
The true value of water

Best practices for managing
water risks and opportunities

A PwC Global Best
Practices® Focus Paper

Best practices for managing water risks and opportunities

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Introduction

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“When the well’s dry, we know the worth of water.”
—Benjamin Franklin

As the world faces growing scarcity of the freshwater essential for sustaining life and running businesses, leading companies are waking up to the true value of water—and the related risks and opportunities.

Globally, one in three people are affected by water scarcity¹, and if current trends continue, nearly half—47 percent—of the world’s population will live in areas of high water stress by 2030.² As rapid population and economic growth in developing countries increase demand, scientists warn that the effects of climate change are escalating risks to water supplies. The record floods and droughts that devastated communities and agricultural crops in 2010 and the previous decade support scientific analysis indicating that extreme weather events are increasing in frequency and intensity.³ At the same time, water levels are dropping sharply in key rivers and lakes fed by shrinking glaciers and mountain snowcaps, while demand-driven extraction is depleting important groundwater supplies.⁴

Water challenges can cause significant physical, regulatory, and reputational risks leading to business disruptions, higher costs, and even loss of license to operate in locations experiencing water insecurity. In fact, 41 percent of chief executive officers (CEOs) responding to the PricewaterhouseCoopers **Global CEO Survey** in 2009 said that freshwater scarcity will have a negative impact on their company’s long-term success.⁵ Investors are taking notice, too, and calling for better disclosure of corporate water performance and risks. But with risk, there is opportunity. Companies that apply best practices are taking action to improve water measurement, management, and efficiency in internal operations, across supply chains, and in product use. In turn, they are reducing costs and strengthening competitive advantage. There are also growing opportunities for companies providing solutions to water-related challenges for industry, government, and consumers.

1 “10 Facts About Water Scarcity,” World Health Organization, <http://www.who.int/features/factfiles/water/en/>, March, 2009.

2 *Environmental Outlook to 2030*, Organization for Economic Cooperation and Development (OECD), 2008.

3 “In Weather Chaos, a Case for Global Warming” by Justin Gillis, *New York Times*, August 14, 2010.

4 *Climate Change and Water*, Intergovernmental Panel on Climate Change (IPCC), June, 2008.

5 *13th Annual Global CEO Survey*, PwC, January, 2010

A.

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Identify and assess water-related business risks.

Many companies are already experiencing negative impacts related to water, according to the *CDP Water Disclosure 2010 Global Report* published by the Carbon Disclosure Project (CDP), a non-profit coalition of investors. In the CDP's first annual survey on corporate water risks, 39 percent of responding companies reported impacts, including operational disruptions from drought and flooding, poor water quality causing higher pre-treatment costs, increases in water prices, and fines and legal costs linked to pollution incidents. More than half of CDP responders classified water-related risks as being current or near-term, from 1 to 5 years.⁶

While water risks vary significantly across industries, few companies will be untouched by water challenges at some point. Sectors that involve high volumes of water use and wastewater—such as the agricultural, beverage, electric power, and mining industries—face the greatest risks. However, other sectors can still experience significant risks if their supply chains and product use require large amounts of water or produce wastewater discharge.

Proactive risk management of water issues helps companies protect their license to operate and prevent business disruptions resulting from inadequate water availability, and reassures investors and markets that business operations will continue to be profitable. Leading companies gain a clear understanding of their key risks related to water so they can prioritize and develop effective mitigation strategies.

3x

Water withdrawals have tripled over the last 50 years due to rapid population growth.

Source: United Nations World Water Assessment Programme, 2009

⁶ CDP Water Disclosure 2010 Global Report, Carbon Disclosure Project, November, 2010.

Figure 1: Water-related business risks

Key questions used in analyzing water risks include:

- *To what degree would the company’s direct operations and supply chain be affected by changes in water supply, quality, reliability, and price?*
- *What percentages of the company’s direct operations and supply chain are located in water-stressed or ecologically sensitive regions? Is demand growing in those regions?*
- *What percentages of the company’s direct operations and supply chain rely on energy sources that require large amounts of water to produce?*
- *How do the company’s direct and indirect water use and discharges affect local communities and ecosystems?*
- *What are the effects of future demographic, economic, and climate changes?*

Physical	<ul style="list-style-type: none"> • Disruptions or declines in water supply limit industrial use for production, irrigation, material processing, cooling, and cleaning • Prices increase for water and water-intensive commodities • Water scarcity limits sales of products that require water during use
Reputation	<ul style="list-style-type: none"> • Conflicts with local communities over access to water threaten license to operate and damage to brand image • Concerns about water risks are raised by shareholders and other investors • Industrial wastewater pollutes public water resources
Regulatory and legal	<ul style="list-style-type: none"> • Company loses license to operate or incurs higher costs because of changes in water rights, pricing, and wastewater treatment requirements • Major spills or failure to meet wastewater discharge requirements lead to plant closure • Legal challenges increase pollution liability and limit growth • Increased water quality standards constrain power generation

Because water is largely a local or regional resource, geographic context is a critical element in risk assessment. The impacts, and therefore the risks, of using a million gallons of water are vastly different between New York and Nebraska and London and Beijing—in terms of local water supplies and quality, ecosystems, and community needs. Leading companies use specialized tools to analyze water risks based on local hydrologic, geopolitical, social, and environmental contexts.

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Two valuable open-source water risk analysis tools include:

- **Global Water Tool:** By combining geographic mapping with global water availability data, the tool enables companies to compare water use with validated water and sanitation availability information on a country and watershed basis. Available on the World Business Council for Sustainability Development (WBCSD) web site, the tool rates facilities based on local water stress and generates key water indicators used by the Global Reporting Initiative (GRI).
- **GEMI Water Sustainability Planner:** Provided by the Global Environmental Management Initiative (GEMI), the planner includes two online tools that help assess a company's relationship to water and the local communities where it operates, identify related risks, and develop a business case for improvement.

Systematic water risk analysis enabled **The Dow Chemical Company**, based in Midland, Michigan, to prioritize improvement projects and improve planning at its manufacturing plants located in the most water-stressed areas—saving time, reducing analysis costs, and improving results. Faced with higher infrastructure costs and other drought-induced impacts at several facilities, Dow used the Global Water Tool to identify 7 priority sites out of a potential 160. Using the GEMI Water Sustainability Planner, managers collected water data and conducted in-depth risk surveys at targeted sites, and then generated risk factor scores based on local conditions for the watershed, supply reliability and economics, social context, compliance, and efficiency.

Guided by this information, Dow managers developed and implemented site-specific risk management plans. For example, **Dow Terneuzen** in The Netherlands restructured its water process to recycle 80 percent of its freshwater and partnered with local authorities to use community sewage water for industrial processes. Combined, the projects annually reduce treatment chemicals by 500 tons, reduce energy use sufficient to power 1,000 homes, and preserve the local freshwater supply.^{7 8}

⁷ *Corporate Water Accounting*, UNEP, UN CEO Mandate, Pacific Institute, 2010.

⁸ *Dow Chemical 2008 Global Reporting Initiative Report*.

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Develop a clear accounting of corporate water performance.

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Best practice companies are improving processes for measuring and analyzing their water performance, which is an essential first step toward understanding the challenges and improving management. They begin by measuring their water consumption and costs, source availability and quality, and the impacts of the water they use and discharge within a geographic and site-specific context.

Because a company's water risks depend heavily on external factors, or those that occur outside the fence lines, leading companies focus on a combination of quantitative accounting of internal operations, analysis of regional watersheds, and impact assessments across the supply chain and customer use life cycles. Companies track corporate and site-level water use and wastewater discharge on an absolute, or total, basis. To provide a perspective on performance that adjusts for changes in production quantity, many companies create water efficiency, or normalized, measures of water use intensity, expressed as the ratio of water use to a unit of production, revenue, facility square footage, or employee. Both absolute and efficiency measures are important for reporting transparency and internal and external benchmarking, and for informing decision makers on water performance and progress on meeting improvement targets.

To understand local externalities involving regional watersheds, companies consider:

- current and projected water availability
- water quality
- water “stress” on people, environment, and agriculture
- access to safe drinking water and sanitation
- population and industrial growth

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Global food company **Nestlé S.A.** reports water use of 3.47 cubic meters (m³) per ton of product, a reduction of 3.8 percent compared with 2008 when adjusted for constant production volume. Relative to sales, the Vevey, Switzerland-based company reduced its water use from nearly 5 to 1.8 liters per dollar in sales volume over a 10-year period. To further illustrate its reductions in water withdrawals relative to growth, Nestlé's Creating Shared Value Report 2009 includes a graph showing diverging trend lines of food and beverage production volume, which increased by 63 percent, compared to a 33 percent reduction of absolute water withdrawals from 2000 to 2009. Nestlé reports its water metrics are still evolving, with plans to develop more sophisticated and localized measures. In the meantime, the company states its goal is to reduce consumption by another 10 to 15 percent over the next five years.⁹

An analysis of direct and indirect water impacts across its value chain helped **Unilever PLC**, which owns 400 food and household brands, reduce its water use per ton of production by 65 percent in manufacturing operations from 1995 to 2007, with estimated savings of \$26 million from 2001 to 2007. By using product life-cycle assessment, water footprinting, and site-level analysis, the London-based company developed a water management plan focused on four strategies:

- working with farmers and other suppliers to reduce water used in crops
- reducing water use in internal manufacturing operations
- designing products that require less water during use
- helping consumers understand how they can save water^{10 11}

⁹ Nestlé' *Creating Shared Value Report 2009*.

¹⁰ *Corporate Water Accounting*, UNEP, UN CEO Mandate, Pacific Institute, 2010.

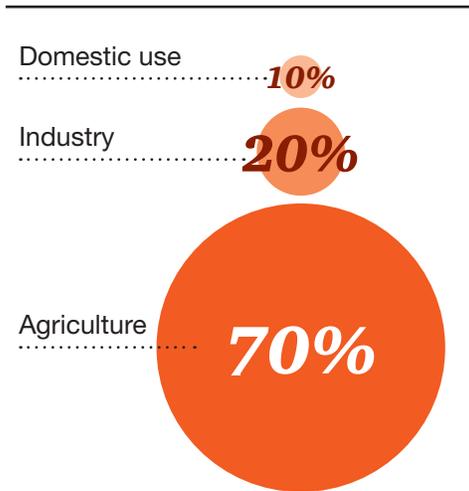
¹¹ *Unilever Sustainable Development Overview 2009*.

C.

Strengthen reporting and disclosure on water risks.

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Global water use



Source: United Nations World Water Assessment Programme, 2009

As with climate change, there is increasing pressure from investors and regulators for public companies to provide better disclosure on water-related performance and risks. In its early 2010 interpretive guidance issued to clarify what public companies need to disclose to investors about their climate-related risks and opportunities, the U.S. Securities and Exchange Commission (SEC) highlighted water as a potentially material issue. “Changes in the availability or quality of water...can have material effects on companies,” wrote the SEC in the guidance issued to answer a request from leading institutional investors. In response, leading companies are working to improve both internal and external water use reporting.¹²

Though no clear standards for water disclosure are yet established, companies use existing sustainability and emerging water-specific voluntary reporting frameworks for guidance, including:

- **Global Reporting Initiative (GRI) Water Indicators:** In addition to five specific water indicators, companies are expected to identify their most significant sustainability issues—including water, if appropriate—and discuss strategies and prioritization for managing related risks and opportunities.
- **CEO Water Mandate:** Companies endorsing this public-private initiative of the U.N. Global Compact commit to disclosing corporate water performance by publishing a “communication of progress” (COP). The COP includes an annual reporting of the company’s water use, conservation measures, and water impacts; water assessment and management practices; and engagement with suppliers, local communities, and civil society in watershed management programs and public policy development.
- **CDP Water Disclosure:** To address the close link between water, climate change, and energy issues—often referred to as the energy-water nexus—the CDP recently published its first annual report on how companies are managing water issues. In response to investor concerns about water risks, 300 companies were asked to provide information on corporate water usage, operational and supply chain water risks and opportunities, and water management plans. The 2010 CDP water disclosure report and the questionnaire for 2011 are available for downloading at the CDP web site.

¹² Securities and Exchange Commission Guidance Regarding Disclosure Related to Climate Change, SEC, February 2, 2010.

Figure 2: Key water measures

Measure	Why
<p>Total water withdrawal by source:</p> <ul style="list-style-type: none"> • Surface water (rivers, lakes, wetlands) • Groundwater • Rainwater • Wastewater from external sources • Water utility supplies 	<ul style="list-style-type: none"> • Provides baseline for improvement • Indicates scale of use and risk vulnerability to supply disruption and cost changes
<p>Total water discharge by quality and destination</p>	<ul style="list-style-type: none"> • Identifies opportunities to reduce environmental impacts and related costs • Indicates priorities for reducing risk of fines for noncompliance and loss of license to operate
<p>Percentage and total volume of water recycled and reused</p>	<ul style="list-style-type: none"> • Demonstrates and tracks efficiency and reductions of total water withdrawals and discharges • Identifies opportunities for reducing water consumption, treatment, and disposal costs
<p>Water efficiency or water use ratio (water used per unit of production, revenue, square footage, or employee)</p>	<ul style="list-style-type: none"> • Provides perspective on performance adjusted for changes in production quantity • Improves ability to benchmark across operations and industry
<p>Percentage of facilities operating in water-stressed areas</p>	<ul style="list-style-type: none"> • Identifies locations subject to increased risks from water scarcity, supply disruption, higher costs, regulatory changes, conflicts with local stakeholders, and resulting reputation damage • Guides decision making on prioritizing improvements and operational planning
<p>Quantifiable targets for reducing water use and wastewater</p>	<ul style="list-style-type: none"> • Drives improvement and tracks performance • Increases commitment and accountability

In recognition of the importance of water as an essential ingredient and process resource for making its alcoholic beverages, **Diageo plc** is committed to meaningful, transparent reporting and disclosure on water performance. The London-based company received the highest score for disclosure on water issues in a benchmarking study of 100 leading companies conducted by **Ceres**, a coalition of investors and nongovernmental organizations (NGOs) working with companies to address climate change, water, and other sustainability issues. Diageo reported it uses 7.2 liters of water to make 1 liter of product in 2009, compared with a baseline of 8.1 liters in 2005, and has a water efficiency goal of 5.2 liters by 2015. The Ceres study noted Diageo was one of the few companies to put its water use into perspective by reporting how many facilities are located in water-stressed areas and by setting a higher wastewater reduction target for those locations.^{13 14}

41%

of CEOs responding to the PwC Global CEO Survey in 2009 said that freshwater scarcity will have a negative impact on their company's long-term success.

¹³ *Murky Waters? Corporate Reporting On Water Risk, Ceres, 2009.*

¹⁴ *Diageo Corporate Citizenship Report 2009.*

D. **Develop management strategies to improve water stewardship.**

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To manage water risks, leading companies develop plans to minimize their impacts on water resources while still supporting growth through strategies to do more with less. Effective water management plans address both internal and external factors from a holistic systemwide perspective, with solutions tailored to local conditions.

Emerging best practices in water management plans focus on these elements:

- Improving operational water use efficiency
- Strengthening governance for water issues by providing board or executive committee oversight and assigning responsibility for site and regional water use, risk and opportunity identification, and reduction strategies that consider local conditions
- Reducing reliance on conventional drinking water supply options by treating, reusing, and recycling industrial process water and captured rainwater and storm water, as well as by using small-scale desalination and other innovative strategies
- Minimizing wastewater discharge and impacts on local water quality
- Engaging with communities, water utilities, and other industrial users to better manage regional water resources and share in common solutions
- Setting and meeting quantifiable targets for reductions in freshwater use and wastewater discharge
- Assessing supply chain risks and building awareness among Tier 1 suppliers
- Integrating water, energy, and climate change strategies

Effective water management plans address both internal and external factors from a holistic systemwide perspective, with solutions tailored to local conditions.

For example, **Arizona Public Service Company (APS)** formed a dedicated department to manage water resources for its nine power plants in the arid U.S. Southwest through water efficiency, reuse, and other innovative strategies. As the only U.S. utility to use treated city wastewater for nuclear power generation, APS processes about 21 billion gallons of treated effluent for use at its Palo Verde nuclear facility, preserving enough water to supply about 75,000 homes. The Phoenix-based utility is also conducting cost and feasibility studies for identifying and engineering cooling system alternatives to reduce water consumption in new plants and retrofitting existing facilities.^{15 16}

IBM reuses water to clean semiconductor chips, contributing in part to the Armonk, New York-based technology giant decreasing water purchases by almost 30 percent. And the company saved more than \$1.5 million annually in energy costs because reduced water usage translated to reduced energy usage for pumping, cooling, and treating water. Efficiencies such as these can also be turned into business opportunities—IBM has evolved its water management experiences into information systems that governments and businesses can use to track and manage water usage and share information about water conditions and related issues.¹⁷

¹⁵ “When the well runs dry” by Anne Field, *Treasury & Risk*, July/August.

¹⁶ *Pinnacle West Corporate Responsibility Report 2009*, Pinnacle West Capital Corporation.

¹⁷ “When the well runs dry” by Anne Field, *Treasury & Risk*, July/August.

E. Reduce impacts on water quality.

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Pollution caused by increased agricultural and industrial production, combined with inadequate wastewater treatment in developing countries, poses a growing threat to water quality and human health, according to the United Nations World Water Assessment Programme. In China, where nearly two-thirds of the largest cities lack wastewater treatment facilities, many rivers are too polluted for industrial use.¹⁸ This represents a serious risk to businesses in the form of higher costs to pretreat their process water, new or strengthened regulatory restrictions on specific industrial activities, and increased expectations to invest in costly community water improvement projects.

Globally, eutrophication is the most prevalent water quality problem.¹⁹ High nutrient concentrations from agricultural runoff feed oxygen-depleting algae blooms that kill fish and aquatic life. The agricultural industry is not alone. Mining, chemical, and energy companies face increased scrutiny and regulation related to wastewater discharge and water pollution.

Companies are increasingly taking voluntary steps to prevent pollution at the source by developing cleaner production processes that reduce or eliminate the use of hazardous substances, contaminants, and other pollutants. Leading companies are also acting to reduce water pollution in their supply chain. Companies such as **Unilever**, **Marks and Spencer Group plc**, and **Nike, Inc.**, that rely on agricultural products, from food to cotton, are developing and supporting programs that help farmers adopt practices for using fertilizer and pest control alternatives that reduce pollution, often at a lower cost than traditional approaches.

3.575 million

people die each year from water-related diseases.

Source: World Health Organization, 2008

¹⁸ *Water Scarcity & Climate Change: Growing Risks for Businesses & Investors* by Jason Morrison, Mari Morikawa, Michael Murphy, and Peter Schulte, Ceres and Pacific Institute, February, 2009.

¹⁹ *The United Nations World Water Development Report 3: Water in a Changing World*, World Water Assessment Programme: UNESCO and Earthscan, 2009.

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Engage communities as partners in protecting and improving water supplies.

Conflicts with local communities over access to water pose an increasing threat to corporate reputations and the license to operate. Protests by local residents and activists from California to India have already forced well-known companies in water-intensive sectors to close down production plants or abandon growth plans. In 2010, the United Nations passed a resolution recognizing access to clean water as a fundamental human right. Though nonbinding, the action further raises awareness and expectations for companies to take greater responsibility for their impacts on water in return for their continued license to operate.

To mitigate potential conflicts, best practice companies proactively partner with local communities, NGOs, and government agencies to protect and improve water supply and quality for neighboring communities as well as for their own operations. For example, **The Coca-Cola Company** partnered with the World Wildlife Fund to improve the water quality of the Yangtze River as part of a major long-term commitment to grow its business in China.

Some of the goals of the joint effort include reducing animal waste run-off into the Yangtze, educating local communities about environmental issues, and recycling the water the company uses. In turn, the Atlanta-based beverage giant increases the safety of water supplies to make its products and boosts its brand image in the Chinese market. Coca-Cola's strategic water stewardship framework also includes replenishing water resources through community partnerships. In 2009, the company engaged in more than 250 partnerships focused on watershed protection, conservation, and clean water and sanitation accessibility. Through these efforts, the company replenished 638 million liters for communities and 28.8 billion liters for nature, representing approximately 22 percent of the water used in its finished beverages.²⁰

²⁰ *The Coca-Cola Company Replenish Report*, January 2010.

In Australia, **Royal Dutch Shell plc** is partnering with the local water utility to build a treatment plant to help shore up water supplies strained by prolonged drought and population growth. The plant will treat wastewater from the Shell Geelong refinery and sewage from neighboring areas, providing industrial-quality water for the refinery and irrigation water for community recreation facilities. By saving two billion liters a year of water currently used by the refinery, the project will increase the community's available drinking water supply by 5 percent and will meet demand for expanded sewage treatment. Shell is paying half of the \$90 million project cost, with the balance funded by the water utility and government agencies.²¹

2.5 billion

people lack access to improved sanitation.

Source: World Health Organization and UN Children's Fund Joint Monitoring Programme for Water Supply and Sanitation, 2008

²¹ *Royal Dutch Shell plc Sustainability Report 2009, May 2010.*

Increasing water scarcity and related risks are fueling an emerging market for more efficient and innovative water management solutions. The private and public-sector market for products and services that improve water efficiency is estimated at \$50 to \$60 billion annually over the next two decades, according to global consultancy McKinsey & Company.²²

Companies are developing solutions to meet water-related challenges, including:

- driving down water usage in agriculture to get “more crop per drop”
- improving water measurement, tracking, metering, and management
- providing water and wastewater treatment and distribution technologies and infrastructure, including desalination
- helping other companies increase water efficiency in water-intensive consumer and industrial products and processes

Developing and marketing new technologies for water purification and conservation make up an important segment of **General Electric Company’s** (GE) ecomagination initiative, which generated \$18 billion in revenue in 2009. For example, GE is a leader in water desalination systems, including a plant that now provides 20 percent of the clean water supply in Algiers. In Tempe, Arizona, GE helped the city expand water reclamation capabilities to increase water reuse by 2.5 billion gallons a year for commercial and industrial applications. And in the electric utility sector, **Cogentrix Energy, LLC** is using GE technology to conserve an estimated 3 million gallons of water annually.²³ GE is also involved in a number of joint ventures focused on water. In 2010, GE and **ConocoPhillips** opened the Global Water Sustainability Center in Qatar to research opportunities for treating and recycling byproduct water from oil and gas production and refining and from other industrial and municipal projects. In partnership with the **World Resources Institute** (WRI) and **The Goldman Sachs Group, Inc.**, GE is developing a water index to measure water-related risks facing companies and their investors based on 20 weighted factors capturing water availability, regulations, water quality, and reputational issues.²⁴

²² “The Business Opportunity in Water Conservation” by Giulio Boccaletti, Merle Grobbel, and Martin R. Stuchtey, *McKinsey Quarterly*, December 2009.

²³ *GE ecomagination 2009 Annual Report*, 2010.

²⁴ “Finding Solutions to Global Water Needs,” GE web site, 2010.

Conclusion

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With far-reaching consequences on so many industries—from food and beverage production to semiconductors and energy generation—water scarcity has the potential to change the business landscape. Proactive companies recognize how they can save vast quantities of water and significantly reduce water-related costs by eliminating waste and innovating to develop cleaner, more efficient ways to produce food, energy, and other goods. Seeing the connection between healthy water systems and the bottom line, companies engage with governments, communities, and NGOs to achieve sustainable water supplies for their neighbors as well as their own operations.

Companies that fail to take action face the threat of business interruption, reputational and regulatory risks, and diminished access to capital as investors factor in water-related uncertainties.

47%

of the world's population will be living in areas of high water stress by 2030 unless new policies are introduced.

Source: Organization for Economic Cooperation and Development (OECD)

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about how water issues may affect
your business, please contact:*

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