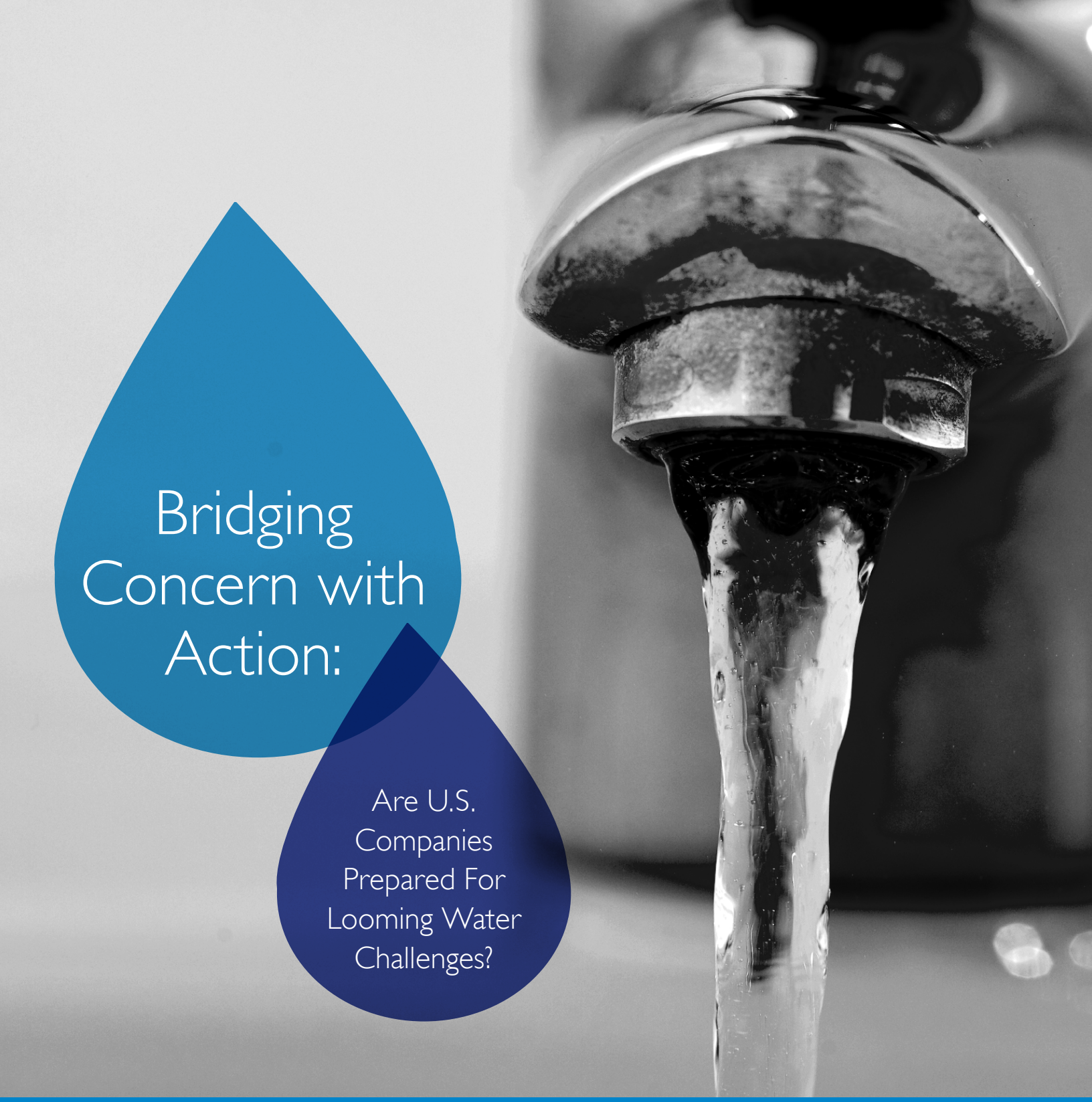


Bridging Concern with Action:

Are U.S. Companies Prepared For Looming Water Challenges?

April 2014

Study Partners: VOX Global and Pacific Institute
Authors: Peter Schulte, Jason Morrison, Stefanie Woodward, Jen Anderson, Tony Calandro, Sarah Howell, and Leah Stonefeld
Contributors: CDP, AT&T, Cummins, The Hershey Company, MillerCoors, and Union Pacific

PACIFIC INSTITUTE

VOX Global

ACKNOWLEDGEMENTS

VOX Global is a strategic communications and public affairs firm with decades of experience navigating the intersection of business, media and society. Our Sustainability Practice Group helps position sustainability leaders and their companies for long term success. We offer a wide range of services that provide companies with both a reputational and financial return on investment. We work with our clients to identify, design and communicate business practices that enhance their reputation and strengthen their bottom-line. Our team understands the environment many of our clients face in their efforts to drive change inside and outside their companies and the need to speak the language of their internal and external stakeholders to be successful.

For more information on VOX Global visit the firm's website at www.voxglobal.com.

The Pacific Institute works to create a healthier planet and sustainable communities. We conduct interdisciplinary research and partner with stakeholders to produce solutions that advance environmental protection, economic development, and social equity — in California, nationally, and internationally. Our aim is to find real-world solutions to problems like water shortages, habitat destruction, global warming, and environmental injustice. Based in Oakland, California, we conduct research, publish reports, recommend solutions, and work with decision makers, advocacy groups, and the public to change policy. Since our founding in 1987, we've become known for independent, innovative thinking that cuts across traditional areas of study. Our interdisciplinary approach not only helps us make connections that others miss, it also enables us to bring opposing groups together to forge effective real-world solutions.

For more information on the Pacific Institute, visit the organization's website at, www.pacinst.org.

About the Authors:

Jen Anderson is managing supervisor of VOX Global's corporate citizenship & sustainability programs.
Tony Calandro is a partner with VOX Global and leads VOX Global's Sustainability and CSR Practice Group.
Sarah Howell is a research associate with VOX Global's Sustainability and CSR Practice Group.
Jason Morrison is the Director of the Pacific Institute's Corporate Sustainability Program.
Peter Schulte is a Research Associate for the Pacific Institute's Corporate Sustainability Program.
Leah Stonefeld is a research associate with VOX Global's Sustainability and CSR Practice Group.
Stefanie Woodward is a Research Associate at Pacific Institute.

Acknowledgements:

The authors would like to thank first and foremost, CDP for providing their insights on this topic in the Foreword they wrote for our study. We would also like to thank AT&T, Cummins, The Hershey Company, MillerCoors, Union Pacific and the dozens of companies that completed the survey, offering their perspectives and insights on this important topic. We would also like to thank Ceres, Business for Social Responsibility, United States Business Council for Sustainable Development and World Resources Institute for their support in raising awareness of this online survey. Lastly, we would like to acknowledge Mai-Lan Ha, Matthew Heberger and Nancy Ross of the Pacific Institute for their contributions in support of this project.

PREFACE

In the U.S, water is a strategic resource for most businesses. The reasons are straightforward. A growing population and increasing economic activity coupled with declining water quality in many regions have resulted in increased competition for water in the public and private sectors. While the term "water scarcity" is frequently heard, we are more specifically experiencing greater competition for water; we are placing greater demands on an irreplaceable natural resource.

Pressure is growing therefore for U.S. companies to integrate water into strategic business decisions. In CDP's experience, while most companies clearly recognise water as an issue, too few recognize its strategic importance or understand the risks. Further, the immediacy of water risks is often underestimated. Water shortages and restrictions in licenses to operate may not be as far away as some companies think. In fact 46 percent of U.S. companies engaging with CDP have already suffered detrimental business impacts as a result of water issues with costs for some as high as US$400 million and projected impacts as high as US$1 billion.

It is therefore no surprise that investors are filing record numbers of environmental and social policy resolutions on water, particularly in the U.S.[1] Investors and companies that understand the complexities of water and devise and implement a strategy that drives water stewardship will be the long-term winners in an increasingly water-stressed world. A report released earlier this year by CDP and Eurizon Capital analyzing the metals and mining sector revealed that companies acting to manage water strategically perform better financially.

While some U.S. companies are realizing water-related gains, there is a significant disparity between investor expectations and company actions. The number of investors requesting corporate water data and expecting action through CDP has quadrupled in just three years. The economic effects of mismanaging water resources are becoming increasingly apparent and we at CDP are concerned that U.S. companies may not be truly prepared in the face of worsening water challenges. We believe a shift in practice is required if U.S. companies are to realize the true benefits of water stewardship, achieve business resilience and competitive advantage and minimize the multitude of very real business risks posed by water.

Tom Carnac
President, CDP North America

Cate Lamb
Global Head of Water, CDP North America

1 Sustainable Investments Institute (Si2), 20th August 2013.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Bridging Concern and Action: Are US Companies Prepared for Looming Water Challenges?

Policy makers, the investment community and non-governmental organizations are increasingly focused on social and environmental pressures and their impacts on business. According to the World Economic Forum's Global Risks 2013 report, water crises present one of the three risks of highest concern for the world today. The wide variety of problems that fall under water challenges, such as insufficient water supply, water pollution, contaminated drinking water, crumbling infrastructure or degraded ecosystems, suggest that water is among the greatest social and environmental challenges that businesses around the globe face in the 21st century.

Although internationally many companies are beginning to acknowledge that water poses real risks to their business, limited analysis exists to reveal how companies in the United States specifically perceive and respond to the issue. To help fill that research void, Pacific Institute, a sustainability research organization based out of Oakland, California, and VOX Global, a bipartisan public affairs and strategic communications firm based out of Washington, D.C., conducted a survey of more than fifty US-based companies to better understand both how they view water's impact on their business and how they respond to water challenges. In

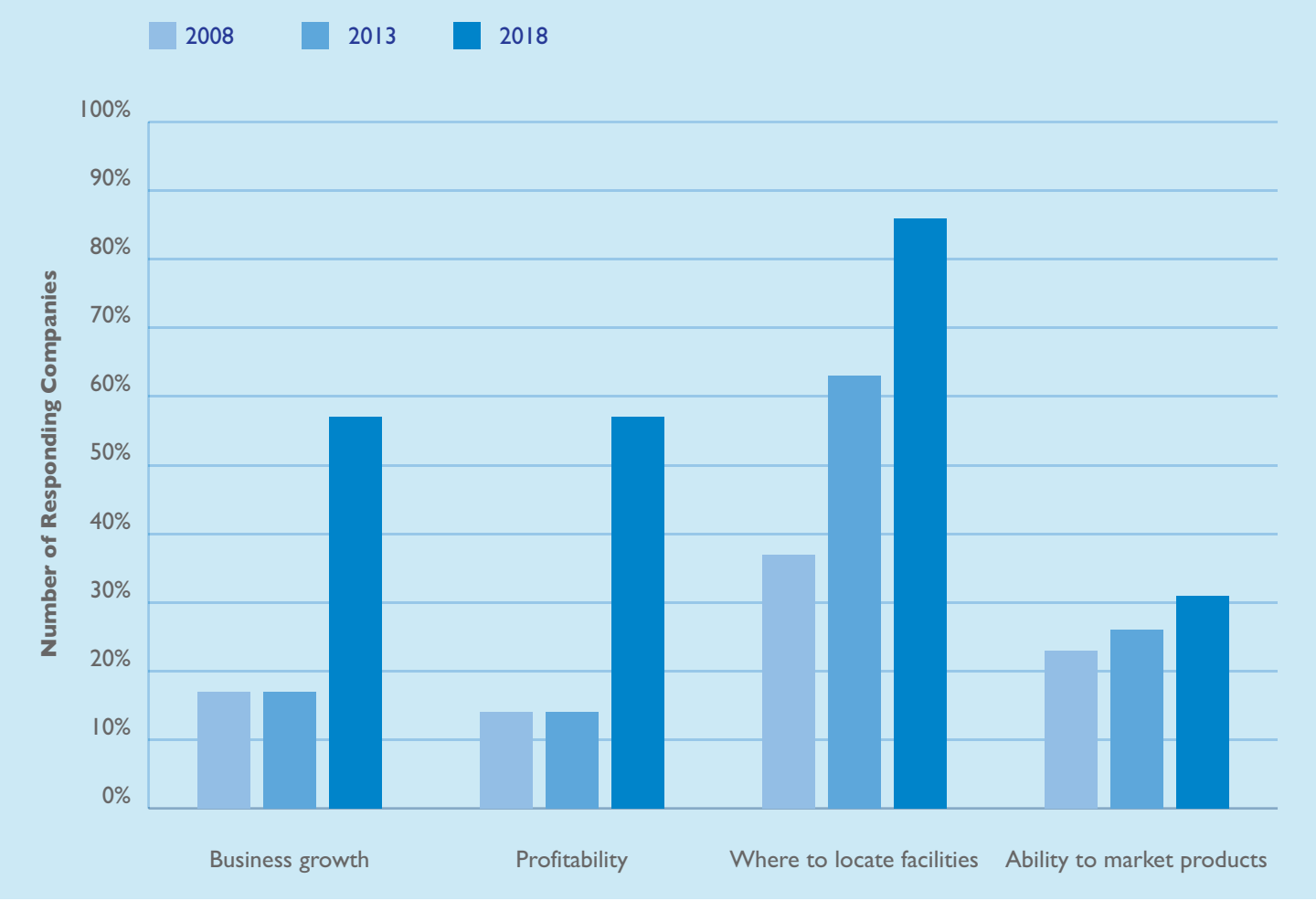


Figure ES-1: Water's Effect on Core Business Objectives

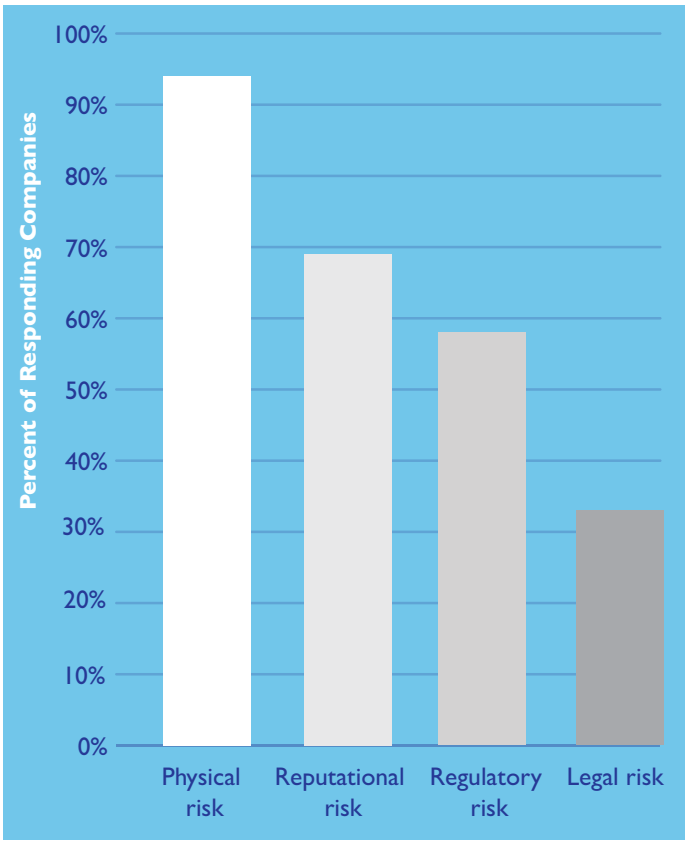


Figure ES-2: The Types of Water Risks US-Based Companies Face

addition to the survey, the project team conducted five case studies of companies across a variety of industries to provide added context to the survey findings.

Key Findings

Water is a key U.S. business challenge, now and in the future

One of our survey's most resounding findings is that water challenges are not just a future concern, but a current problem that already affects many businesses. When we asked our survey respondents to rank the importance of several natural resource risks to their business, including energy security, climate change and others, water emerged as their leading concern. 79 percent of responding companies claim that they currently face water challenges, while 84 percent believe they will face water challenges in the next five years.

Survey respondents also made the connection between these challenges and their bottom line: nearly 60 percent of responding companies indicated that water is poised to negatively affect business growth and profitability within five years, while more than 80 percent say it will affect their decision on where to locate facilities over that span (see Figure ES-1). Furthermore, these challenges and risks are concerning enough to warrant discussion at the highest levels of the company, as three out of four responding companies report that water-related issues have been discussed at the board level and nearly 90 percent believe that water will be discussed at that level within the next five years. Respondents also indicated that water challenges are not just a physical issue of supply but also about reputational, regulatory and legal risks to their business (see Figure ES-2).

Survey results and the supplemental case studies pointed to the reality that a wide array of industry sectors is vulnerable to water risk, not just the water-intensive industry sectors like agriculture or food and beverage. For example, Union Pacific, a transportation company covered in one of our case studies, has found that drought and flooding events can cause erosion that threatens their railway infrastructure.

Meaningful data drive strategic responses

Survey respondents indicated monitoring and assessment-related activities provide information that is essential for developing water management strategies. When rating the current and future importance of various water practices, companies indicated that three of the top five most important current practices were related to assessing internal operational conditions and external watershed conditions. Four of the top five practices deemed most important in the future relate to assessment.

Some companies, as exemplified in the Cummins case study, gather data on what is often referred to as the "embedded" or "true" cost of water. This type of accounting can provide the financial information useful for justifying and developing water management strategies that more accurately reflect the level of risk water poses to a company.

Most respondents already face water challenges, while many anticipate that water challenges will become increasingly problematic for their company within the next five years. Respondents expressed their growing concerns over water challenges in a variety of ways.

Respondents who...	2008	2013	Next 5 Years	% Change, 2008-2018
Face water challenges	N/A	79%	84%	5%
Discuss water-related issues at board level	28%	78%	89%	61%
Consider water when deciding where to locate	37%	63%	86%	49%
Believe water impacts growth	17%	17%	57%	40%
Believe water impacts profitability	14%	14%	57%	43%

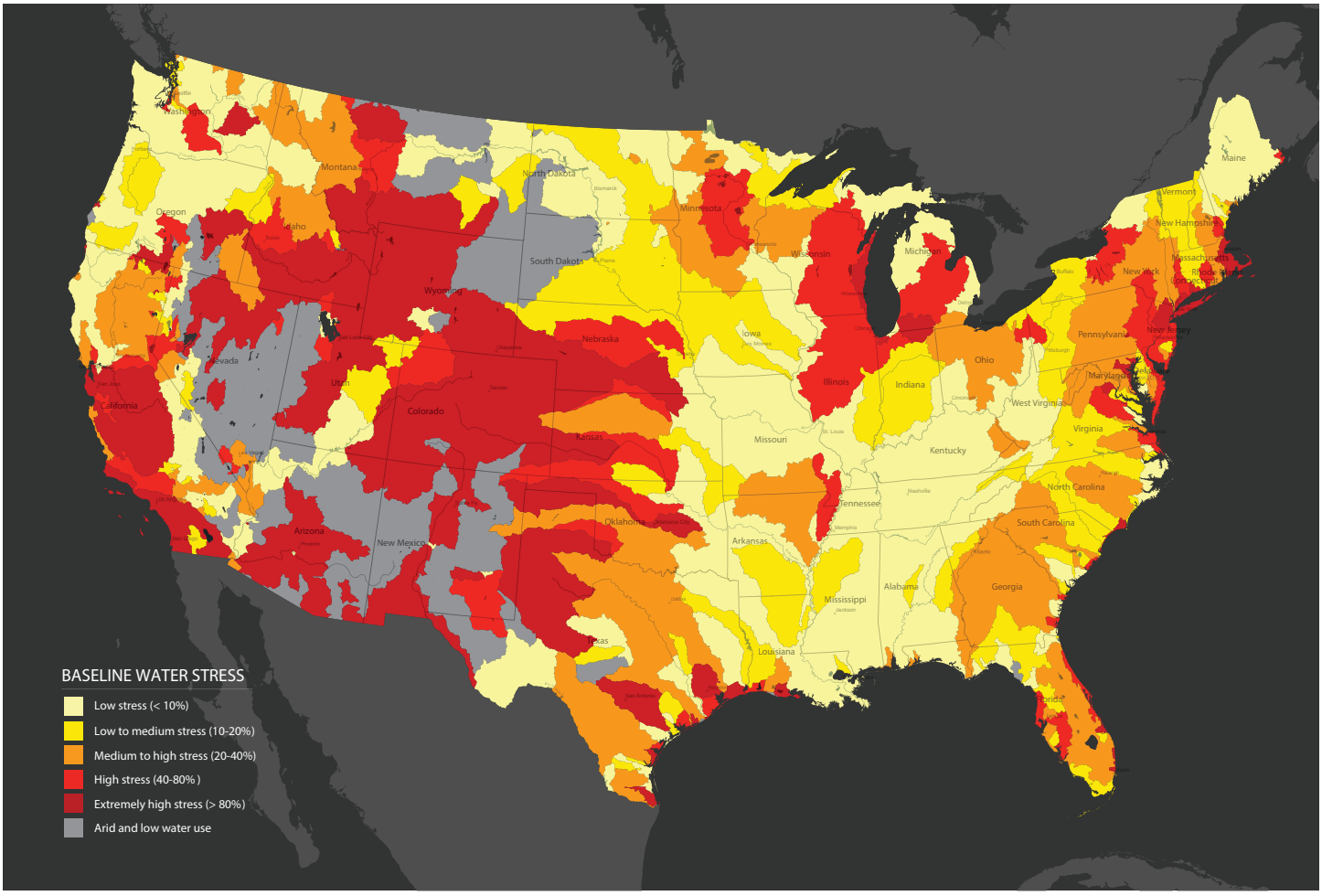


Figure ES-3: US Baseline Water Stress WRI Aqueduct

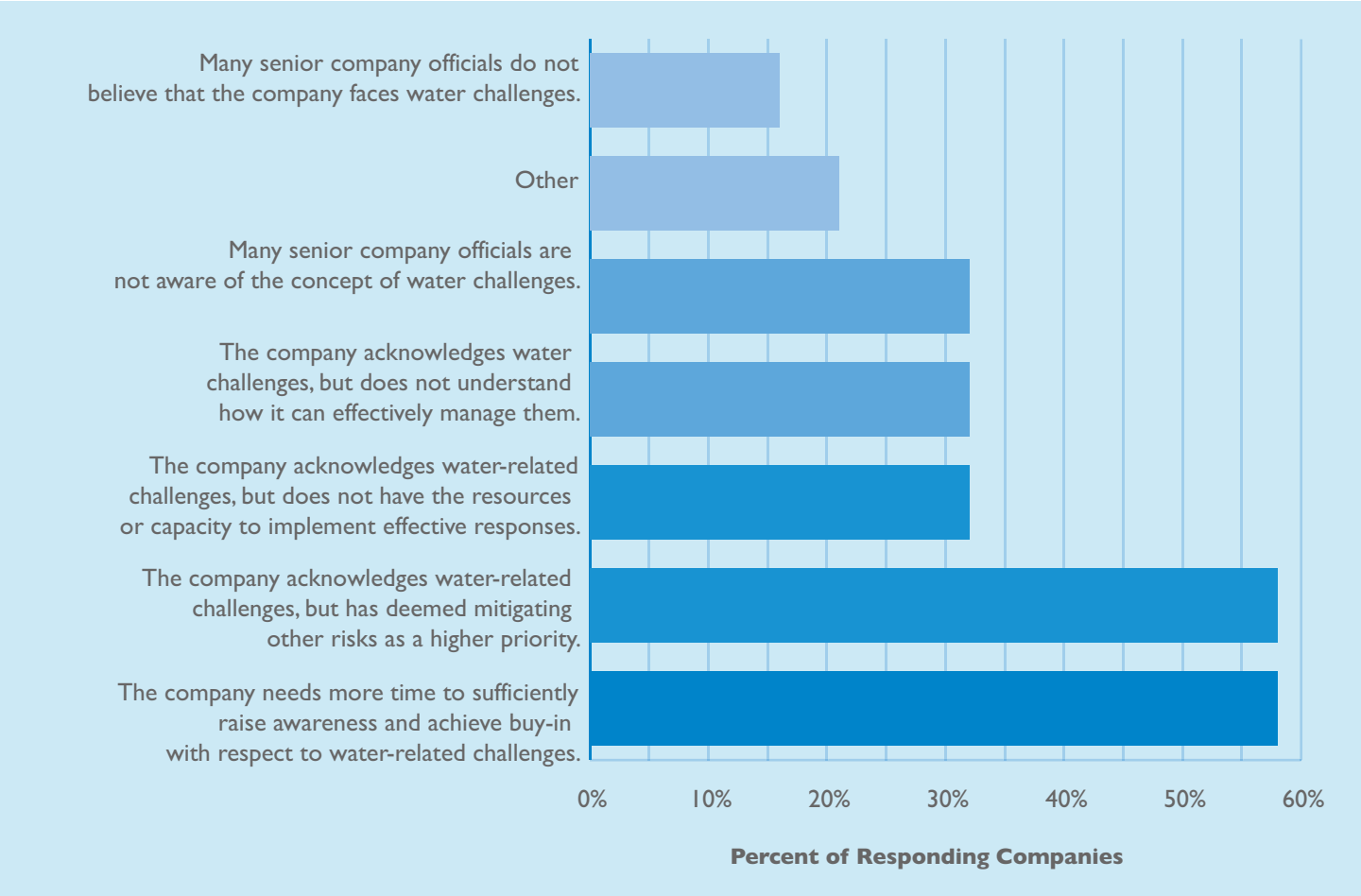


Figure ES-4: Key Obstacles to Greater Awareness and Acceptance of Water Challenges at All Levels of Business

A "one size fits all" approach does not work

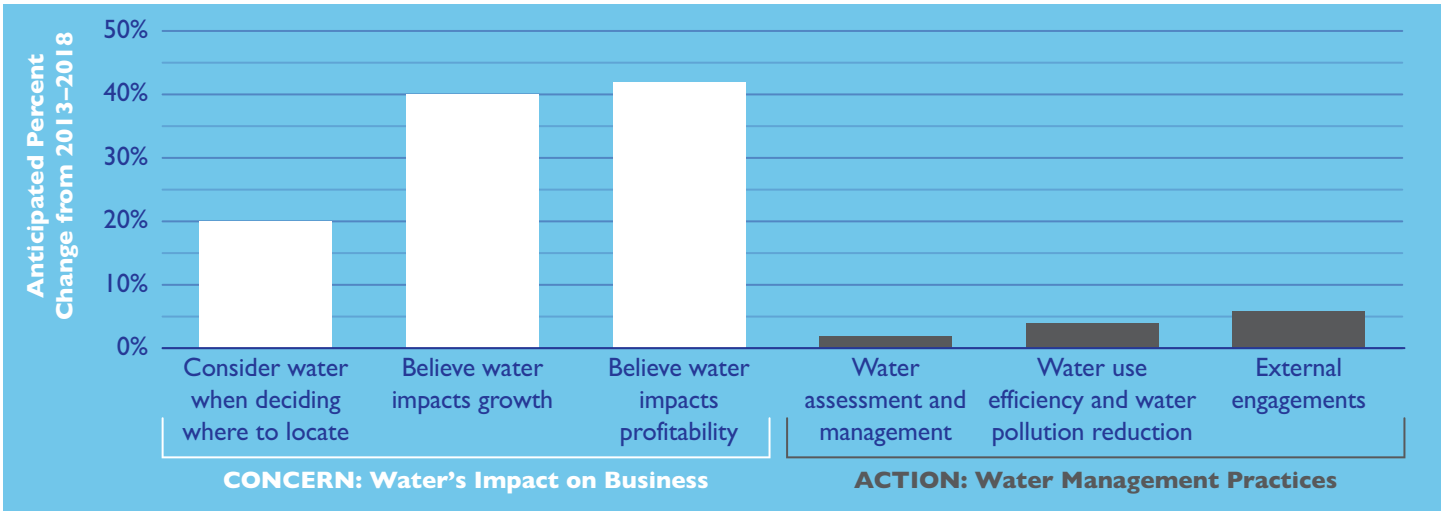
Water issues are local in nature and, as such, every responding company has already assessed regional differences in water risk. A majority of responding companies indicated that they face water challenges in both the South and Southwest. However, companies report facing water challenges in nearly every region listed in the survey. (Figure ES-3 demonstrates how water stress, often resulting in risk to business, spans many different areas across the nation.) **The localized nature of each operation's particular set of water challenges could explain why a majority of responding companies utilize a multi-pronged approach to water management. Their water strategies include a variety of efforts aimed at reducing water use and pollution, monitoring and accounting for water, setting goals and targets related to water, communicating and disclosing water efforts and engaging with external stakeholders to support sustainable public water management.**

Is there a gap between concern and action?

Overall, we found a possibly significant set of findings that appear to be potentially contradictory: while companies believe water challenges will significantly worsen in the next five years, the majority of companies surveyed do not appear to be planning corollary increases in the breadth and scale of their water risk management practices. In fact, nearly 70 percent of responding companies said their current level of investment in water management is sufficient.

Internal obstacles hinder companywide buy-in

Respondents identified several obstacles to gaining company-wide recognition of water challenges within their company (see Figure ES-4). Lack of time to raise awareness and buy-in and the company deeming other risks as a higher priority over water stood out as the most significant challenges.



ES-5: Respondents' Anticipated Concerns and Actions Regarding Water's Impact on Business

Conclusion

Water is becoming a core business issue

Our results confirm that water-related challenges and risks are a business concern today that will only increase over time. That said, one of the most compelling findings was **the majority of companies surveyed do not appear to be planning corollary increases in the breadth and scale of their water risk management practices** (see Figure ES-5).

There are a wide range of possible explanations for this apparent gap between concern and response. For example, though survey respondents noted the importance of integrating water into their business strategy, it may be premature to assume that all have done so. Perhaps the potential impact of water challenges on the business is of deep concern among the company representatives in charge of sustainability and natural resource issues, but not yet fully integrated into core strategic decisions. Similarly, as indicated in the survey, many companies may simply prioritize other issues over water and not have the resources to adequately address growing water concerns. This may be due in part to a failure to adequately evaluate the true cost of water. As a stand-alone cost, water remains relatively cheap. When compared to a company's electricity costs, for example, water is substantially less expensive. For those companies that have chosen to dig deeper, however, they realize a wide variety of hidden costs associated with water and thus better appreciate the financial need to address the business challenges that water may pose to their company.

Other companies may delegate water-related responses to specific business units and facilities, due to the highly-localized nature of water risk and response, and not have an overarching water strategy that guides the business's water-related decisions. Others may believe that social or environmental issues — such as water — are "sustainability" risks that are the responsibility of a special team designated to deal with those particular types of issues, rather than a core strategic issue for the company. Both scenarios frame water into silos and maintain the perception that water management is peripheral to business success. Combined, these factors could explain what respondents identified as the most significant internal challenges to increased investment in water management:

- *Company needs more time to raise awareness and achieve buy-in; and*
- *Mitigating other business risks is a higher priority.*

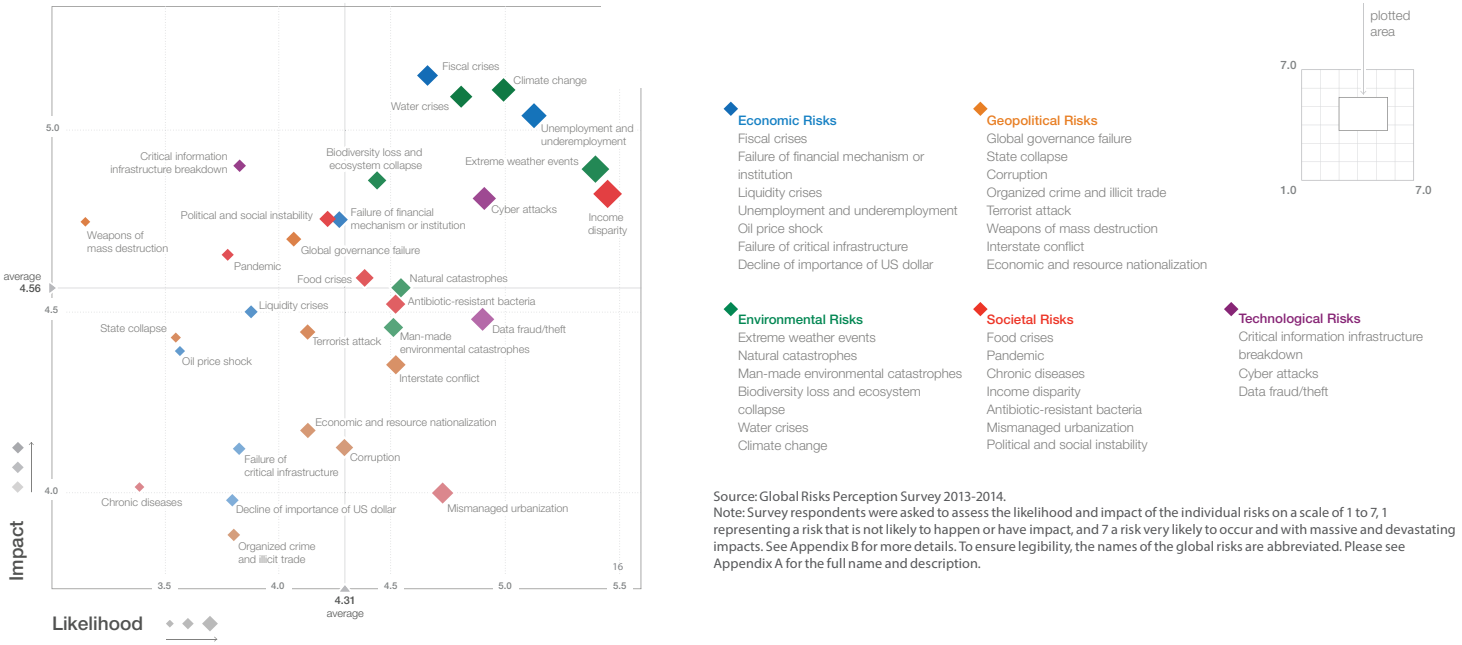
As stated in the beginning of this summary, policy makers, the investment community and non-governmental organizations are increasingly focused on social and environmental pressures and their impacts on business. Our survey results suggest that water is no longer a peripheral business concern, but an essential aspect of business strategy. As more and more boards discuss the impact of social and environmental issues like water on their profitability and growth, topics such as water-risk will emerge as central issues to company strategy. This new economic reality necessitates that companies better understand the many ways that water affects both their bottom line and reputation as well as the multitude of communication and management strategies they may need to adequately address related business challenges.

INTRODUCTION

The rising prominence and threat of water challenges in the United States

Water poses one of the greatest sustainability challenges of the 21st Century, both here in the United States and around the world. According to the World Economic Forum, water crises present one of the three risks of highest concern for the world today (World Economic Forum 2014). These challenges will manifest themselves in many ways, whether through insufficient water supply, water pollution and contaminated drinking water, inadequate infrastructure or degraded ecosystems, just to name a few.

These challenges are not just for "developing" countries; they are happening here in the United States. Drought, climate change, aging infrastructure, population growth and pollution all threaten water resources in many regions across America. For example, at the time of this study's publication, nearly 91 percent of California's land was considered to be under severe drought, while over 26 percent was considered to be experiencing exceptional drought (U.S. Drought Monitor 2014). Persistent depletion of the Ogallala Aquifer, one of the world's largest groundwater supplies and a significant source of irrigation water in South Dakota, Nebraska, Wyoming, Colorado, Kansas, Oklahoma, New Mexico and Texas, is threatening agricultural production in these states and considered unsustainable (Steward et al. 2013). As of January 2014, the US Department of Agriculture had declared portions of eleven states to be primary natural disaster areas due to water shortages (Myers 2014). These are not just acute problems; many regions face a chronic imbalance between water supply and demand. Figure 2 shows the extent to which different regions face water stress.



Source: Global Risks Perception Survey 2013-2014.
Note: Survey respondents were asked to assess the likelihood and impact of the individual risks on a scale of 1 to 7, 1 representing a risk that is not likely to happen or have impact, and 7 a risk very likely to occur and with massive and devastating impacts. See Appendix B for more details. To ensure legibility, the names of the global risks are abbreviated. Please see Appendix A for the full name and description.

Figure 1: Greatest Risks Facing Society According to the World Economic Forum

SOURCE: WORLD ECONOMIC FORUM 2014

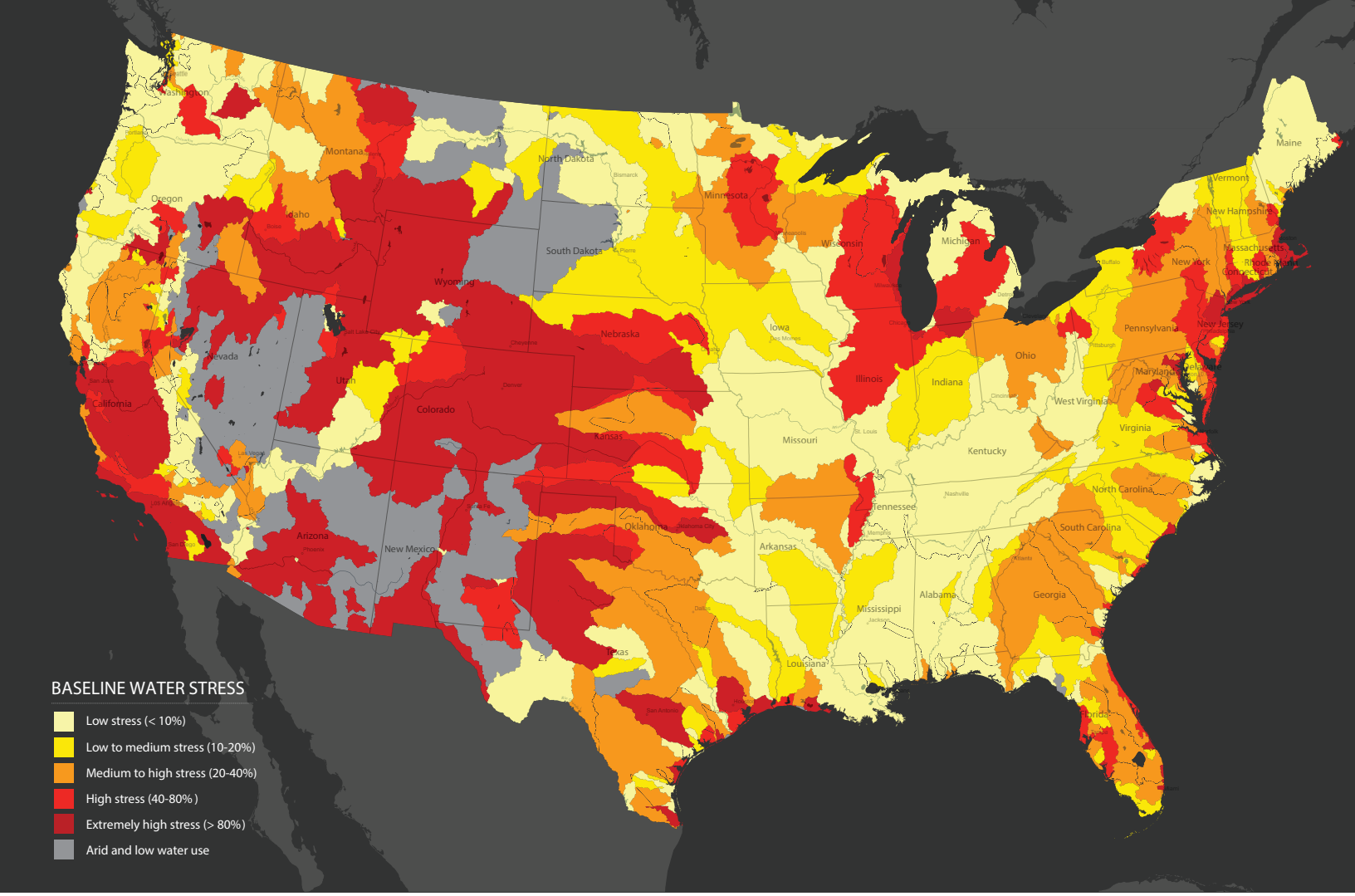


Figure 2: US Baseline Water Stress

SOURCE: WORLD RESOURCES INSTITUTE 2014

The impact of water challenges on US-based businesses

There is growing recognition that in addition to being a considerable societal problem, water also creates critical challenges for businesses specifically. For many industries, water is an integral part of their direct operations and supply chains. It is used to cool industrial processes, act as a solvent, to irrigate crops, to extract fossil fuels and as an ingredient in many products, among many other uses. Because of this, insufficient or contaminated supply, or a lack of infrastructure to reliably deliver that supply, can mean companies may not be able to maintain the volume and quality of their production.

Such water challenges for business are already happening. In 2011, drought damaged or destroyed crops across the South and Midwest, causing more than $7.5 billion in losses to the agricultural industry in Texas alone (Fannin 2012). In 2011, Gap Inc. cut its annual profit forecast by 22 percent because of production limitations driven by water shortages in Texas, India, Pakistan and Brazil (Larson et al. 2012). The California Farm Water Coalition, an industry group evaluating the current drought in California, estimates that lost revenue from farming and related industries could reach $5 billion in 2014 (Oldham 2014).

Project background

Though companies around the world are beginning to acknowledge that water-related risks must be addressed, there has been only limited analysis of how US-based companies specifically perceive and respond to these challenges. This study came out of this recognition. In it, VOX Global and the Pacific Institute have sought to explore some of these issues and develop greater insight on a few critical questions:

- *How do US-based companies think about water-related challenges? Do they consider water a critical challenge and/or risk to their business?*
- *Can we add new insights into this issue and build upon the body of existing information that groups like CDP, WRI, CERES and others have published?*
- *If so, what types of water-related challenges are of greatest concern for US-based companies?*
- *How does water affect a company's bottom line and other core business objectives?*
- *What geographic areas are most susceptible to water-related challenges for business?*
- *What practices are companies currently implementing to respond to the water challenges they face? What practices are they planning to pursue?*
- *What are the key barriers to more sustainable corporate water management practices?*

We have sought to gather companies' perspectives on these issues primarily by means of an online survey targeted specifically at US-based businesses. Fifty-one companies in total completed the survey, spanning a wide range of industry sectors and US regions. A more detailed description of the study's methodology can be found in Appendix A on page 39.

The first section of the study explores whether companies believe they face water-related challenges, and, if so, the nature of such challenges. The second section looks into how companies assess water challenges and structure themselves to manage them. Next, we assess the different types of water management strategies that companies find most important, now and in the future. Lastly, we do a "deep dive" into five company case studies to better understand how water affects companies differently, as well as the innovative practices companies have implemented to address water concerns.

It is our hope and belief that greater awareness of how other companies view and respond to water-related challenges will encourage businesses to think more deeply about water and assess whether further investment in water management might be valuable for them. Further, a better understanding of what water-related practices companies are pursuing and will pursue in the future can help guide more sustainable water practices among those that have not yet prioritized the issue.

SECTION 1: COMPANY PERCEPTIONS OF WATER-RELATED CHALLENGES AND RISKS

Do US-based businesses believe they face water challenges?

Many recognize that water is an important and limited resource and that related challenges are becoming more pronounced. But do water challenges present problems for businesses here in the United States? Our survey suggests a resounding "yes."

More than three-out-of-four responding companies believe they currently face water-related challenges, while more than four-out-of-five companies predict they will face water challenges in the next five years. These findings signal that water-related risks are relevant to the US business community today, and they suggest that companies that haven't paid much attention to water issues may want to reconsider them as a current rather than future concern. This notion is further supported by the fact that on average, survey respondents believe water is the most significant sustainability challenge they face (see Table 1).

1	WATER
2	ENERGY SECURITY
3	CARBON / CLIMATE CHANGE
4	WASTE / POLLUTION
5	FOOD SECURITY

Table 1: Company Perceptions of the Most Significant Natural Resources Challenges for Their Business

Further, these risks are taken seriously. More than three-quarters of responding companies reported that water-related issues had been discussed by their company's board of directors, while nearly nine-out-of-ten believe they will be within the next five years. This is a significant change from five years ago when less than one-third of responding companies were discussing water at the board level. This ten-year trend in the growing number of companies discussing water at the board level suggests an increasing recognition of the relevance of water to core business strategy.

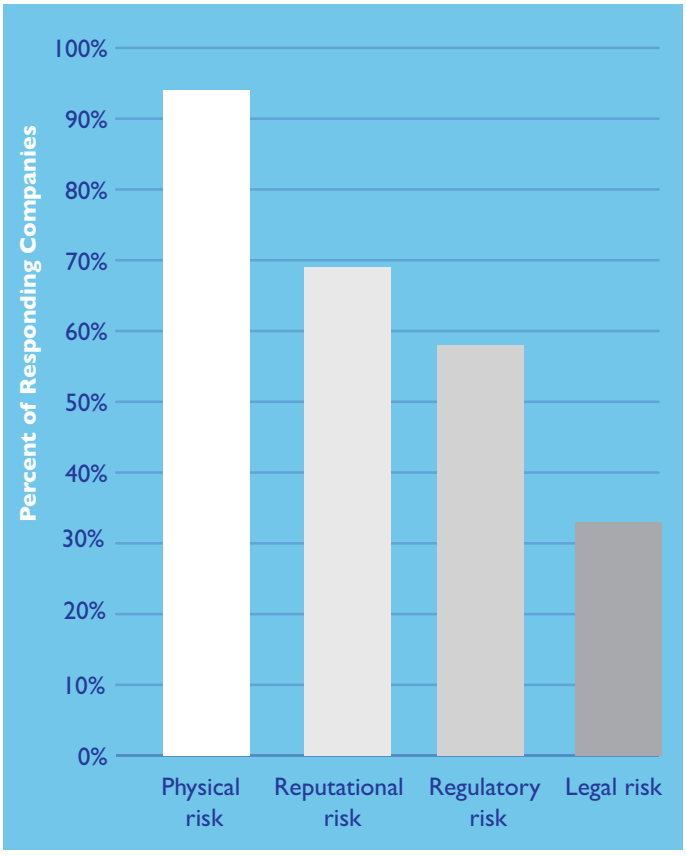


Figure 3: The Types of Water Risks US-Based Companies Face

How do water challenges affect businesses and their bottom line?

Water is not just a supply issue for companies. This survey reveals that water is a challenge that affects companies in many different ways and often requires an array of responses to adequately manage. In fact, **a majority of responding companies indicated that they face physical, regulatory or reputational risks related to water, while a third indicated they face legal risks** (see Figure 3).

Water challenges directly affect companies' bottom lines. Notably, a majority of responding companies believe that water is already affecting their decisions on where to locate facilities, and this will jump to more than four-out-of-five in the next half decade. On top of that, **nearly 60 percent of companies believe water challenges will affect both business growth and profitability in the next five years**. Figure 4 shows companies' perceptions of how water negatively affects core business objectives now, five years ago and five years in the future.

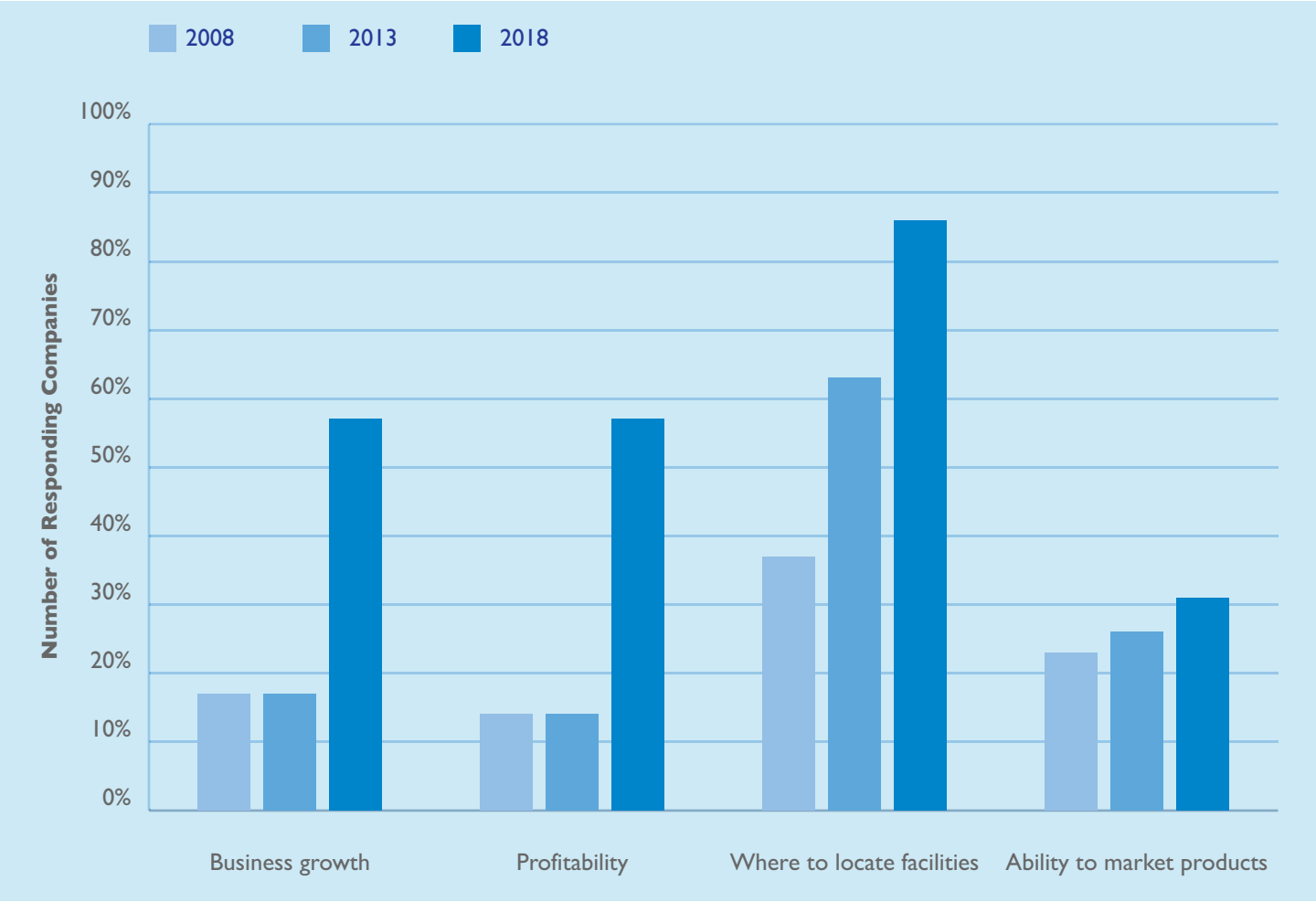


Figure 4: Water's Effect on Core Business Objectives

SECTION 2: GEOGRAPHIC LOCATION OF WATER-RELATED BUSINESS CHALLENGES

Water issues are local by nature, meaning a "one size fits all" approach cannot address the nuanced challenges that manifest for different companies, or even different branches of the same company. For example, a company using a relatively modest volume of water in a desert will likely have more immediate and significant water-related business risks than a company using much greater volumes of water in a region with plentiful supply.

It makes sense then that companies assess their water risk within a geographic context. Our survey affirms this: **of the 35 companies responding to this question, all 35 have already assessed water challenges on a geographic basis in an attempt to decipher which of their operations were most prone to water risk**.

In what regions in the United States are water challenges most prevalent for businesses?

A majority of responding companies indicated that they face water challenges in both the South and Southwest, while the Midwest and Pacific Northwest are also home to many companies facing water challenges. Figure 5 illustrates US regions where a high concentration of responding companies are facing water challenges. Large dots do not necessarily show where water challenges are most pronounced, but rather regions where there is both a high degree of perceived water challenges and a large industrial and business community, according to the survey.

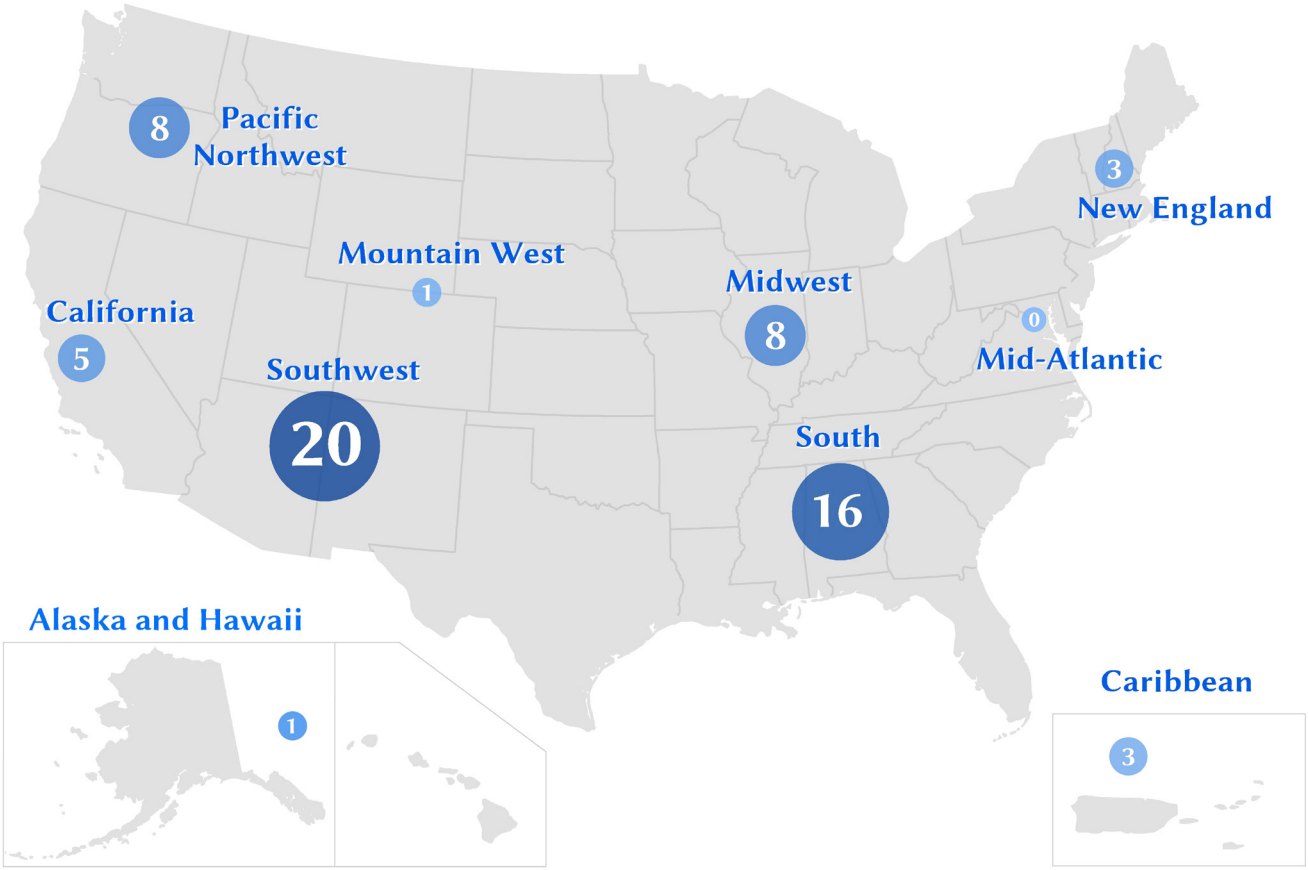


Figure 5: US Regions Where Survey Respondents Face Water Challenges

In what world regions are water challenges most prevalent for businesses?

Of all the regions in the world, the US was identified by the highest number of companies as having water challenges. Though this is to be expected given the geographic bias of the survey sample, it does serve to refute the notion that water challenges are largely "developing country" problems. Outside the United States, East Asia (China, Mongolia, Korea, Japan, etc.) and South Asia (Pakistan, India, Bangladesh, etc.) are also regions where water is a concern among many respondents, whether for their direct operations or supply chain. Figure 6 illustrates the world regions where survey respondents face water challenges.

The two maps shown above indicate geographies where water-related business challenges are seen as most prevalent and thus where many companies are prioritizing (or should prioritize) their water management practices. The maps also point to an opportunity for companies to tackle water challenges collaboratively, making use of online water stewardship coordination platforms, such as the CEO Water Mandate's Water Action Hub.[1]

1 The Pacific Institute, a co-author of this study, partners with the UN Global Compact to serve as the CEO Water Mandate Secretariat and has played an integral role in the creation and ongoing development of the Water Action Hub.

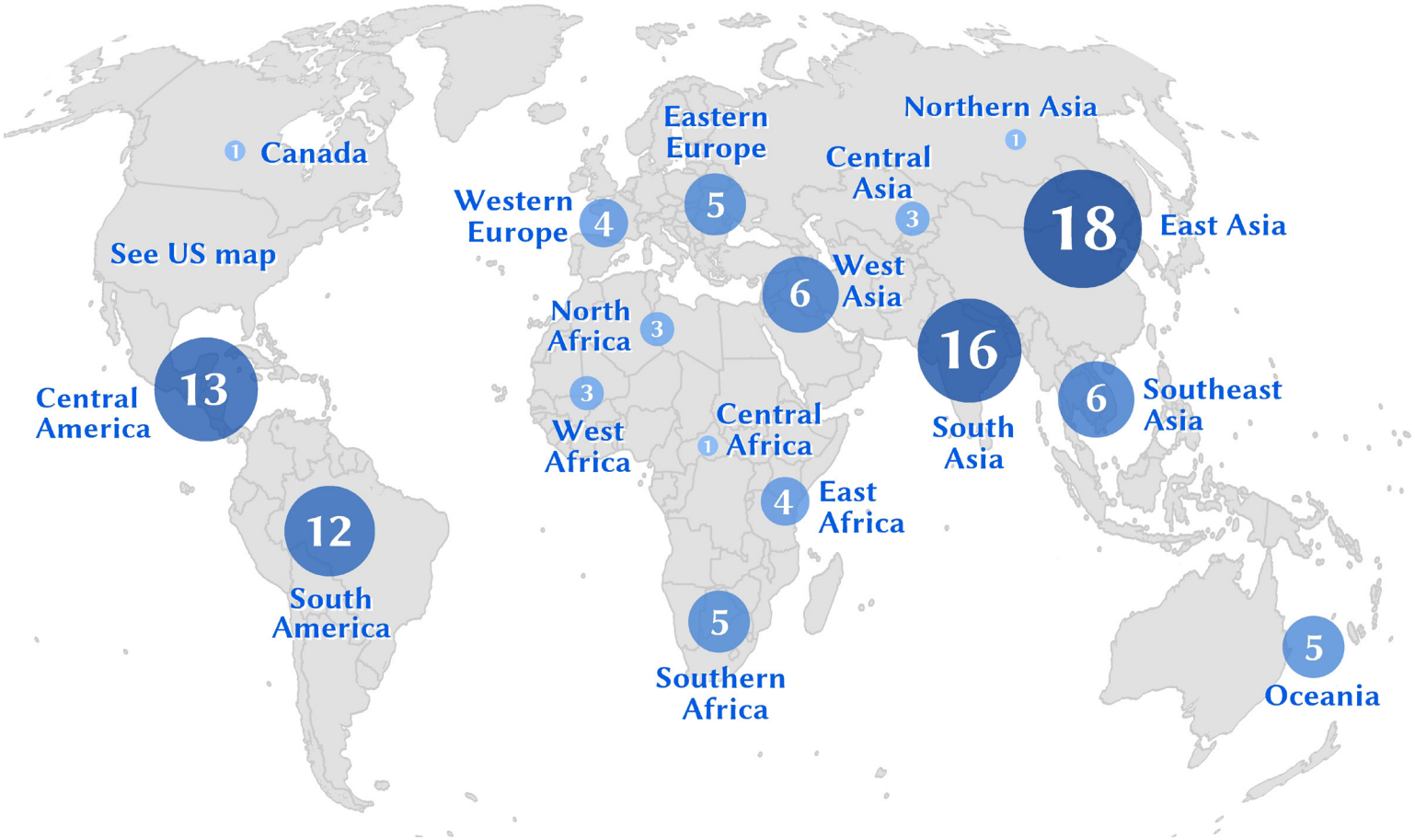


Figure 6: World Regions Where Survey Respondents Face Water Challenges

SECTION 3: HOW COMPANIES LEARN ABOUT AND STRUCTURE THEMSELVES TO MANAGE WATER CHALLENGES

Beyond simply asking whether and in what ways companies face water challenges, our survey explored how companies assess water challenges and manage responses. Results of our survey suggest that this happens in a variety of different ways.

How do companies evaluate the water challenges they face?

The vast majority of companies responding to the survey have already sought to better understand the water challenges they face through readily available resources aimed to help companies assess water issues. The majority of responding companies use multiple methods to gather information including conferences or meetings; publicly-available online water assessment tools such as WRI Aqueduct, WWF Water Risk Filter, WBCSD Global Water Tool and WFN Water Footprint Assessment Tool; and internally-developed water risk assessments. Figure 7 illustrates some of the means companies use to learn about water.

Respondents noted that there are several external factors driving water awareness in their company. A majority of companies believe that non-governmental organizations (NGOs) and advocacy groups play a significant role in increasing awareness of water risks, while company reputation ratings, customer expectations and competitive advantage concerns also play a substantial role. Over 70 percent of responding companies also indicate that their trade associations are discussing water, providing yet another avenue to learn more about the issue and develop solutions.

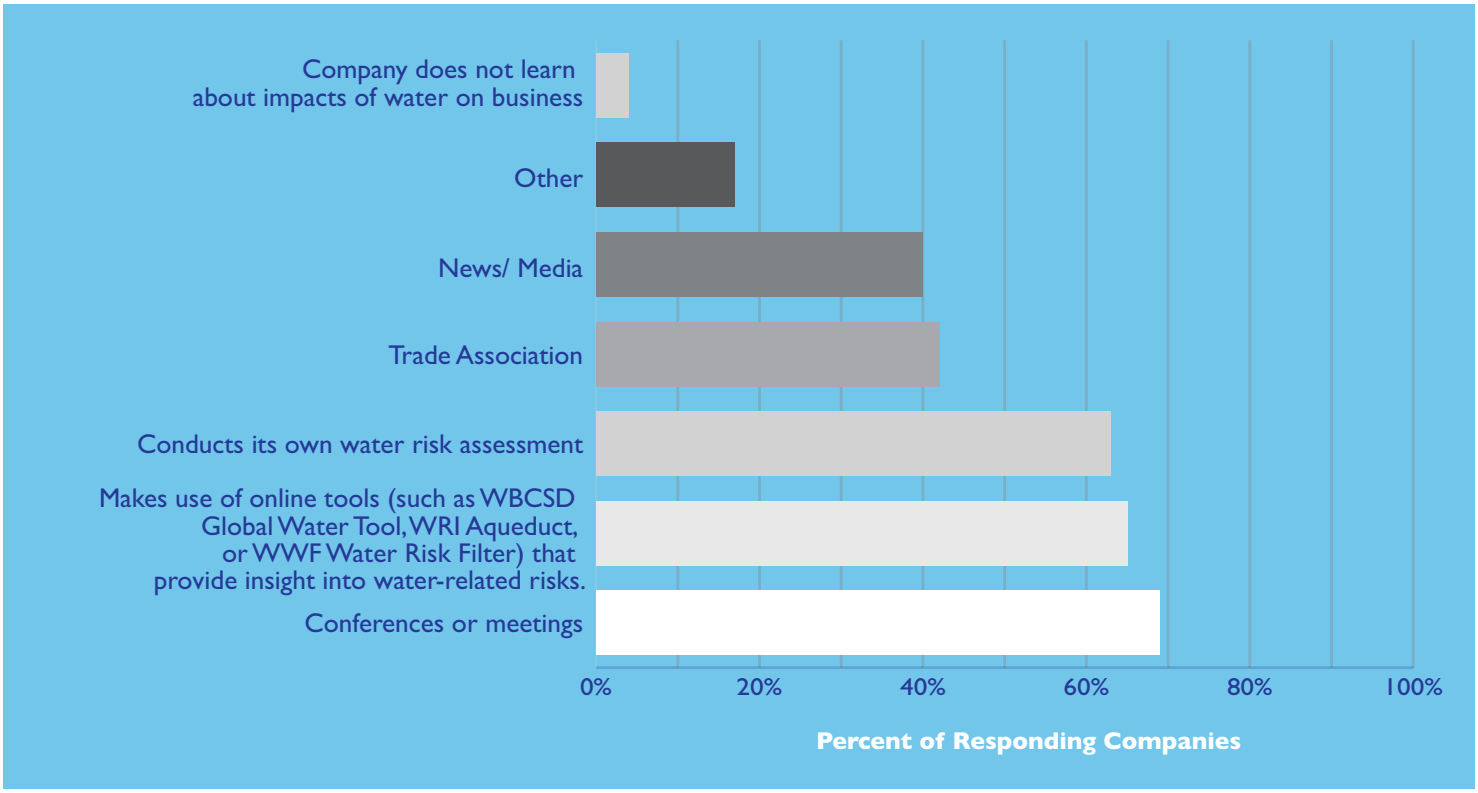


Figure 7: How Companies Learn About Water Challenges

Who within companies is responsible for managing water?

More than 95 percent of responding companies reported they have already established formal responsibility or accountability mechanisms for water. Companies noted that responsibility for identifying water issues and developing solutions typically resides in many departments and levels within a company, and even across these boundaries. Less than 40 percent have a single, company-wide risk manager that is responsible for assessing the cost and impact of water. Two-thirds of companies have water management responsibilities assigned to their Corporate Social Responsibility (CSR) / Sustainability departments, as well as to facility-level personnel. Figure 8 illustrates where responsibility for water issues resides among responding companies.

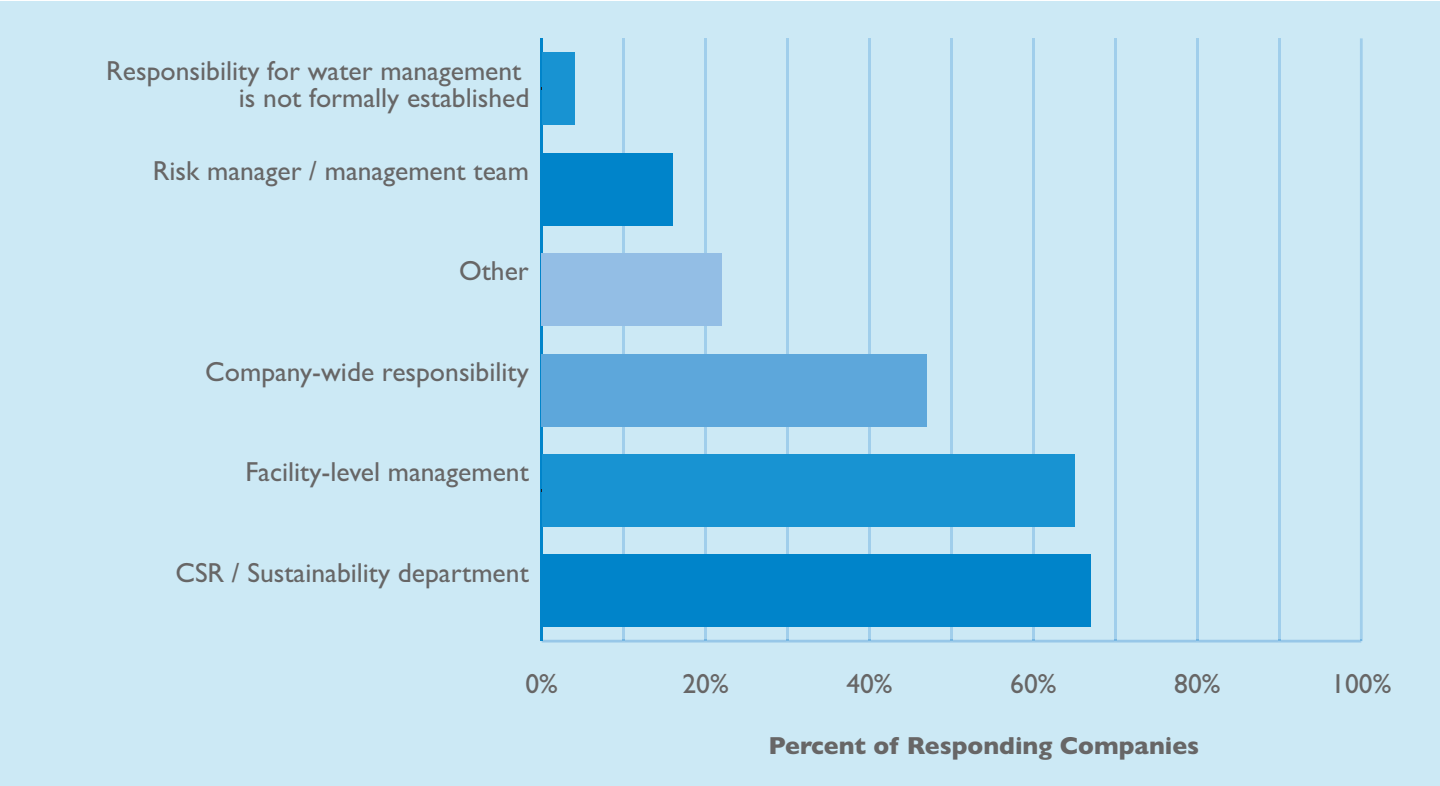


Figure 8: Responsibility for Identifying Water Issues and Developing Solutions

SECTION 4: EXISTING AND EMERGING CORPORATE WATER STEWARDSHIP PRACTICES

Next, we delve into the types of mitigation practices that companies are implementing now and planning to pursue in the future in order to address water concerns.

In order to gain insight into how companies value different types of water management practices, the survey asked companies to assess the current and future importance of 27 specific water practices on a scale of 1 to 5, with 5 being most important. Though these numbers do not signify anything on their own, they do shed light on the relative importance of different practices in the eyes of survey respondents. Further, the gap between perceived current and future importance to businesses provides some insight into whether companies believe there is untapped potential in these practices and whether they believe their current level of implementation is sufficient.

How are companies responding to water challenges?

More than two-thirds of survey respondents already have a formal, company-wide water policy, strategy or management plan in place, while four-out-of-five already report to implement some type of water management strategy at their facilities. However, **survey results also indicate that companies' approaches to water are highly diverse and multi-pronged, with a majority of companies pursuing numerous types of water-related practices**. This breadth of action reinforces the notion that companies believe water stewardship is not just about using less water, but understanding the context for that water use and communicating and engaging with external interests to address shared water concerns. Figure 9 shows the range of actions companies are currently implementing in response to water challenges.

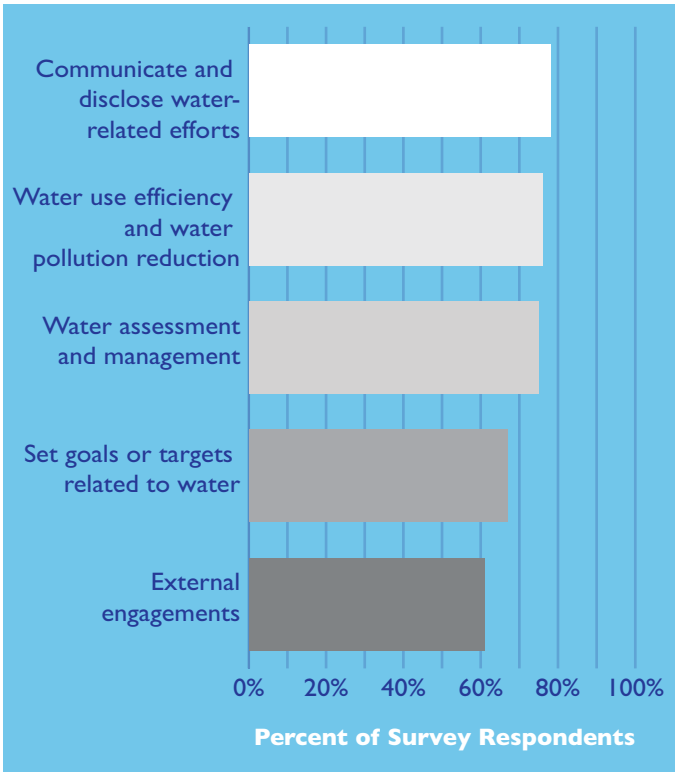
Figure 9: Types[1] of Water-Related Practices Companies Currently Implement

1 External engagements refer to company efforts to collaborate with other organizations, such as government agencies, NGOs, communities and other businesses to address shared water challenges and advance sustainable water management.

What types of water use efficiency and water pollution reduction practices do companies most value?

More than 75 percent of survey respondents are implementing some sort of water use efficiency or pollution reduction practices already, while the remaining responding companies all say that they will do so within five years.

The survey asked companies to assess the current and future importance of five specific operational water practices relative to one another. Companies indicated that "driving water use efficiency" and "treating wastewater discharge to meet local regulations" are the most important of these practices at present, though by a slim margin. In fact, survey responses suggested that companies believe all five operational practices listed are valuable both now and in the future. Figure 10 illustrates the perceived importance of these practices to companies.



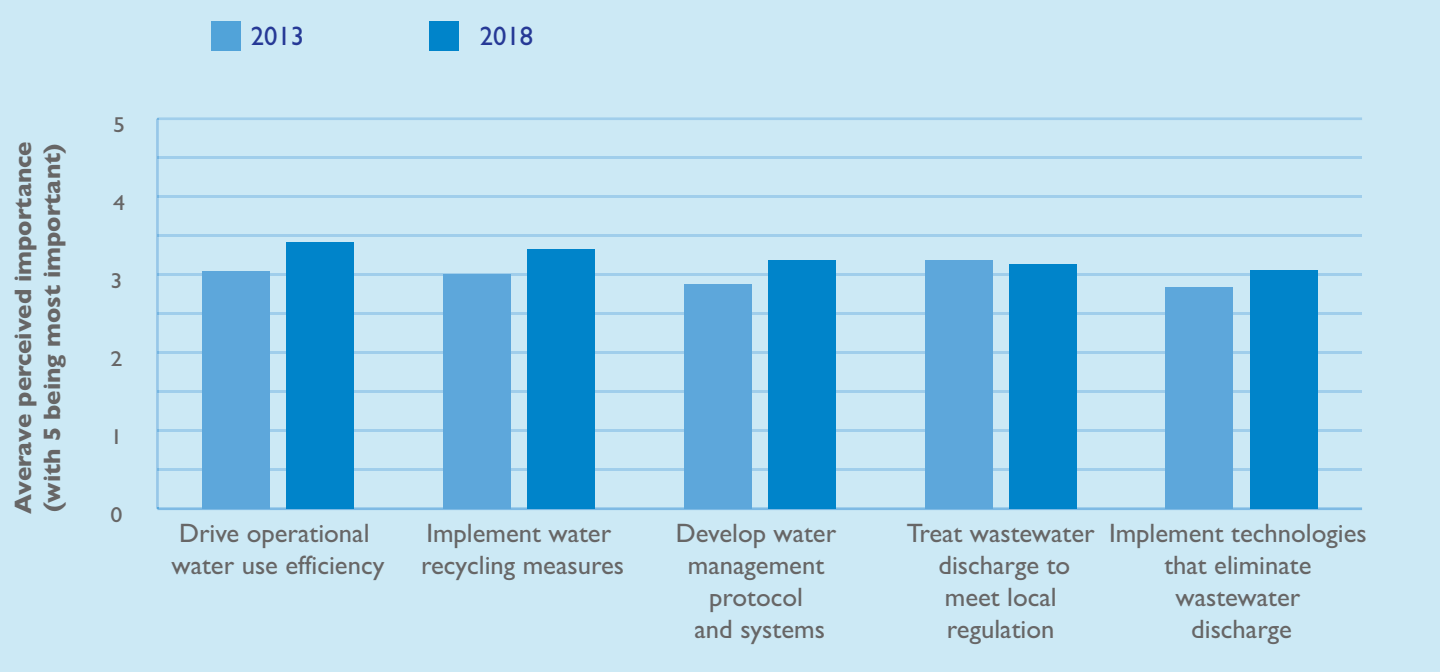


Figure 10: Perceived Importance of Various Water Efficiency and Pollution Reduction Practices

What types of water assessment and management practices do companies most value?

Three-out-of-four survey respondents already conduct water assessment and management practices of some sort or plan to within the next five years.

When asked to rate nine types of water assessment and management activities in terms of current and future importance to their business, survey respondents indicated that measuring and monitoring water use is by far the most important, followed by assessing the quality of water discharge. Though the practice of engaging stakeholders to develop effective response strategies was relatively far down the list of most important current practices of this type, companies consider it the second most important in the future. This suggests that though companies may not engage with stakeholders in this way now, they plan to in the near future and consider it critical to their water strategies moving forward. Figure 11 illustrates company perceptions of the importance of various water assessment and management practices.

To which external audiences are companies disclosing water-related information?

The most common type of water-related practice companies currently implement is reporting information to external stakeholders. Currently, 78 percent of survey respondents are reporting water-related information in some form of communication. The survey indicated that companies are reporting to a wide range of stakeholders, with a majority of companies reporting to the general public, investors, customers and communities in which they operate.

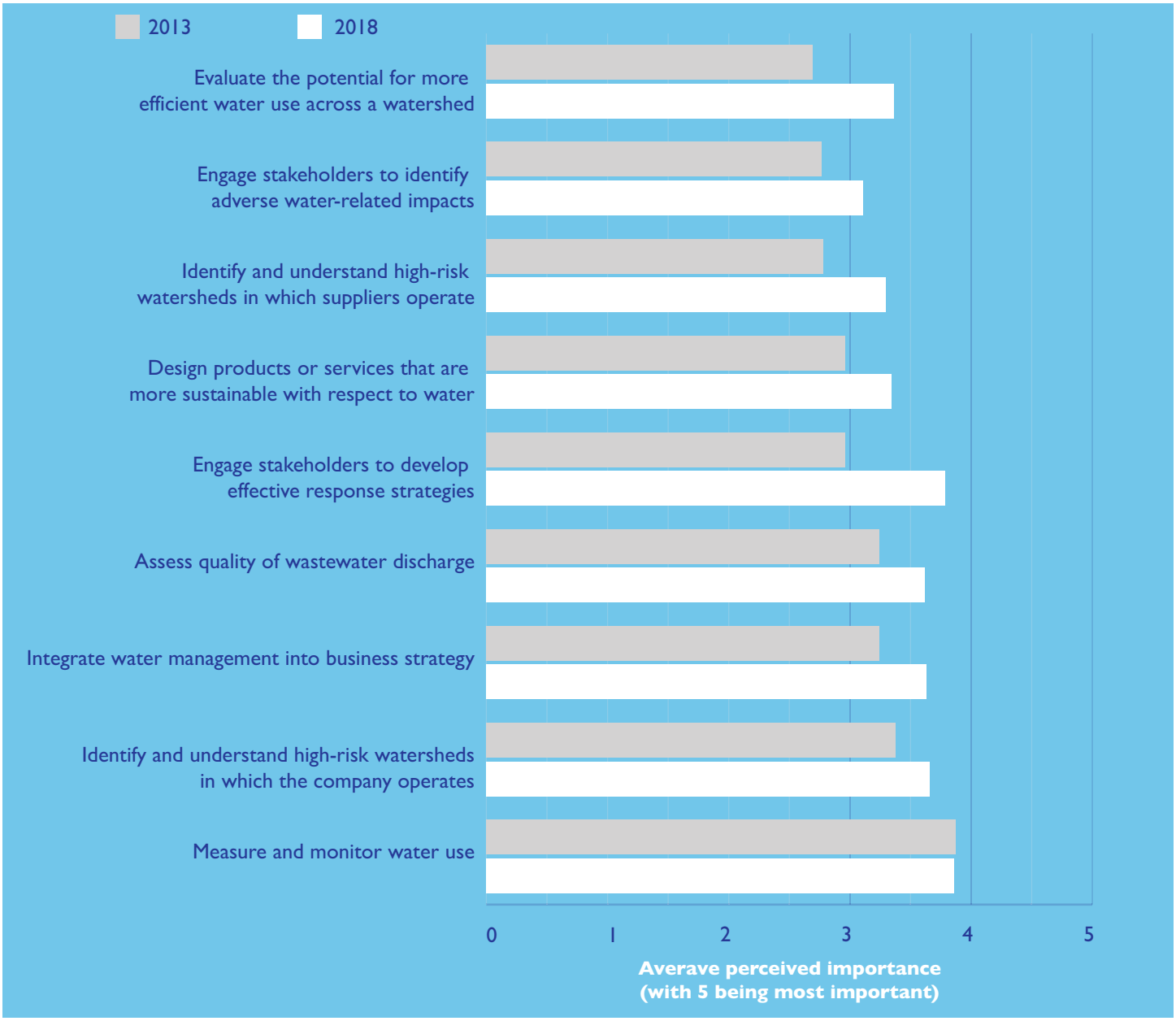


Figure 11: Perceived Current and Future Importance of Various Water Assessment and Management Practices

What types of water-related performance goals and targets are companies setting?

Two-thirds of survey respondents are setting goals and targets related to water. A majority of responding companies set goals related to both water efficiency improvement (i.e., water use normalized by another factor such as production) as well as overall reductions in water use. However, the number of companies setting other types of goals was relatively modest: **out of the 34 survey respondents setting water-related goals, fewer than half include a goal not related to water use (e.g., wastewater quality or community access to water)**. Figure 12 shows the various types of water-related goals and targets companies are setting.

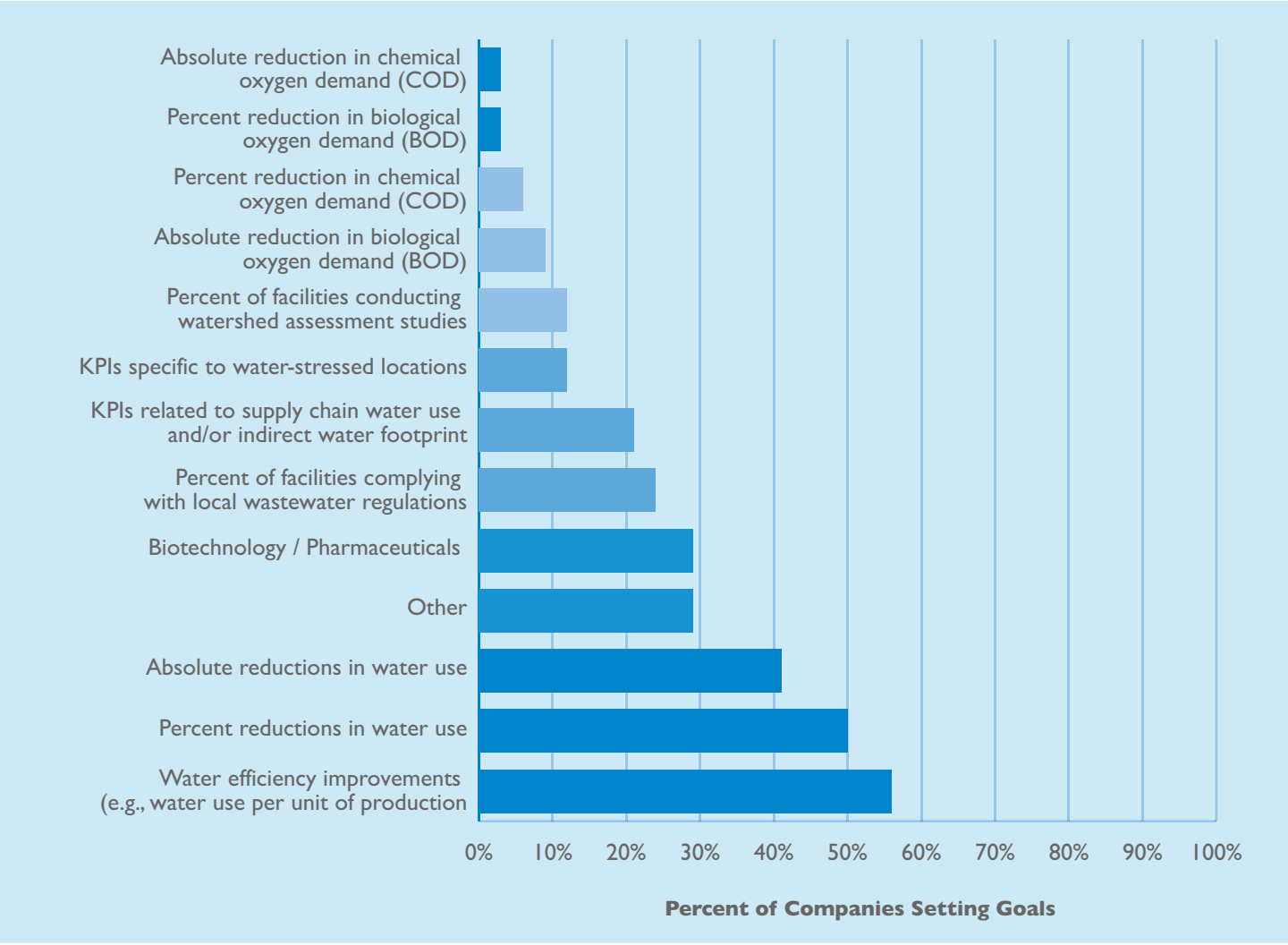


Figure 12: Types of Water-Related Goals and Targets Set

What types of external engagement related to water do companies most value?

Many companies also choose to implement practices that focus on looking beyond their own operations to drive sustainable public water management and in so doing manage water challenges shared by businesses, governments, communities and others alike. Though external engagement is the least implemented type of water-related practice assessed in the study, still **three-out-of-five survey respondents implement some sort of external engagement,** while two-thirds plan to do so within the next five years.

Our survey asked companies to rate the current and potential future importance of 13 types of external engagement related to water. Though companies do not prioritize external engagements to the extent they do operational practices and assessment at this point, they do value some types of external engagements, namely participating in trade associations and other industry sector groups, sharing or gathering water data and aiding the development of water infrastructure. They also identified collective action, facilitating sustainable water use among others across their watersheds and leveraging improved performance among their suppliers as practices that will be particularly important in the future. The greatest discrepancy between current and future importance related to supply chain engagement, suggesting that there is great untapped potential in that practice area. Figure 13 takes a closer look at the perceived importance of various water-related external engagement activities.

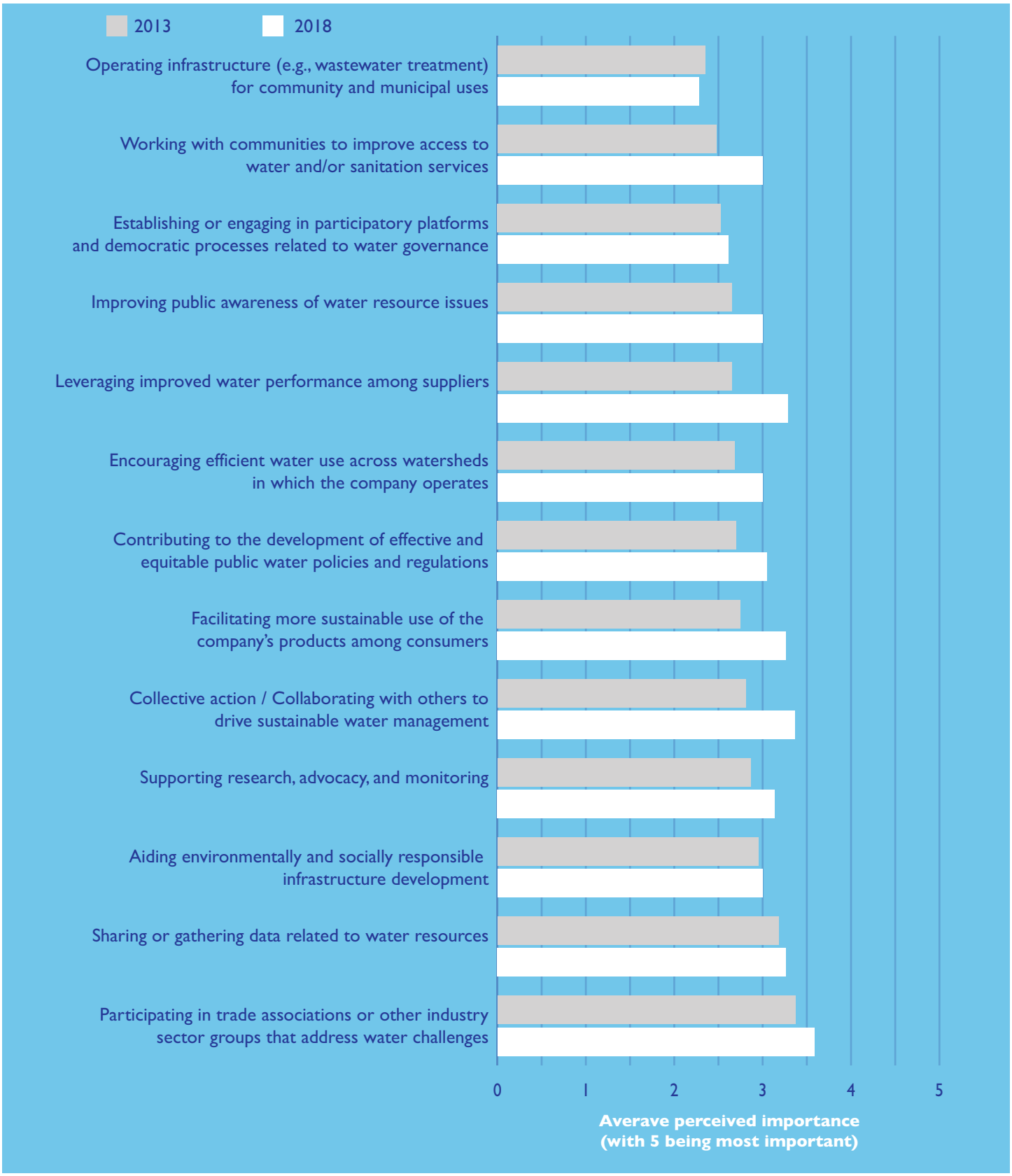


Figure 13: Perceived Current and Future Importance of External Engagement Practices

What water practices have proven to be of greatest value to companies overall?

When considering all operational, assessment and engagement practices included in the study, the following practices (in order of importance) were deemed most important to companies (all scoring 3 or above on a scale of 1 to 5):

- *Measure and monitor water use*
- *Identify and understand high-risk watersheds in which the company operates*
- *Participate in trade associations or other industry sector groups that address water challenges*
- *Integrate water management into business strategy*
- *Assess quality of wastewater discharge*
- *Treat wastewater discharge to meet local regulation*
- *Share or gather data related to water resources*
- *Drive operational water use efficiency*
- *Implement water recycling measures*

Three of the top five most important current practices were related to assessing internal operational conditions and external watershed conditions. Four of the top five practices deemed most important in the future relate to assessment, suggesting that companies believe water assessment and analysis is critical to properly managing water challenges and risks.

The practices with the greatest differential between current and future perceived importance, and thus those with perhaps the most potential expansion in terms of companies' corporate water stewardship practices, were:

- *Engage stakeholders to develop effective response strategies*
- *Evaluate the potential for more efficient water use across a watershed*
- *Leverage improved water performance among suppliers*
- *Collective action / Collaborating with others to drive sustainable water management*
- *Work with communities to improve access to water and/or sanitation services*
- *Identify and understand high-risk watersheds in which the company's key suppliers operate*
- *Facilitate more sustainable use of the company's products among consumers*

Three of the top five practices in this respect are related to external engagement, suggesting that many companies appreciate that robust water management relies upon actions beyond the company fenceline to encourage and facilitate sustainable public water management.

SECTION 5: A CLOSER LOOK AT FIVE COMPANIES AND WHY AND HOW THEY ADDRESS WATER CHALLENGES

In addition to the online survey that we've been discussing until now, the project team also conducted a series of company case studies to dig deeper into how specific companies view and respond to water challenges. This process allowed a more nuanced view of how water affects a wide range of industries in a variety of different ways, how companies decide to address water challenges, and how they envision their water-related practices will expand and evolve over time. This section describes key findings from these case studies and lessons learned that may be helpful for other companies facing similar challenges.

AT&T

Industry overview of water risk

As wireless technology use continues to expand and the amount of data sent over airwaves grows exponentially, more energy and water will be needed to help maintain the daily operating integrity of the facilities that house the network.

Water Risk Indicators: Technology	Importance
Physical Risk: Quantity	
Baseline Water Stress	*Very High*
Upstream Storage	*High*
Groundwater Stress	*High*
Physical Risk: Quality	
Return Flow Ratio	*Very High*
Upstream Protected Land	*High*
Reputational & Regulatory Risk	
Media Coverage	*High*
Threatened Amphibians	*High*

Source: Aqueduct Water Risk Atlas, World Resources Institute, 2013.

Water plays an integral part in providing the evaporative cooling needed for maintaining constant temperatures at these facilities. Companies that transmit, collect and store data need to make decisions regarding the water efficiency of their operations, especially if located in drought-prone or water scarce regions of the United States.

Overview of AT&T

AT&T is one of the world's largest telecommunications companies. With a powerful array of network resources AT&T is a leading provider of wireless, Wi-Fi, high speed Internet, voice and cloud-based services.

Water impacts AT&T's business operations in ways perhaps not readily apparent to the public. As the global economy becomes more digitized, the need for water used to cool servers and other technical equipment could increase, posing a potential risk in some regions. Through the use of cooling towers, the company uses water to cool many of the facilities that house the equipment through which data is transmitted to and from AT&T's customers. AT&T has assessed its water impact annually since 2010, when it worked with a group of MBA students from Vanderbilt University to first calculate the company's water footprint. From its annual assessments, AT&T found that its top 125 water-consuming facilities — a small percent of its total real estate square footage — accounted for nearly half of the company's total water

use. Further, 31 of these facilities were in water stressed regions. In 2012, AT&T used 3.3 billion gallons of water companywide, and approximately 1 billion of that was for cooling tower operations.

Driving innovation through collaboration with Environmental Defense Fund

AT&T was interested in working with an environmental organization that could help identify economical solutions to significantly reduce water and energy use associated with cooling facilities. Environmental Defense Fund (EDF) brought expertise about water efficiency, but more importantly, it also brought the business acumen to help build a compelling business case for water and energy efficiency. Further, in order to maintain its independence, EDF does not accept any funds from its corporate participants. EDF's involvement therefore brought added credibility to the company's water commitment, something also important to AT&T.

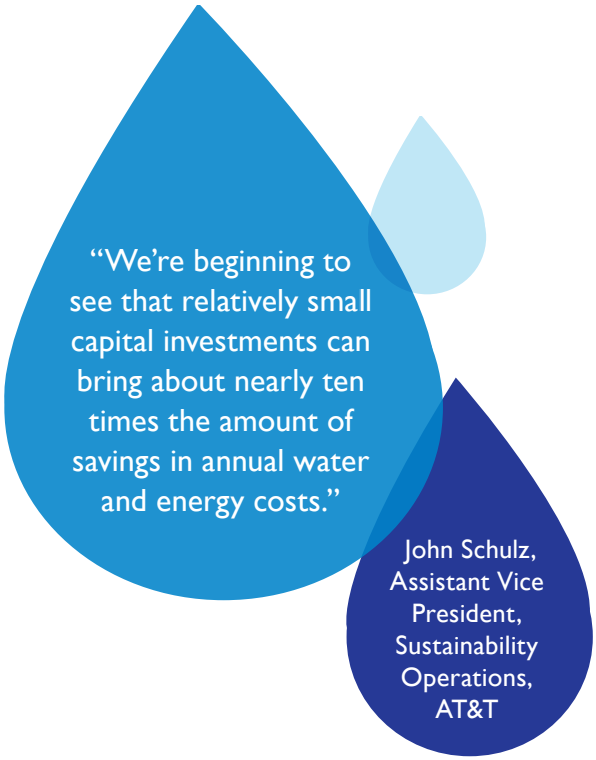
EDF's approach to corporate participants is to select a company that is an industry leader, either in market share or size of operations. EDF does so because working with a large company increases the potential to scale the solutions it develops across many industry sectors. The tools developed through such collaboration work to gain additional credibility in other companies' eyes, as the tools have already been tested in real-world circumstances and have produced measurable results. AT&T, as one of the largest telecommunications companies in the U.S., provided the opportunity for collaboration with wide-reaching impacts.

Developing pilots and tools to test

AT&T and EDF developed three types of pilot projects to determine the greatest opportunity to reduce water and energy use at cooling towers. The three pilots explored technical solutions, free air cooling and operational changes that could bring about better water management techniques. They found that free air cooling and upgrades to higher efficiency cooling tower equipment offered the best potential for reducing water use, with potential for annual water savings ranging between 14-40 percent. They also developed an innovative toolkit, WaterMAPP, that provides the essential tools and resources for a company to develop a facilities-based water efficiency program. The toolkit provides information about how efficient a building's water use is, with a focus on helping the facility managers to measure and optimize water, energy and chemical use at the cooling tower. This tool is one of several resources, all freely accessible by other companies, that can be used to manage and reduce water, energy and chemical usage in buildings with cooling towers.

Preliminary results

Working with EDF, the company developed its first set of water-related goals, including the goals to reduce water use by approximately 150 million gallons of water by 2015 and realize 400 million kWh in annualized electricity savings from air cooling projects by 2015. Early results from implementing water efficiency projects have shown significant savings in water, sewer, chemical and energy costs. For example, a cooling tower filtration system that was installed at an AT&T facility cost less than $100,000 but has returned more than $60,000 a year in water and sewer savings alone. At one site using free air cooling, AT&T implemented a $4,000 upgrade



to the cooling system that has returned a savings of nearly $40,000 per year. For a small initial capital investment, AT&T has found that it can achieve a significant ROI in water and energy costs in a short amount of time.

Lessons learned: Building the business case for water

Since water is cheap (for now), companies need to understand all of the savings that can be realized from water efficiency projects — including not just the cost of water coming into the facility, but also the savings on sewer, energy and chemicals. Building a strong business case for water efficiency that ties all of the costs together is critical in gaining executive attention and support. Also, it's important to be strategic and focused about where water risk is greatest within a company's operations. For example, a company should focus on cooling tower facilities in a drought-prone region where maintaining adequate water supplies may carry unforeseen costs, such as trucking in water during times of shortage. Environmental NGOs such as EDF can provide subject matter expertise while the company provides the testing ground for building important tools such as WaterMAPP. These strategic corporate relationships can produce high-value outcomes such as these tools, which then become crucial resources that companies can use to build the business case for efficiency.

CUMMINS

Manufacturing industry overview of water risk

Water is critical for many aspects of the manufacturing process including fabrication, washing, diluting, cooling, product transport and sanitization. Based on the results of a study by Ceres and Pacific Institute, manufacturing operations that produce steel, metals or heavy machinery have the greatest water withdrawal and discharge intensities upstream in the supply chain during the mining and raw material processing phases of their product value chains (Ceres 2009). As these are the most water intensive aspects of the manufacturing process, they are also the most vulnerable to water-related risks. Additionally, operations located within water scarce regions meet additional challenges from limited water supplies and stringent regulations. To minimize risk and potential operational interruptions, companies should take steps to monitor on-site water use and manufacturing processes in order to improve water use efficiency throughout their operations.

Overview of Cummins Inc.

Cummins Inc. is a multinational Fortune 500 corporation that designs, manufactures, distributes and services diesel and natural gas engines and related technologies, including fuel systems, controls, air handling, filtration, emission solutions and electrical power generation systems. While global in scope, the company is headquartered in Columbus, Indiana. Cummins employs approximately 47,900 people worldwide and serves customers in approximately 190 countries.

Water Risk Indicators	Mining	Chemicals	Construction Materials
Physical Risk: Quantity			
Baseline Water Stress	*Very High*	*High*	*Very High*
Upstream Storage	*Medium*	*Medium*	*High*
Groundwater Stress	*Very High*	*High*	*High*

Source: Aqueduct Water Risk Atlas, World Resources Institute, 2013.

Cummins addresses its environmental impact through an enterprise environmental management system that focuses on using metrics and baseline data to drive continual improvement of resource conservation and efficiency in manufacturing processes and facilities. Through site level efforts within this program alone, the company has successfully reduced its total water consumption globally by about 24 percent since 2008, a 47 percent reduction when normalized to labor hours.

Launching a global water strategy

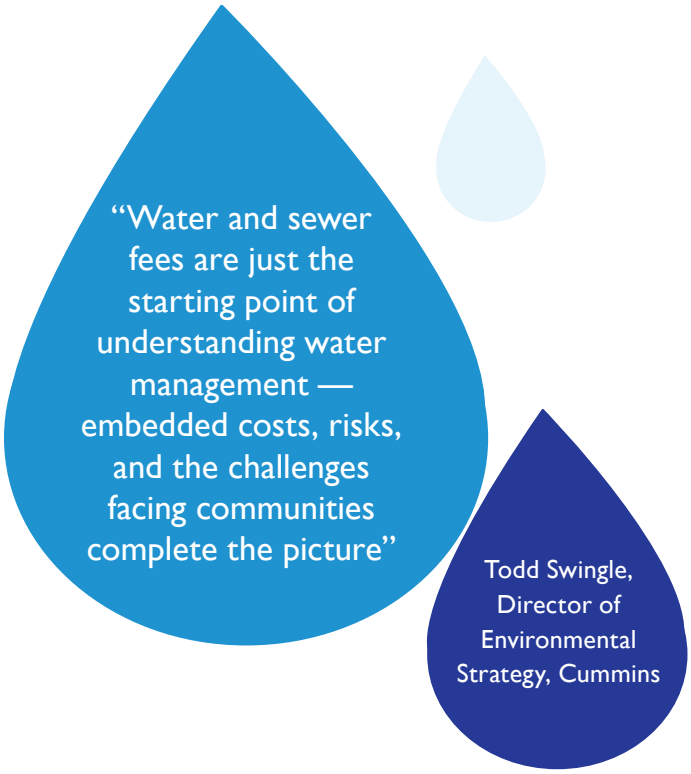
Recognizing the rising global importance of water, Cummins launched an initiative to develop a comprehensive water strategy that would improve the company's water management. The Cummins environmental team developed the strategy using data from four inputs: 1) interviews with senior company leadership, 2) peer group and industry leader benchmarks, 3) gap assessments using the Ceres Aqua Gauge tool and 4) a global risk screen (GRS). The strategy addresses water management in four elements: conservation, business operations risk, community engagement and supply chain.

Perhaps one of the most important results of developing the Global Water Strategy was the Global Risk Screen (GRS). Combining the results of the GRS tool with an internally developed water efficiency score allows Cummins to systematically target its actions and ensure effective use of resources to achieve impactful results. Thus, prioritized facilities within the Company's operations have been targeted for on-site water audits that: 1) assess water conservation and efficiency opportunities present at the site, 2) develop a more refined understanding of site level risk exposure and mitigation opportunities, 3) educate local staff on the complexities of emerging water management topics and 4) support cross-pollination of best practices.

Enhancing water conservation

The relatively low price of water creates an obstacle to driving improvement in site level performance with little or no economic incentive apparent on many projects. Cummins has found that the true cost of water is often masked by the complexity of water systems. Many direct costs such as pumping, electricity and chemical usage are often not accounted for when evaluating a project. When one takes these factors into account with water scarcity, the cost of water consumption increases.

Cummins has developed a tool that identifies water costs embedded in activities such as pumping, electricity and chemical use. Using this tool at an engine plant in Columbus, Indiana, Cummins measured the fully embedded cost of water exceeded $20 per thousand gallons when incorporating the cost of energy required for heating, over five times the basic water and wastewater cost of under $3 per thousand gallons. Calculating the total cost of water is critical to helping water projects compete, driving efficiency efforts, as well as assessing and understanding risk exposure to drive further actions that would otherwise not be considered viable.



Lessons learned: Assessing and mitigating water risk

Cummins aims to proactively drive facility and operational design choices that effectively mitigate risk. Through a variety of metrics that provide detailed information about the intensity of water use and the type of operations, Cummins uses the information to identify opportunities to improve and benchmark water use. Deployed within the recently enhanced GRS tool are design specifications that apply to higher risk, water scarce environments. Though efforts at improving water efficiency and accountability have occurred in a decentralized fashion, centralized tools such as the GRS tool help Cummins share lessons across operations, increasing the scale and impact on water resource use and risk management. Through its efforts in identifying true costs and risk and inefficiencies in water use, Cummins is able to build a more sustainable global operation instead of waiting until the cost to act becomes too high. These activities help to prepare the company to better mitigate future water-related risks and challenges.

THE HERSHEY COMPANY

HERSHEY'S®

Food manufacturing industry overview of water risk

Water Risk Indicators: Food & Beverage Industry	Importance
Physical Risk: Quantity	
Baseline Water Stress	*High*
Upstream Storage	*High*
Physical Risk: Quality	
Return Flow Ratio	*High*
Reputational & Regulatory Risk	
Media Coverage	*High*

Source: Aqueduct Water Risk Atlas, World Resources Institute, 2013.

Water is an important input for the food manufacturing industry in many junctures of the process including agricultural product production, cleaning, rinsing and processing. Food processing and manufacturing businesses are at risk if there are threats to the quality or quantity of their water supply. According to a report by Ceres and Pacific Institute on Water Scarcity & Climate Change, the highest levels of water withdrawal and discharge intensity in the food industry occur in food crop and livestock production, with nearly 60 percent of the world's freshwater withdrawal used solely for agriculture irrigation (Ceres 2009). Large amounts of water withdrawal are required for freshwater rinsing, cleaning and also the direct operations of meat and food processing and distribution. Ensuring high quality standards of water supplies is important for many sub-sectors of the food industry including dairy, fresh fruits and vegetables, as they all require water as an input in the processing of food products.

Overview of The Hershey Company

The largest chocolate producer in North America and one of the largest confectioners in the world, The Hershey Company, with headquarters in Hershey, Pennsylvania, employs approximately 14,000 employees at facilities around the world and delivers its products to about 90 global markets. Established in 1894 when founder Milton S. Hershey began making chocolate at his caramel factory in Lancaster, Pennsylvania, The Hershey Company has been producing chocolate and other confections such as Hershey's Kisses, Reese's, Ice Breakers and Jolly Ranchers for nearly 120 years.

Ensuring an abundant supply of high quality surface and ground water was important to the founder when locating the first chocolate factory in Hershey, Pennsylvania. Water is critical for the company's manufacturing facilities during its processing and cleaning operations. It is also an important ingredient for making and cooling chocolates and confections. Because of the importance of having an abundant supply of high quality water to guarantee the production of chocolate, The Hershey Company is currently working to conserve and improve water efficiency in their manufacturing processes.

Leveraging water audit results for water management

Over the past several years, The Hershey Company has been working to gain a better understanding of its impacts on water supplies in the regions that the company operates. To do this, between 2009 and 2010, the company conducted water-use audits at eight of their wholly owned plants in North America and Mexico. By working with a third party technical engineering firm with water management expertise, The Hershey Company has identified priorities, opportunities and recommendations that improve conservation and water management. Some opportunities have included the reuse of treated wastewater in cooling towers and the installation of efficient devices that reduce the amount of blowdown required in the cooling towers. Additionally, The Hershey Company has replaced high

volume hose nozzles with low flow nozzles, cutting down on water use in facilities.

In 2011, the company established a baseline water consumption measurement of 550 million gallons of water consumed per year and has been working to cut its normalized water consumption in its manufacturing operations by 58 bps from 2009 to 2012. Following this first round of audits, the company initiated water-use audits at all of its facilities, beginning with the Stuart's Draft, Virginia plant. This audit has served as a model for developing and implementing a water management strategy at other facilities.

Building upon the auditing efforts, The Hershey Company formed a comprehensive water management plan which was implemented in 2012. The water management plan is focused on three parts:

- *Establish priority areas for action through water use assessments*
- *Measure facility-based water use at all facility locations*
- *Expand employee education on issues of water conservation and use efficiency*

Additionally, efforts are underway to establish project review criteria that assess wastewater and water use metrics in order to fully incorporate water into The Hershey Company's business strategy.

External and internal drivers for action

Participation in reporting initiatives such as the CDP Water Disclosure Project and the Dow Jones Sustainability Index (DJSI) has provided The Hershey Company with an opportunity to gain added perspective on its water management practices. The Hershey Company found that since they were not necessarily seeing water stress or scarcity issues within the primary manufacturing footprint of the company, the company didn't have the focus that was expected of the food processing industry sector. Participation in the reporting initiatives and evaluation of its peer group's efforts provided the incentive for The Hershey Company to be proactive with its water management. Subsequently, The Hershey Company has integrated water use and efficiency into its business practices by placing water within the framework of the company's corporate culture.

The company's corporate culture is such that often solutions to issues are found by the creation of task teams made up of employees from several different business units. The water use audit results were placed in this same framework, forming a water conservation task team that identified priority goals and projects to direct the company's water conservation efforts. The team brought together mid-level management representatives from several functional areas: Corporate Social Responsibility; Environmental, Health & Safety; Energy & Utility Engineering; Operations; Distribution; and Finance. This cross-functional team, with its desire and expertise to influence the company's water conservation, has bridged business units and has resulted in water conservation measures being implemented across operations.

Lessons learned

The Hershey Company recently joined the Advisory Council of the Sustainability Accounting Standards Board, the Sustainability Consortium and the Conference Board Sustainability Council. The company views these external engagements as opportunities to share its practices and learn from other sustainability leaders on a broad spectrum of issues and activities, including water conservation.

By utilizing internal resources and expertise such as the water conservation task team, The Hershey Company has successfully incorporated water as a part of the company's culture and is now working to reduce its total water consumption by 10 percent by 2015. Steps The Hershey Company has taken that have led to its success have included:

- *Establishing a mechanism to monitor/measure incoming water and wastewater.*
- *Utilizing comprehensive water audits as a mechanism to identify water reduction opportunities.*
- *Developing and implementing a water management plan or program.*
- *Establishing goals and targets based on measurement and audit findings.*
- *Monitoring and reporting on progress against goals and targets.*
- *Developing and implementing an employee water conservation education campaign.*
- *Participating in voluntary reporting initiatives and tracking results of a peer group.*

Though neither water stress nor scarcity was an initial focus of The Hershey Company, its participation in reporting frameworks and engagement with its peers has helped integrate water into its business operations.

MILLERCOORS

Beverage industry overview of water risk

Potable water is a principal and non-substitutable ingredient for beverage products. Water scarcity or contamination of water sources may force bottling or manufacturing facilities to shut down or relocate. Beverage manufacturing requires potable water, often drawing from the same water sources as local populations.

Water scarcity may result in:

- *Policy changes to regulate water use*
- *Rising water prices*
- *Caps on the amount of withdrawal*
- *Suspension of water use rights of certain users*
- *A decrease in the yield and quality of important crops such as barley and hops.*

Overview of MillerCoors

MillerCoors is the second largest brewer in the United States. Today, MillerCoors' eight breweries and other facilities employ nearly 9,000 people. Its facilities are found in 10 cities across the United States. Its notable products include Miller Lite, Coors Light, Redd's Apple Ale and craft brands such as Blue Moon, Crispin and Third Shift.

From the barley field to the bottling line, water permeates MillerCoors' entire production process. MillerCoors has been taking steps to account for water use at every step of its supply chain since 2008, when the company set water efficiency goals and developed a strategy for water efficiency, wastewater management, watershed mapping, water footprinting and community investments.

Preserving water for MillerCoors and local communities

As a first step, MillerCoors conducted two watershed risk assessments: brewery locations experiencing water risk and

Water Risk Indicators: Beverage Industry	Importance
Physical Risk: Quantity	
Baseline Water Stress	*High*
Upstream Storage	*High*
Physical Risk: Quality	
Return Flow Ratio	*High*
Reputational & Regulatory Risk	
Media Coverage	*High*

Source: Aqueduct Water Risk Atlas, World Resources Institute, 2013.

risk within the agricultural supply chain. In assessing water risk across its breweries, MillerCoors identified three of the eight breweries in water scarce or stressed regions: the Texas, Colorado and California facilities. MillerCoors partnered with local nonprofits and began to pilot specific water conservation initiatives. The company's efforts in Texas illustrate the type of conservation practices it is implementing in other water stressed regions across its footprint.

Sand County Foundation and MillerCoors

Following its brewery water risk assessment, MillerCoors partnered with the Sand County Foundation in 2009 to build a multi-faceted, long-term partnership to work with landowners to produce measurable improvements in quantity and quality of water in the region. Beginning with the Trinity River Basin of Texas — a critical watershed that provides water for the Dallas, Fort Worth and Houston communities, as well as the MillerCoors Fort Worth brewery — the Sand County Foundation engaged with leading landowner conservationists to help launch the Water as a Crop™ pilot initiative to benefit many stakeholders including landowners, industry, municipalities and communities. The initial partnership included Trinity Waters, Texas A&M University and the Texas Department of Parks and Wildlife. Efforts have since grown to include over sixty land owners and over twenty public and private partners including the National Resources Conservation Service, the Navarro and Ellis County Soil and Water Conservation District, the Tarrant Regional Water District, the U.S. Fish and Wildlife Service and the Texas State Soil and Water Conservation Board.

Beginning with the Water as a Crop™ pilot initiative that has since expanded to the National Water Quality Initiative, MillerCoors has worked with ranch owners to test various conservation practices and land management techniques such as riparian buffers, improved rotational fencing techniques and the use of native prairie grasses to keep more water in the soil. Additional goals for the initiative included communications and stakeholder engagement to share and scale up results from the pilot tests as well as to make policy recommendations for approaches to improving water quality, quantity and reliability.

Initial results of the pilot project, supported by monitoring efforts of Texas A&M University, show that native grass vegetation grown in the Trinity watershed region retains about 40 percent more water in the soil than non-native prairie grass vegetation. By growing native grasses, soil quality improves, soil erosion decreases and more water is kept in the soil, preserving the health of the land and the surrounding watersheds. Both the local ranchers and the communities benefit from these improvements.

Lessons learned: Success working with local communities

By initiating small scale projects in partnership with communities, MillerCoors can test new methods on a small-scale, whether growing new barley varieties or using native vegetation for water conservation. Pilot projects, limited in scope and scale, pose minimal risk to those involved. By implementing these projects and sharing lessons and successes through community meetings, social events and publications like Better Barley, Better Beer, MillerCoors has facilitated change and improved water management within both its communities and its supply chain. These partnerships not only benefit MillerCoors' operations but also improve the water management techniques across entire watersheds.

UNION PACIFIC

Overview of water risk to rail industry

Extreme temperatures, changes in precipitation, drought or an increase in the number or intensity of extreme weather events in the United States can negatively affect rail transport operations and infrastructure. Drought and excessive heat can cause rail infrastructure to expand and buckle, creating challenging conditions for train use. Excessive rain and rising river levels can lead to washouts and embankment erosion, damaging railroad infrastructure. Without proper planning and anticipation of the potential impacts from such extreme weather, unexpected infrastructure maintenance leads to costs incurred by railroads.

Rail transportation is also susceptible to commodity or freight production fluctuations. Supply fluctuations in commodities such as coal, chemicals and farm products can have impacts on the costs or total loads transported. Thus, there is a potential for water risk in other industry sectors, such as chemicals or agriculture, to have a downstream effect on transportation company bottom lines.

Overview of Union Pacific

Union Pacific Railroad operates over thirty-two thousand miles of track in 23 states and touches over seven thousand communities. The company transports products including corn, soybeans, coal, sand, timber, military equipment, wind turbines, fresh produce and consumer goods.

Overall, water usage poses a relatively low risk to the business; Union Pacific places greater emphasis on locomotive fuel, electricity and natural gas fuel efficiency. That said there are five ways in which water impacts the company's operations, suppliers and customers:

- *Water use in maintenance*
- *Storm water management*
- *Water wells*
- *The legacy of providing water to communities*
- *Water use by its customers*

The Environmental Management Group at Union Pacific oversees the company's water management. Water is considered within the company's environmental policy, and the company does not have a separate water management policy.

Maintenance & operations

Union Pacific estimates that it consumed 2.55 million gallons of water in 2012 for its operation. Among other uses, water is used as a locomotive coolant and for washing locomotives and other equipment. This process generates wastewater that must be treated before being discharged to the environment. The company owns and operates 90 wastewater treatment facilities to accomplish this treatment. The company is committed to complying with national water quality standards and regulations. Tools like low flow filters help Union Pacific reduce water usage; other processes limit the amount of wastewater that is treated and discharged.

Water wells

From the 1800s into the mid-1900s, steam locomotives required wells along the rail to replenish water supplies. As Union Pacific expanded its tracks over the years, it maintained hundreds of wells. Today, the company uses diesel engines to power its trains, and Union Pacific is decommissioning these wells. In addition to encouraging water conservation, in 2012, Union Pacific completed its most significant water initiative to close abandoned water wells across their territory, ensuring environmental compliance and removing safety hazards. This seven-year project involved closing wells originally required to supply water for steam locomotives, shops and section houses. Data review identified more than 2,500 potential sites.

As a result of field visits, the project closed approximately 500 wells. In some locations, Union Pacific maintains water wells to nourish vegetation that serves as a wind break for operations. The wind break reduces fuel consumption and resulting emissions and reduces maintenance required to clear the track and switches from blowing sand.

Impact of extreme weather events

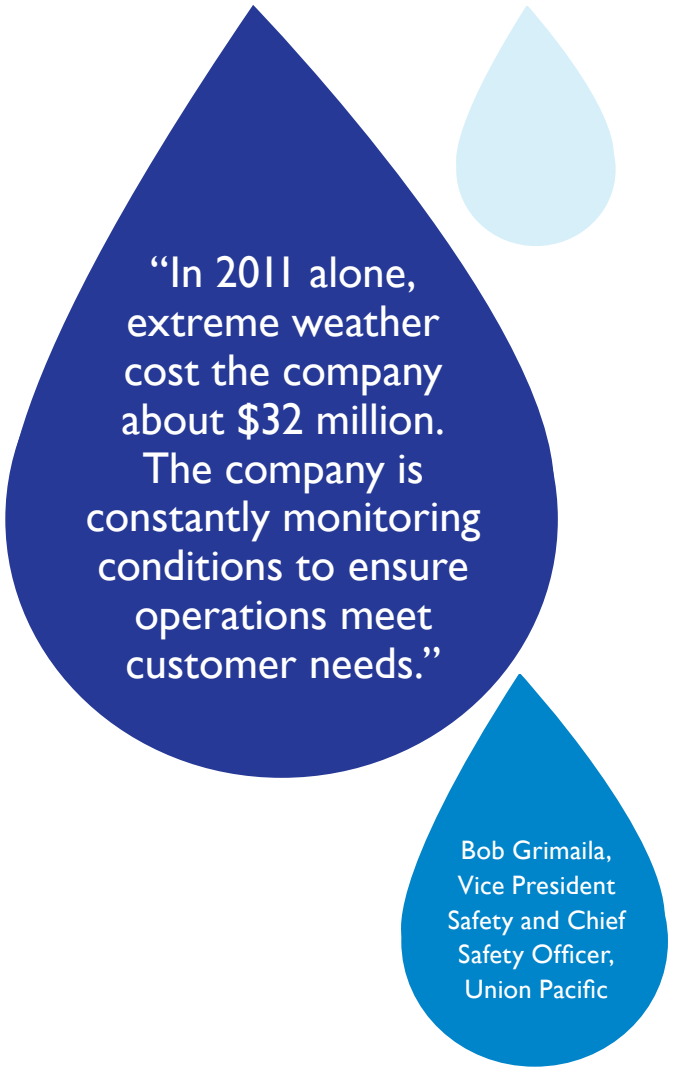
For transportation companies like Union Pacific, floods and droughts pose a risk to the integrity of infrastructure needed to maintain business operations. Unlike road, water and air transport, which uses infrastructure paid for by taxpayers, America's freight railroads operate almost exclusively on infrastructure that is owned, built and maintained by the companies themselves. Interruptions to the safety and functionality of these freight railroads from conditions such as extreme weather put business operations at risk. For Union Pacific, failure to maintain its capital investment can result in reduced service reliability and a reduced ability of the company to provide services to customers.

Soil with high clay content underlying railroad tracks — like that found in much of Texas, Oklahoma, Kansas and Arkansas — is especially vulnerable to expansion and contraction that compromises the track bed structure, operability and safety. When widespread drought conditions occur, damage and subsequent costs from infrastructure repair are incurred by the companies. For example, in 2011, Union Pacific saw increased operating expenses of $18 million due to repairs and other costs associated with damaged tracks in the state of Texas.

In addition to drought, flooding also poses a risk to railroad infrastructure safety and integrity. Railroad tracks often follow the flat, smooth terrain alongside rivers, making them vulnerable to washouts and bank erosion from rising water levels. In 2011, snowmelt from the Rockies and heavy rainfall in Montana led to record flooding of the Missouri River. With this event providing some advanced warning, Union Pacific pre-emptively raised track in multiple locations — in some cases by multiple feet — to ensure that its trains could continue to run. The severe 2011 Missouri River floods resulted in the closure of two Union Pacific lines and increased the company's operating expenses by $14 million.

Lessons learned: Taking steps to mitigate future costs

In 2011 alone, extreme weather increased Union Pacific's operating costs by at least $32 million. The company is constantly monitoring conditions to ensure operations meet customer needs. Union Pacific's large rail network and early mitigation efforts have allowed the company to be flexible in response to extreme weather events. Such responses have enhanced the safety and reliability of Union Pacific's services.



About EDF

Environmental Defense Fund, a leading national nonprofit organization, creates transformational solutions to the most serious environmental problems. EDF links science, economics, law and innovative private-sector partnerships. Follow us on Twitter, on Facebook and at EDF's Business Innovations Blog.

About AT&T

AT&T Inc. (NYSE:T) is a premier communications holding company and one of the most honored companies in the world. Its subsidiaries and affiliates — AT&T operating companies — are the providers of AT&T services in the United States and internationally. With a powerful array of network resources that includes the nation's largest 4G network, AT&T is a leading provider of wireless, Wi-Fi, high speed Internet, voice and cloud-based services. A leader in mobile Internet, AT&T also offers the best wireless coverage worldwide of any U.S. carrier, offering the most wireless phones that work in the most countries. It also offers advanced TV services under the AT&T U-verse® and AT&T | DIRECTV brands. The company's suite of IP-based business communications services is one of the most advanced in the world.

Additional information about AT&T Inc. and the products and services provided by AT&T subsidiaries and affiliates is available at http://www.att.com/aboutus or follow our news on @ATT, on Facebook at http://www.facebook.com/att and YouTube at http://www.youtube.com/att.

About Cummins

Cummins participation in this survey is completely voluntary and does not imply a solicitation or an agreement to collaborate or engage with either Pacific Institute or VOX Global. No remuneration or other thing of value was given or any agreements or promises made or implied in exchange for a company's participation in this survey.

SECTION 6: LOOKING FORWARD — IS THERE A GAP BETWEEN CONCERN AND ACTION?

Overall, we found a potentially significant set of findings that appear to be potentially contradictory: while companies believe water challenges will significantly worsen in the next five years, the majority of companies surveyed do not appear to be planning corollary increases in the breadth and scale of their water risk management practices. In fact, nearly 70 percent of responding companies said their current level of investment in water management is sufficient.

Survey respondents indicated that water challenges will significantly worsen over the next five years. Over that timeframe, water is poised to negatively affect business growth and profitability for 40 percent more responding companies as compared to now (see Figure 4 on page 15). Because of this, perhaps the most perplexing and worrisome finding of our study is that there is no corollary increase in the breadth and scale of water management practices companies are planning to implement. Figures 14 and 15 illustrate this incongruity. The former demonstrates that relatively few companies plan to implement new types of water practices over the next five years. The latter shows that the level of importance companies place on a variety of water practices increases only modestly from now into the future. This may suggest that they do not plan to significantly deepen their investment in water practices in coming years, despite worsening conditions. In fact, **68 percent of responding companies believe they have already made sufficient investments to address water challenges.**

At the same time, companies acknowledge there are many obstacles that impede corporate water stewardship practices. Indeed, **nearly 60 percent of respondents believe there are significant obstacles to achieving company-wide recognition of water challenges.** This fact alone (and especially when coupled with the notion that water poses a greater risk to survey respondents than any other natural resource challenge) is seemingly at odds with the idea that current investment is sufficient.

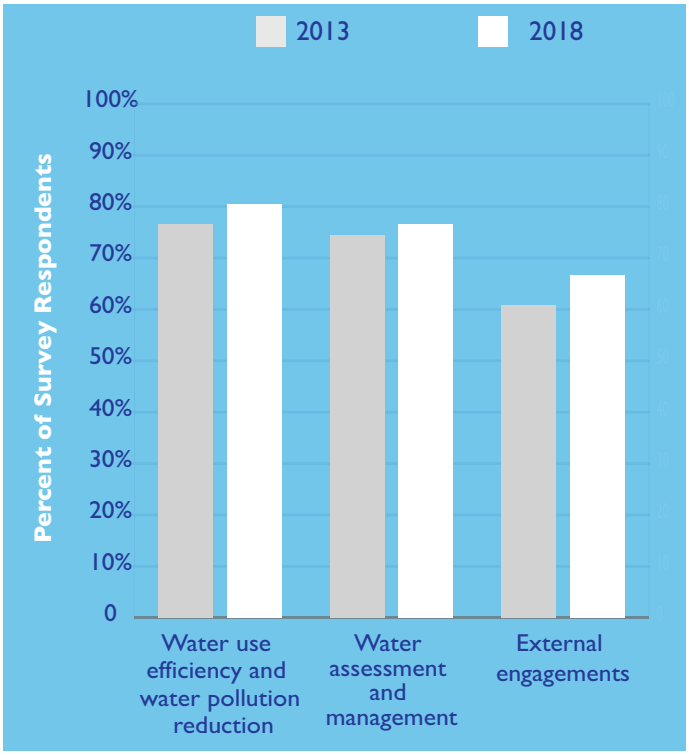


Figure 14: Types of Corporate Water Management Practices Being Implemented

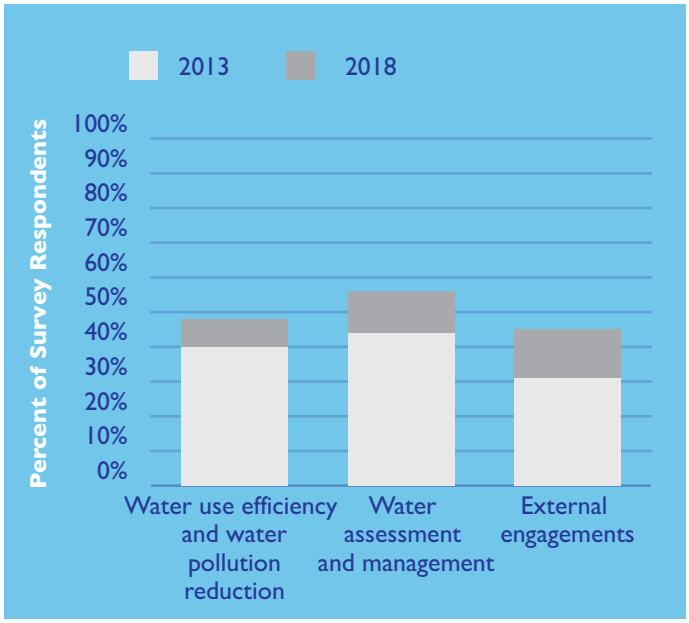


Figure 15: Percent of Companies Placing High Importance[1] on Water Management Practice

1 For the purposes of this analysis, we consider companies to deem practices as of "high importance" when rating it a 4 or 5, on a scale of 1 to 5.

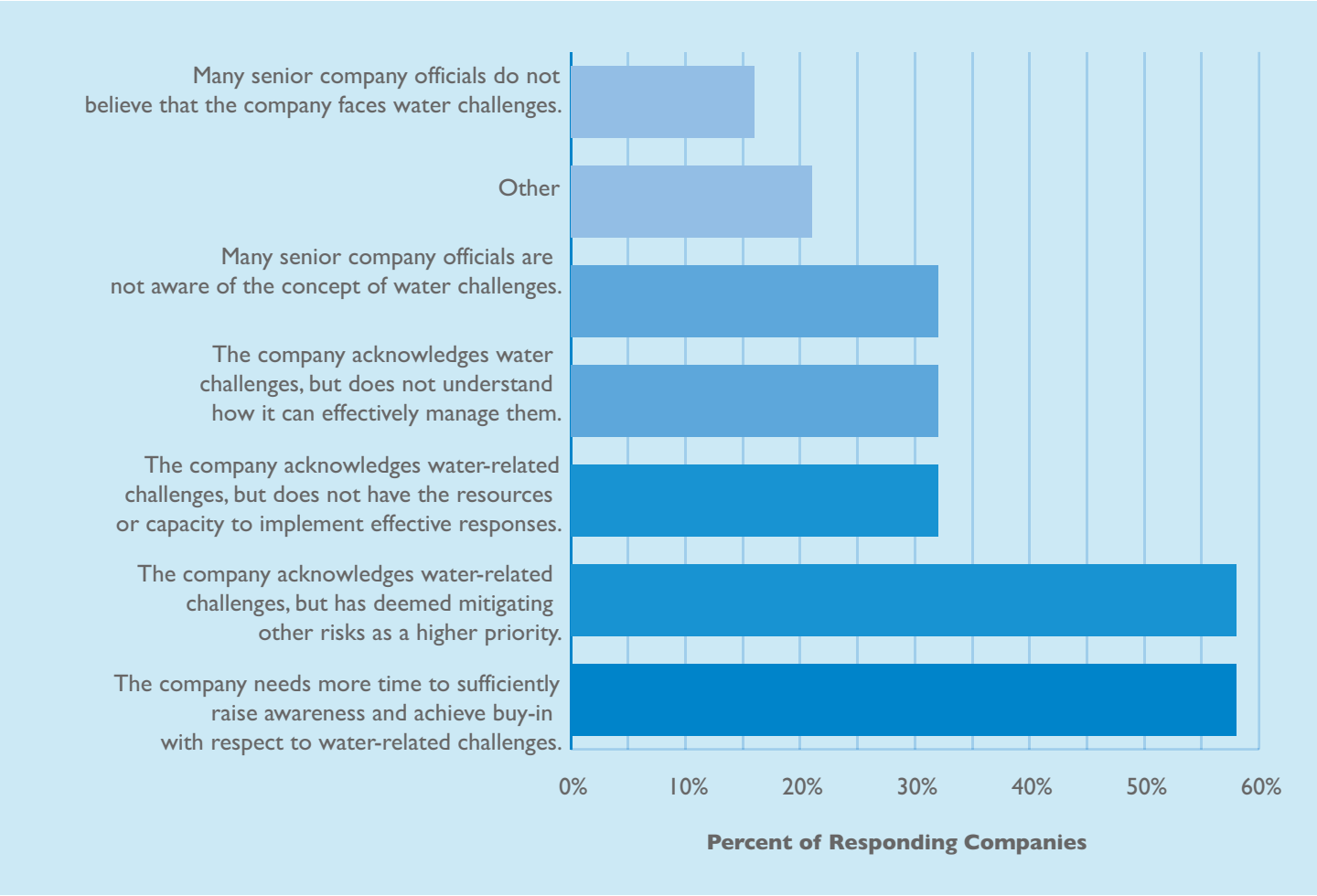


Figure 16: Obstacles to Greater Awareness and Acceptance of Water Challenges Throughout Business

Further, one perceived obstacle to company-wide recognition of water challenges is that companies have deemed mitigating other risks as a higher priority (see Figure 16). Intuitively, this appears inconsistent with the high percentage of survey responding companies that rated water as the greatest natural resource challenge facing their business. Beyond that, water management also appears to be an important factor in managing the non-natural-resource-related risks companies prioritize over water risks. For example, survey respondents recognized their regulatory license to operate as one of the two greatest non-natural-resource risks they face, with 38 percent of responding companies considering it their single greatest non-natural-resource-related risk. Strikingly, 58 percent of responding companies believe water creates regulatory risk for their business and thus potentially affects their regulatory license to operate.

In short, survey respondents report that: 1) water poses the greatest natural-resource-related risk facing their business, 2) water challenges will only become more prominent and impactful over time, and 3) there are significant obstacles to achieving recognition of water challenges within the business. At the same time, they believe their existing practices are by and large sufficient to manage those water challenges and risks. It is this apparent incongruity between predicted worsening water-related business impacts and businesses' planned response that the authors question whether many US-based companies may be complacent with respect to water issues and ultimately unprepared to face emerging water-related challenges and risks.

APPENDIX A: METHODOLOGY

We have sought to gather data and findings on US-based companies' perspectives on and responses to water-related challenges primarily through an online survey targeted specifically at US-based businesses from a wide range of industry sectors. The survey questions, as well as the full range of tabulated results, can be found at: http://voxglobal.com/managing-water-risk-study. Responses are company-wide, meaning that representatives from the survey were encouraged to complete the survey collaboratively. Multiple responses from the same company were not allowed. Seventy-three percent of completed responses were submitted by representative(s) from companies' Sustainability/Environmental or Health & Safety/Corporate Social Responsibility divisions, though we received responses from a wide variety of departments, such as Operations (29 percent), Manufacturing (12 percent), Risk (10 percent), and others.

Fifty-one companies in total completed the survey, with several additional companies providing partial results that were not included in our analysis. These companies spanned a wide range of industry sectors, with Figure 17 showing the sector breakdown.[1] Of the 51 companies, 69 percent are publicly-traded, while the remaining 31 percent are privately-owned.

1 Companies were allowed to indicate as many industry sectors as were applicable to their business, so some companies are counted toward several industry sectors.

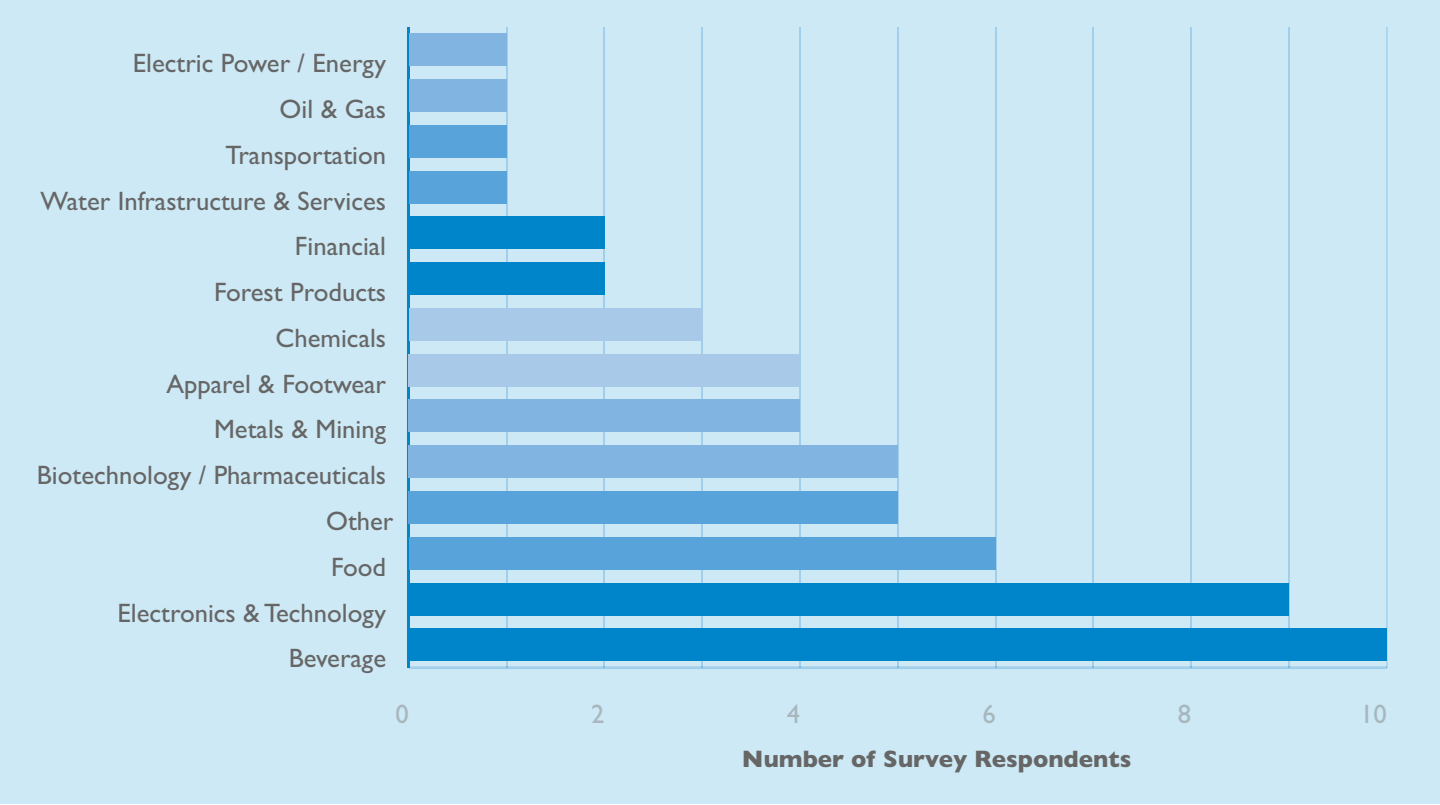


Figure 17: Industry Sector Affiliations of Survey Respondents

It should be noted that our sample size is not large enough to make our conclusions statistically significant. In other words, we do not make any claims that survey results closely reflect averages nationwide. Further, though we did seek to encourage uptake of the survey among companies with a wide range of experience with respect to water and with no bias toward those that might be considered "advanced" water managers, we do believe the survey itself was likely more appealing to companies with existing, mature water management practices. For this reason, results are likely biased toward the perceptions of relatively large companies with greater water awareness and maturity than the average US-based business. A list of the companies who completed the survey can be found in Appendix C on page 42.

All survey questions were able to be skipped. Further, the survey was designed so that companies with a relatively modest understanding of water challenges and implementation of water management practices saw fewer, simpler questions, while companies with robust water policies saw more and more sophisticated questions. For this reason, some companies answered different questions than others did. At the same time, we provided many survey results comparing the percent of companies responding to that specific question. Unless otherwise specified, it should be assumed that are referring to the percent of companies actually responding to that specific question, as opposed to the percent of companies completing the survey more broadly. All questions for which we discuss the proportion of a subset of survey respondents in this way were questions by at least 34 of the 51 survey respondents. We use "survey respondents" as a term to refer to all 51 companies that completed the survey. We use "responding companies" to indicate the subset of that group that responded to a specific question.

In a few cases, we illustrate the "average rank" or "average score" companies ascribe to certain types of risk or water management practices. This is used to assess the relative significance and value of these issues to the business. In these cases, for example, if a practice's importance is rated from 1 to 5, we multiplied the number of companies rating it at "1" by 1, the number of companies rating it a "2" by 2, and so forth. We then took the sum of these computations for each rating (i.e., "1", "2", "3", "4", and "5") and divided by the number of companies to responding to that question, generating an "average score". When comparing various practices' "average score" to one another, we gain insight into which tend to be valued and prioritized more highly by survey respondents. Practices given a score of either 4 or 5 were considered to be of "high importance" to companies.

APPENDIX B: LIST OF COMPANIES PARTICIPATING IN THE SURVEY

Name	Industry Sector(s)
Alcoa Inc.	Metals & Mining
Allergan	Biotechnology / Pharmaceuticals
AMD	Electronics & Technology
Anheuser-Busch InBev	Beverage
AT&T	Electronics & Technology
Biogen Idec	Biotechnology / Pharmaceuticals
Bristol-Myers Squibb	Biotechnology / Pharmaceuticals
CA Technologies	Software
Campbell Soup	Beverage, Food
Chevron	Oil & Gas
CH2M HILL	Consulting Services and Program Management
CINCS LLC	Financial, Cloud-based Technology to Measure Water Risk
Coca Cola North America	Beverage
Comcast Cable Communications Company	Electronics & Technology
Cummins Inc.	Industrial Goods
Dassault Systemes	Electronics & Technology
Dell Inc.	Electronics & Technology
Diageo	Beverage
Duke University	Higher Education
DuPont	Chemicals
Gap Inc.	Apparel & Footwear
GlaxoSmithKline	Biotechnology / Pharmaceuticals
GrafTech International Holdings Inc.	Metals & Mining, Refractory Brick
Green Diamond Resource Company	Forest Products
Hemlock Semiconductor LLC	Chemicals
Ingersoll Rand	Diversified Industrial
Intel Corporation	Electronics & Technology
Jabil	Electronics & Technology
Merck	Biotechnology / Pharmaceuticals
Method Products PBC	Cleaning Products
MillerCoors	Beverage
Molson Coors Brewing Company	Beverage
Nestle Waters North America	Beverage
Netafim USA	Agriculture Products and Services
NewPage Corporation	Forest Products
NFS	Chemicals
Nike	Apparel & Footwear
PepsiCo	Beverage, Food
PVH Corp	Apparel & Footwear
PwC	Financial
Quality Industries Inc	Metal Fabricator
Rain Bird Corporation	Electric Power / Energy; Electronics & Technology; Water Infrastructure & Services
Smithfield Foods	Food
Starbucks Coffee Company	Food, Beverage
Stonepeak Ceramics, Inc.	Ceramic Wall and Floor Tile Manufacturer
The Hershey Company	Food
Unilever	Beverage, Food, Personal Care/Consumer Goods
Union Pacific Railroad	Transportation
VF Sportswear (Nautica & Kipling NA)	Apparel & Footwear
(anonymous)	Metals & Mining

APPENDIX C: RESOURCES FOR COMPANIES ASSESSING WATER CHALLENGES & IMPLEMENTING WATER-RELATED PRACTICES & TECHNOLOGIES

Research

Business for Social Responsibility (BSR) – At the Crest of a Wave

CDP Water Disclosure – 2011 Reporting Guidance

CEO Water Mandate – Bringing a Human Rights Lens to Corporate Water Stewardship

Ceres – Murky Waters? Corporate Reporting on Water Risk

Ceres & Pacific Institute – Water Scarcity & Climate Change: Growing Risks for Businesses & Investors

JPMorgan / WRI – Watching Water: A Guide to Evaluating Corporate Risks in a Thirsty World

Merrill Lynch – Water Scarcity; a Bigger Problem than Assumed

Pacific Institute & Bio-Era – Remaining Drops

UNEP – Water Footprint and Corporate Water Accounting for Resource Efficiency

Veolia – Water Impact Index

Water Neutral – Offset Calculator

Water Sense – Certification Scheme

WFN – Global Blue Water Scarcity Study

WFN – WaterStat Database

WWF – Investigating Shared Risk in Water

WWF – Understanding Water Risks

Guidance

CEO Water Mandate – Corporate Water Disclosure Guidelines

CEO Water Mandate – Guide to Responsible Business Engagement with Water Policy

CEO Water Mandate – Guide to Water-Related Collective Action

Ceres – Aqua Gauge

Tools

Alliance for Water Stewardship Sustainability Standard

CEO Water Mandate – Online Capacity Platform

CEO Water Mandate – Water Action Hub

GEMI Collecting the Drops

GEMI Connecting the Drops

GEMI Local Water Tool

Water Footprint Assessment Tool

Water Impact Index

WBCSD Global Water Tool

WRI Aqueduct Tool

WWF Water Risk Filter

WORKS CITED

Ceres. 2009. Water Scarcity & Climate Change: Growing Risks for Businesses & Investors. Authored by Pacific Institute. http://www.ceres.org/Document.Doc?id=406 (accessed on February 27, 2014)

Fannin, B. 2012. "Updated 2011 Texas Agricultural Drought Losses Total $7.62 Billion." Texas A&M University. AgriLife Today: March 21, 2012. http://today.agrilife.org/2012/03/21/updated-2011-texas-agricultural-drought-losses-total-7-62-billion/ (accessed on March 4, 2014)

Larson, W.M., Freedman, P.L., Passinsky, V., Grubb, E., and Adriaens, P. 2012. Mitigating Corporate Water Risk: Financial Market Tools and Supply Management. Water Alternatives 5(3): 582–603. http://www.limno.com/pdfs/2012_Larson_WatAlt_Art5-3-5%5B1%5D.pdf (accessed February 21, 2014).

Myers, John. 2014. "California governor declares drought emergency". KXTV-TV Sacramento California. USA TODAY. http://www.usatoday.com/story/weather/2014/01/17/california-drought-emergency/4581761/ (accessed on February 28, 2014).

Oldham, J. and M.B. Marois. 2014. "California Drought Impact Seen Spreading From Fires to Food Cost." BusinessWeek: Undefined, February 7, 2014. http://www.businessweek.com/news/2014-02-07/california-drought-impact-seen-spreading-from-fires-to-food-cost (accessed on March 4, 2014)

Steward, D.R.; Bruss, P.J.; Yang, X.; Staggenborg, S.A.; Welch S.M., and M.D. Apley. 2013. Tapping unsustainable groundwater stores for agricultural production in the High Plains Aquifer of Kansas, projections to 2110. PNAS 2013 : 1220351110v1-201220351. http://www.pnas.org/content/early/2013/08/14/1220351110.full.pdf+html (accessed on February 28, 2014)

U.S. Drought Monitor. 2014. United Stated Department of Agriculture. The National Drought Mitigation Center. http://droughtmonitor.unl.edu/Home/StateDroughtMonitor.aspx?CA (accessed on February 28, 2014).

U.S. Global Change Research Program. "National Climate Assessment: Draft Report." Washington, D.C., 2014.

World Economic Forum. 2014. Global Risks 2014 Ninth Edition. Geneva. http://www3.weforum.org/docs/WEF_GlobalRisks_Report_2014.pdf (accessed on March 4, 2014)

World Resources Institute. 2014. "U.S. Baseline Water Stress." WRI Aqueduct. U.S. Global Change Research Program. "National Climate Assessment: Draft Report." Washington, D.C., 2014.