consumer or used as inputs by a producer (i.e., water used in the production and supply chain of the goods and services consumed; water used in a business’s supply chain).
Life cycle assessment (LCA)	Process to evaluate the environmental burdens associated with a product, process, or activity by identifying and quantifying energy and materials used and wastes released to the environment; to assess the impact of those energy and materials used and released to the environment; and to identify and evaluate opportunities to affect environmental improvements. The assessment includes the entire life cycle of the product, process or activity, encompassing, extracting and processing raw materials; manufacturing, transportation and distribution; use, reuse maintenance; recycling and final disposal.
Reclaimed water	The term “reclaimed water” often applies to water that is used for a secondary purpose requiring a lower quality level as compared to the first use.
River basin	Area having a common outlet for its surface runoff. Synonyms include: catchment, drainage area and watershed.
Surface water	Water that flows over or is stored on the ground surface.

TERM	DEFINITION(S)
Wastewater	Water that is of no further immediate value to the purpose for which it was used or in the pursuit of which it was produced because of its quality, quantity or time of occurrence. However, wastewater from one user can be a potential supply to a user elsewhere. Cooling water is not considered to be wastewater.
Watershed	Area having a common outlet for its surface runoff. Synonyms include: catchment, drainage area, and river basin.
Water allocation	In a hydrologic system in which there are multiple uses or demands for water, the process of assigning specific amounts of water to be devoted to a given purpose or use.
Water availability	A concept expressing the amount of water that is accessible at a location.
Water consumption	See “consumption (of water).”
Water conservation	The practice of minimizing the use of water and/or the consumption of water.
Water demand	Actual quantity of water required for various needs over a given period as conditioned by economic, environmental and/or social factors.
Water discharge	(1) Liquid flowing out of a container or other system. (2) Water or wastewater flowing out of a reservoir or treatment plant. (3) Outflowing branch of a stream or lake.
Water efficiency	Generally, the ratio of water actually used for an intended purpose and the amount of water applied for that purpose.
Water footprint	An indicator of water use that looks at both direct and indirect water use. The water footprint of a business is the volume of freshwater used to produce its goods and services. Water use is measured in terms of water volumes consumed (evaporated) and/or polluted per unit of time. The footprint includes green, blue and grey water components. It is a geographically explicit indicator, not only showing volumes of water use and pollution, but also the locations.
Water footprint assessment	Quantifying a water footprint, assessing its impacts and formulating a response. The assessment includes four phases: setting goals and scope; water footprint accounting; water footprint sustainability assessment; and water footprint response formulation.
Water footprint sustainability assessment	Assessing the sustainability of a water footprint from an environmental, social and economic perspective, at local, river basin as well as global level.
Water intensity	Usually taken to be the ratio between a process, product, business, or human freshwater use and a defined unit of production or population. In some circumstances “water consumption” is substituted for “water use.”
Water quality	Water quality refers to the physical, chemical, biological and organoleptic (taste-related) properties of water.
Water recycling/reuse	The act of processing used water/wastewater through another cycle before discharge to final treatment and/or discharge to the environment. In general, there are three types of water recycling/reuse: 1. Wastewater recycled back in the same process or higher use of recycled water in the process cycle 2. Wastewater recycled/reused in a different process, but within the same facility 3. Wastewater reused at another of the reporting organization’s facilities.
Water rights	Governmental or other entitlements allowing the access, use or management of water resources.

TERM	DEFINITION(S)
Water scarcity Water shortage Water stress	<p>Terms such as water shortage, scarcity and stress are commonly used interchangeably. They all related to an excess of demand over available supply.</p> <p>Water shortage describes a state where levels of water supply do not meet minimum levels necessary for basic needs. Water scarcity is a more relative concept describing the relationship between demand for water and its availability. And water stress would be the symptomatic consequence of scarcity.</p>
Water scarcity	<ol style="list-style-type: none"> 1. Physical water scarcity occurs when the demand outstrips the land's ability to provide the needed water (implying that dry areas are not necessarily water scarce) 2. Economic water scarcity results from insufficient human capacity or financial resources to provide water
Water shortage	When annual water supplies are below 1,000 cubic meters per person, producing chronic shortages of freshwater and subsequent negative effects on food production, economic development and ecosystem health.
Water stress	When a country's annual water supplies are below 1,700 cubic meters per person and are characterized by periodic water shortages.
Water supply	See "water availability."
Water use	Refers to any use of water by agriculture, industry, energy production and/or households, including in-stream uses such as fishing, recreation, transportation and waste disposal.
Water withdrawal	Removal of water from any source, either permanently or temporarily.



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