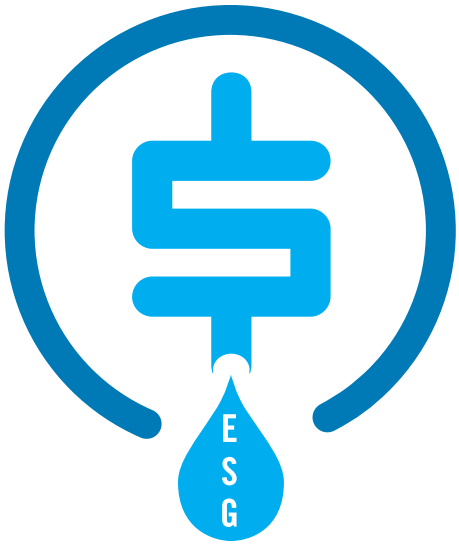
An Investor Handbook for Water Risk Integration

Practices & Ideas Shared by 35 Global Investors

A Ceres Report

March 2015



Authored by
Monika Freyman, CFA
Siobhan Collins
Brooke Barton

Acknowledgements

This report was made possible by the generous support of Bloomberg L.P. and the Park Foundation. The opinions in this report are those of the authors and survey participants and do not necessarily reflect the views of our sponsors.

We would like to thank the following individuals for their valuable input:

Reviewers

Simon Bell, *Professor of Innovation and Methodology*, Open University, UK
Paul Chandler, *Investor Engagements Manager, Environmental Issues*, UN PRI
Celso Funcia Lemme, *Associate Professor, COPPEAD Graduate School of Business*, Federal University of Rio de Janeiro, Brazil
Su Gao, *Senior ESG Analyst*, Bloomberg L.P.
Jon M. Jensen, *Executive Director*, Park Foundation
Cate Lamb, *Head of Water*, CDP
Jacques Lussier, PhD, author of *Successful Investing Is a Process: Structuring Efficient Portfolios for Outperformance*
Steve Lydenberg, *Founding Director, Initiative for Responsible Investment*, Harvard Kennedy School
Michael McCauley, *Senior Officer*, Investment Programs & Governance State Board of Administration (SBA) of Florida
Malango Mughogho, *Programme Manager, Sustainable Finance*, WWF South Africa
N. LeRoy Poff, *Director of the Graduate Degree Program in Ecology*, Colorado State University Stream Ecology Lab
Paul Reig, *Associate, Water Program and Business Center*, World Resources Institute
Lenora Suki, *Senior Product Strategist*, Bloomberg L.P.

Ceres

Additionally, Ceres would like to thank our colleagues who provided invaluable insight, support and assistance: **Sharlene Leurig, Peyton Fleming, Andrea Moffat, Lindsey White, Peter Ellsworth, Tracey Rembert, Chris Davis** and **Rob Berridge**. We are also particularly grateful for our interns—**Kate Schaffner, Jessica Hausman** and **Matthew Conlon**. We would also like to thank our editor **Karina L. Tahiliani** for her assistance in formatting and reviewing the report.

Investor & Water Experts

We would like to thank the following individuals who provided valuable information on key issues, research approaches or regional perspectives on water risk analysis:

Peter Adriaens, *CEO*, Equarius Risk Analytics
Sougata Basu, *Senior Manager*, Tata Steel
Libby Bernick, *Senior Vice President, North America*, Trucost
Loïc Dujardin, *Director, Research Products*, Sustainalytics
Gregory Elders, *Senior ESG Analyst*, Bloomberg Industries
Patricia Jones, JD, LLM, PhD, *Senior Program Leader,* Human Right to Water, Unitarian Universalist Service Committee
Gustavo Pimentel, *Managing Director*, SITAWI, Finance for Good
Debra Tan, *Director*, China Water Risk
Michael Yow, *Director of Research* and **Kyle Balkissoon**, *Director of Quantitative Strategy*, Corporate Knights Capital

Institutional Investor Survey Participants

We would in particular like to thank the study participants, listed below (two remaining anonymous), for contributing their time and sharing their thoughts on how to improve ESG and water risk integration:

Henrike Kulmann, *ESG Analyst*, Allianz Global Investors GmbH
Kelly Christodoulou, *Environmental, Social and Governance Manager, Investments*, AustralianSuper
Constantina Bichta, PhD, *ESG Research* and
Lisa Hayles, *Institutional Investment Services*, Boston Common Asset Management
Robert Fernandez, CFA, *Vice President, Credit Research*, Breckinridge Capital Advisors
Jennifer Coulson, *Manager of Shareholder Engagement* and
Barb MacDonald, *Manager of Shareholder Engagement*, British Columbia Investment Management Corporation
Gabriel Thoumi, CFA, *Senior Sustainability Analyst*, Calvert Investments
J. Michael Reinoso, *Director of Business Development*, Castleton Partners
Nils Mellquist, *Vice President-Portfolio Management Global Telecom and US Sector Head Utilities*, Deutsche Investment Management Americas Inc.
Bill Davis, *Managing Director*, Empirical Asset Management LLC
Sagarika Chatterjee, *Associate Director, Governance and Sustainable Investment*, F&C Management Limited
Heather C. Keough, *Head of Sustainability Research and Governance Policy, Fundamental Equity*, Goldman Sachs Asset Management
Adrian Bertrand, *Environmental, Social & Governance Manager*, Government Employees Pension Fund South Africa
Ophelia Barsketis, *Portfolio Manager*, Great Lakes Advisors
Victoria Barron, *Global Utilities Lead*, Hermes Investment Management
Nadira Narine, *Program Director, Strategic Initiatives* and
David Schilling, *Senior Program Director, Human Rights and Resources*, Interfaith Center on Corporate Responsibilities
Alexandre Gazzotti, *SRI Analyst*, Itaú Asset Management
Munish Malhotra, CFA, *Portfolio Manager*, Marsico Funds
Robert M. Wilson Jr., *Research Analyst* and
Matthew Filosa, *Assistant Vice President, Corporate Governance & Proxy Voting Manager*, MFS Investment Management
Ylva Hannestad, *Director of Responsible Investments and Identity* and
Sasja Beslik, *Head of Responsible Investments and Identity, Senior Executive Management*, Nordea Asset Management
Isabelle Juillard Thompsen, CFA, *Senior Analyst*, Norges Bank Investment Management
Julie Fox Gorte, Ph.D., *Senior Vice President for Sustainable Investing*, Pax World Investments
Piet Klop, *Senior Advisor Responsible Investment*, PGGM Investments
Beth Williamson, *Senior Research Analyst*, Trillium Asset Management
Ronnie Lim, *Senior Investment Specialist*, and **Junwei Cai-Hafner**, *Senior Equity Analyst*,
Peter van der Werf, *Engagement Analyst*, RobecoSAM AG
Luzia Hirata, *Equity Research*, Santander Asset Management
Emilye Pelow Corbett, *Sustainable Research Analyst* and
Joy Facos, *Senior Sustainable Investing Research Analyst*, Sentinel Investments
Seiji Kawazoe, *Associate General Manager*, Sumitomo Mitsui Trust Bank
Bill Brennan, *Equity Chief Investment Officer*, Summit Global Management
Bruce M. Kahn, Ph.D., *Portfolio Manager*, Sustainable Insight Capital Management
Richard S. Bookbinder, *Managing Member*, TerraVerde Capital Management LLC
Kenneth P. Scott, CFA, *Managing Director* and **Aaron John Ziulkowski**, *Senior ESG Analyst,* Walden Asset Management, Division of Boston Trust & Investment Management Company
Matthew J. Diserio, *President and Co-Founder*, Water Asset Management LLC
Sonia Kowal, *President*, Zevin Asset Management LLC

Note: While survey participants were affiliated with the above named organizations at the time of interview, some have since moved to other institutions.

Ceres is a nonprofit organization mobilizing business and investor leadership on climate change, water scarcity and other global sustainability challenges. Ceres directs the Investor Network on Climate Risk (INCR), a network of over 100 institutional investors with collective assets totaling more than $13 trillion. For more information, visit www.ceres.org or follow on Twitter @CeresNews.

Graphic design by Patricia Robinson Design.

For more information:

Monika Freyman CFA
Water Program, Ceres
freyman@ceres.org

Siobhan Collins
Water Program, Ceres
collins@ceres.org

99 Chauncy Street
Boston, MA 02111
www.ceres.org

Table of Contents

Foreword From the State Board of Administration of Florida

Investors are increasingly becoming aware that the 21st century economy will be shaped by powerful forces such as climate, population growth, rising energy demand, protection of human rights and declining freshwater resources. Water risks, in particular, are becoming more tangible. The World Economic Forum recently named water availability as the "top global risk." Historic droughts, more pronounced extreme weather events and escalating water competition are all adding to the materiality of water as a financial risk.

To serve current and future beneficiaries and maximize risk-adjusted returns, investors need to boost their attention to water-related risks and opportunities. Integration of water into portfolio management and overall strategic practices is an essential element for a deeper understanding of material investment risks. This report delves into the mechanics of how to integrate environmental, social and governance (ESG) issues—and water issues, in particular—into investment decision-making. Although there have been many reports raising awareness of material sustainability risks, few reports outline in such detail steps investors can take to manage these risks and opportunities.

An Investor Handbook for Water Risk Integration follows the publication of the *Ceres 21st Century Investor: Blueprint for Sustainable Investing*, which provides specific steps that help asset owners and managers steer a sustainable investment course. It also follows the publication of the *Ceres Aqua Gauge*, which provides a framework for both companies and investors to evaluate their exposure to water risks and develop mitigation strategies across their value chains.

When asset owners and managers integrate sustainability risks and opportunities into their decision-making, they aren't just being smart investors; they're helping ensure a vibrant economy for future generations. That's good for their beneficiaries and the planet.

This report offers recommendation on how to integrate water into investment policies, portfolio management, strategic planning and client relationship building. It serves as a stepping-stone for managers just beginning to integrate water risks and opportunities into their thinking, as well as for advanced investors looking to deepen their practices. Recommendations are designed to guide individual investment managers. It is also a helpful resource for those in the data and research ecosystem looking to help asset managers and owners expand their understanding of sustainability risks.

By operating and investing sustainably, companies and investors will be contributing significantly to the creation of a sustainable economy—one that meets the needs of people today without compromising the ability of future generations to meet their needs. Investors, especially large institutional investors like the State Board of Administration (SBA) of Florida, which manages over $180 billion of assets for Florida retirees and other stakeholders, exercise enormous power and influence through their capital deployment. When they integrate sustainability risks and opportunities into their decision-making, they aren't just being smart investors; they're helping ensure a vibrant economy for future generations. That's good for their beneficiaries and the planet.

Michael McCauley
Senior Officer,
Investment Programs & Governance
State Board of Administration (SBA)
of Florida

Executive Summary

This report reflects insights on managing water risk by 35 global asset owners and fund managers with over $6 trillion in collective assets under management. These seven asset owners and 28 fund managers were interviewed about: how they analyze water risk as part of their overall attention to environmental, social and governance (ESG) issues; how they structure their research departments; how they collect and track ESG and water data; how they assess water risks; and how they apply ESG and water analysis in their buy and sell decisions, and beyond.

Quotes from these managers are highlighted in blue throughout the report. Where investor methodology is publicly available, we have so noted. The investors interviewed offer perspectives on ESG and water risk integration in the context of portfolio monitoring, strategic planning, client relationship management and new product development. They also outline their thoughts on current barriers to deeper integration and the resources, metrics and systemic changes that would improve integration of ESG and water factors into portfolio management. Ceres' analysis synthesizes these ideas and builds upon them to offer ways forward to accelerate improved water risk integration practices.

This report, which is designed for both the uninitiated and those more advanced in ESG integration, showcases data sources, metrics and research methods that investor peers are using, as well as approaches investors may apply in the future. Although water is the main focus of this report, it can serve as a case study about how ESG integration actually takes place in many investment firms. While there is no one correct way to integrate ESG or water risks, we hope that the ideas shared here will lift all boats in a rising sea of material water risks and opportunities.

Methods

This report reflects insights from global asset owners and managers (from here on referred to as "managers," whereas the term "investor" is used as a general term, not limited to our interviewees) who are working to integrate water and other ESG factors into their investment process. Seven are asset owners, 28 are fund managers, and collectively they represent most asset classes, although the majority of discussions were centered on equity and corporate water risk analysis (versus fixed income, infrastructure, sovereign, private equity or project analysis).[1] Sixty percent are based in the U.S., 14 percent in the EU and the remainder are based in Canada, Brazil, South Africa, Australia, Hong Kong and Japan. They range in size from just over $100 million in assets under management to over $950 billion. About half of the participants are ESG specialists and the other half is comprised of portfolio managers, research analysts, chief investment officers, directors or risk managers.[2] While a broad geographic range and style of managers were pursued, ultimately those managers already interested in the topic of ESG and water integration were often most willing to participate. All but one institution is a UN PRI signatory, and therefore, this group is not an unbiased representation of global investor integration trends.

Throughout 2013 and 2014, managers were interviewed on their ESG and water risk integration methods. They also shared thoughts on barriers for deeper integration and, most importantly, their views on what resources, metrics, systemic changes and research innovations would help trigger improved integration of ESG and water factors into portfolio management. See **Appendix A** for a sample of survey questions.

Water: Despite Challenges, a Growing Priority for Investors

Three key challenges were highlighted as barriers to more efficient inclusion of water in investment decision-making: 1) lack of clear mandates from many asset owners and clients for fund managers to prioritize water risks, with carbon often being a larger priority due to regulatory and other drivers, 2) lack of consistent, comparable data on corporate water performance and contextual water risks, and 3) lack of an effective investor water risk analysis framework.

Despite these challenges, many managers recognize that water is becoming a major area of concern, a point made clear by the World Economic Forum, which recently ranked water as the world's "top global risk."[3] Water risks can have material strategic, operating and financial implications for many global corporations. Whether it's for human consumption, the natural environment, key business sectors or the overall economy, healthy water resources are a key prerequisite. Many managers indicated that they felt water was a growing material risk (as well as an opportunity) and that they were planning on investing future efforts in elevating their water research and strategies.

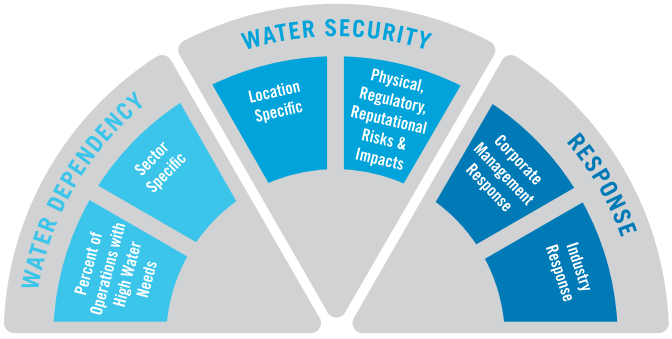
Innovative Practices are Evolving

Managers shared examples of leading practice and innovation in three areas: 1) how to conduct corporate water risk analysis, 2) applying that analysis to investment decisions, and 3) applying water risk analysis beyond buy/sell decisions to portfolio monitoring, strategic planning, client relationship-building, and even new product development. Although much of the focus is on equities, some fixed income ideas were also shared, and many of the concepts and ideas can be applied to other asset classes.

Conducting Corporate Water Risk Analysis

Corporate water risk exposure is a function of three variables: 1) company/sector-specific characteristics (e.g. water intensity of production), 2) the water conditions in particular geographies (e.g. drought-prone or strictly regulated), and 3) the strength of corporate management (e.g. proactive vs. reactive) in mitigating risks. More advanced survey participants reported capturing these variables in their analyses, looking specifically at relative levels of corporate water dependency, the security of relevant water resources and a company's management of water risks—the building blocks of a corporate water risk dashboard framework **(Figure ES1)**.

Figure ES1: Key Elements of a Corporate Water Risk: Water Dependency, Security & Response to Risks



Corporate Water Risk Dashboard

Many managers reported capturing information such as the percentage of corporate facilities in high water risk areas, and how water- or waste-intensive a company or product is overall. Although capturing these sorts of metrics is an important step in understanding water risk exposure, many managers felt that their current approaches to analyzing corporate water dependency and security were still insufficient. Several managers shared practices and ideas for closing this gap, including:

- **Analyzing water risks in the context of sector-specific water dependencies and location-specific water resource security.**
- **Leveraging knowledge and analysis from the scientific and academic community to better inform water security analysis, especially physical and regulatory risks and impacts.**
- **Developing a network of regional experts to gain context for water-related reputational and social license to operate risks.**
- **Applying a shadow price of water—valuing water more highly—as a proxy for water risk analysis.**

Overall, managers interviewed were most advanced in analyzing corporate responses to water risks. Many routinely assessed factors such as: Is management aware of water risks? Is the company measuring and disclosing water data? Do the board and upper management have oversight of water risks? Are they engaging stakeholders on water issues? Additionally, investors noted the United Nation's recognition of the human right to clean drinking water and sanitation, and its implications for corporations as an issue of growing importance.

Ideas for Systems Change

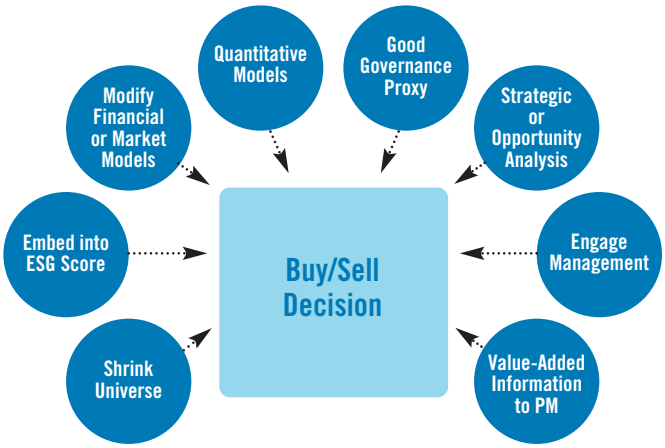
Although individual asset owners and fund managers have a direct role to play in deepening integration of water into investment decision-making, there are many opportunities to improve the broader research ecosystem to make water risk analysis more efficient and effective. Ideas for improvements included:

- **Establishing an effective and broadly-recognized investor framework for conceptualizing water risks.**
- **Further standardizing corporate water risk reporting and data gathering.**
- **Systematically capturing more location-specific corporate information.**
- **Integrating more water data into financial databases.**
- **Greater acceptance of the use of shadow water prices that reflect higher value of water in financial models.**
- **More efficiently aggregating NGO environmental and social research.**
- **Creating an independent body to conduct water risk analysis on behalf of investors.**

Applying Water Research to Buy/Sell Decisions

After corporate water risk assessments were completed, managers applied this information in a variety of ways, from shrinking the investment universe to including the data as variables in quantitative models **(Figure ES2)**.

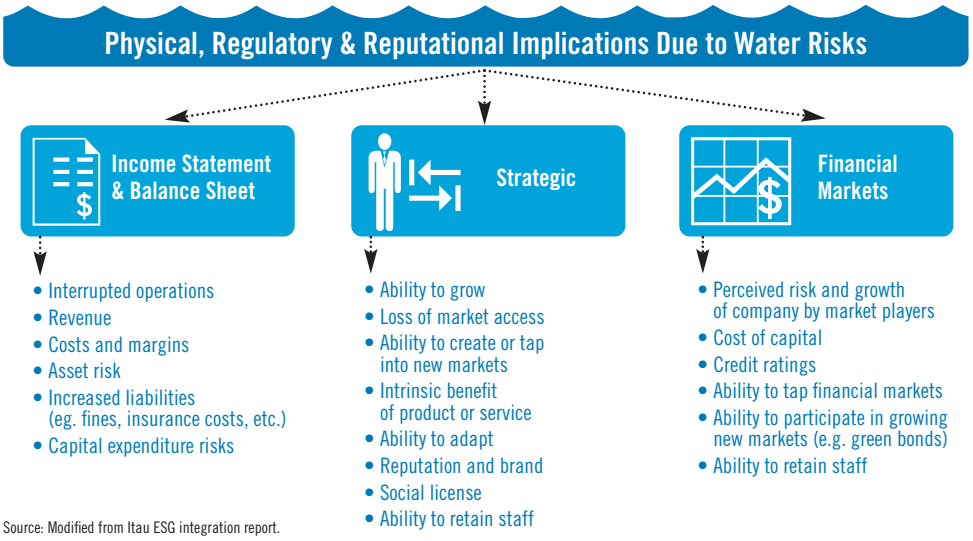
Figure ES2: Different Approaches in Applying Water & ESG Analysis to Buy & Sell Decisions



One of the most common practices was embedding water risk data into the creation of ESG scores, which then informed financial modeling, scenario analysis and other variables (such as discount rates) that influence buy/sell decisions **(Figure ES3)**.

Another practice was to use the analysis as a means to eliminate the worst performing ESG stocks or subsectors (negative screens). Other managers used analysis of corporate water risk management as a proxy for good governance and corporate resilience, or as an indicator of competitive or strategic advantage.

Figure ES3: Modification of Financial Statements or Market Forecasts Due to Water



Source: Modified from Itau ESG integration report.

Water risk research was also fundamental for some managers in prioritizing and informing corporate engagement activities. A Ceres' analysis of water-related shareholder resolutions over the past decade found significant investor concerns related to lack of water risk disclosure, shale energy development, contamination events, as well as community, human rights and social license to operate issues. The oil and gas industry, followed by the power generation and coal industries were most actively targeted in this way.

Addressing Water Risks Beyond Buy/Sell Decisions

Looking beyond the buy/sell decision was viewed as critical by several managers who also integrated analysis of water risks into other institutional policies and activities. These included:

- **Conducting a portfolio-level water footprint analysis**
- **Informing strategic decision-making**
- **Institutionalizing ESG and water analysis**
- **Client relationship-building and new product development**

Establishing public investment policies and guidelines on water and sustainability issues helps guide investment staff, trustees, companies and third parties on ESG and water expectations. Gaining high-level institutional commitment and support were also seen as very important. Two managers had conducted portfolio-level water footprint analysis—one to assess their water risks versus the benchmarked index, another to help inform their engagement activities. Water and other ESG issues were also being evaluated by some institutions to inform cross-asset class, strategic, high-level planning. One manager shared elements of institutional support that they viewed as fundamental in driving integration, including establishing investment beliefs and guidelines, high-level management commitment and alignment of compensation. Finally, ESG and water risk integration were viewed by many as critical to building deeper relationships with clients and driving new product development. Integration was seen as ultimately serving the evolving interests of the next generation of investors, who are more often looking to align investment goals with professional or philanthropic ones.

Key Recommendations for Asset Owners & Managers

Many in the investment community recognize the growing challenges posed by resource scarcity, population growth, energy demands, climate change and water issues. Integration of water into portfolio management and strategic practices, in particular, is an essential element for a deeper understanding of material investment risks and opportunities.

Although there is no one-size-fits-all approach to ESG and water integration, the ideas and recommendations in this report can be selectively or collectively considered, depending on the unique needs of asset owners and fund managers. Asset owners in particular—whether large pension funds, endowments or family offices—can play an important role in driving systemic changes in integration practices. Ceres has identified 10 recommendations as most critical to advancing water risk integration in the near- and long-term.

Strategic Recommendations:

1. **Integrate water into investment beliefs, investment policy, RFPs (requests for proposals) and manager evaluations.** Clear mandates on the importance of water risk integration aligns internal integration efforts, and is also fundamental in setting clear expectations with managers, consultants and research providers.[4] Aligning compensation structures related to integration or toward longer-term performance can also be an important component.
2. **Promote upper management support for ESG and water risk integration.** High-level institutional support, in the form of investing in research and communication infrastructure and signaling internal high-level commitment, are additional building blocks in driving integration.
3. **Engage standard-setting and regulatory bodies and key stakeholder institutions** on the importance of material ESG and water risks. This includes working with national regulators, standard-setting bodies, finance industry associations, investor networks and academic institutions to drive improvements in disclosure and integration of material ESG and water risks.
4. **Encourage asset owners to communicate to consultants and fund managers** on how ESG and water risk integration is taking place. Stronger information flows on ESG and water risk analysis practices will move the conversation beyond checking boxes on "if" integration is taking place to a deeper understanding on the depth of the practices.
5. **View ESG and water integration as an opportunity** to deepen relationships between asset owners and investment managers and evolve new products. In many cases, constructive engagement with clients on water and ESG strategies is helping managers improve their research processes, strengthen their relationship with clients, as well as develop new product offerings.

Portfolio-Level Recommendations:

6. **Apply ESG and water risk integration to buy/sell decisions** through whatever approach fits best with client and institutional goals. Possible approaches include embedding water analysis into ESG scores, shrinking the investment universe, conducting scenario analysis in financial models or any number of other methods shared in this report and beyond.
7. **When conducting corporate water risk analysis, capture elements of water dependency, security and management response.** Gain an understanding of sector-specific water dependencies and risks, as well as information on operating or financial exposure in regions with high water risk. Assess corporate water management plans to counter and proactively deal with material water risks. Engage The scientific community, investor networks and institutions with expertise, tools and resources on ESG and water issues (many such experts are listed in this report).
8. **Engage portfolio companies on how they manage water risks.** Leverage existing collaborative investor water engagement efforts when appropriate. Embed water into proxy voting guidelines and publish corporate water management expectations guidelines.
9. **Apply water analysis to risks and opportunities across-asset classes.** By applying water analysis as a global mega theme that will affect all asset classes, more comprehensive and strategic risk mitigation and opportunity planning can be facilitated within an entire organization.
10. **Conduct a portfolio-level water footprint analysis** to assess sectors, geographies and portfolio companies with high water risk exposure. A portfolio-level view of water risk exposure will establish regions, sectors and stocks with particularly high water risks and help prioritize research, engagement and risk mitigation strategies.

Introduction: Why Water Integration Matters

There are many catalysts spurring investors to integrate environmental, social and governance (ESG) and water factors into portfolio management. In many countries, reporting of extra-financial or ESG information is required through stock exchange listing standards, national mandates, responsible investment codes and pension regulations.[5] Voluntary efforts are also growing, such as the UN's Principles for Responsible Investment (UN PRI), with 288 asset owners and 883 investment managers committing to integrate ESG factors into investment and corporate engagement activities.[6] Most importantly, many investors are integrating ESG factors in an effort to achieve better financial performance, be better fiduciaries, and more effectively meet client objectives.[7, 8, 9]

Assisting investors is the primary reason corporations are disclosing sustainability indicators through voluntary[10] and mandatory guidelines.[11] For example, the Global Reporting Initiative (GRI) and Sustainability Accounting Standards Board (SASB) are developing guidelines and industry-specific metrics to advance sustainability reporting.[12] More than 1,000 companies voluntarily disclosed water-related data to investors in 2014 through the CDP water questionnaire.[13] Other efforts include the creation of environmental profit and loss accounting, monetizing natural capital and associated tools, and completely redesigning investor, corporate and shareholder frameworks to counter "quarterly capitalism" and influence a longer-term mindset that is more compatible with long-term sustainability and financial goals.[14, 15, 16]

"Speaking to all our staff about ESG integration is fairly new for us. For us, the value is in the thought process."

Investors are increasingly turning their attention to the broad range of water issues that are not only material to the long-term financial performance of their investments, but can also help preserve the water resources fundamental to building strong economies, markets and communities. While this paper is not aimed at providing an exhaustive list of investor-relevant water issues, it does showcase best practices and ideas for conducting water risk integration. It also highlights a few statistics that illustrate a growing trend of water risks facing companies and investors **(Figure 1.1)**.

Water issues create material, physical, regulatory and reputational risks (and some opportunities) to investors, from shareholders of companies in industries with large water impacts to owners of physical assets such as commodities, real estate, farmland and infrastructure to holders of debt or equity positions in government entities or corporations.

Figure 1.2: The Cantareira reservoir providing water to Sao Paulo (a city of 11 million people) is estimated to be at less than 5% capacity.

Source: "Brazil drought crisis deepens in Sao Paulo," *BBC News*, October 10, 2014 http://www.bbc.com/news/world-latin-america-29581069 Photo credit: AP

The growing incidence of historic droughts in key economic hubs such as California and Texas add increasing urgency to understanding and integrating water risks. In three states of Brazil, representing 53 percent of its GDP and a population of 40 million, water reservoirs are at five percent capacity **(Figure 1.2)**. Sustained drought in Brazil has also led to rating downgrades, spikes in commodity prices and earnings declines—not to mention the impact it will have on communities and the overall economy.[17, 18] Examples of material financial impacts due to escalating global water risks include:

- A drop in net income of more than 80 percent for the first nine months of 2014 for Sabesp (SBS), Brazil's large publicly-traded water utility, with drought and declining reservoir levels a significant factor.[19]
- A decline of over 45 percent in the share price of Imperial Metals (III CN) due to a large water contamination event that has led to regulatory investigations of poor practices.[20]

Figure 1.1:

Physical, Regulatory and Reputational Water Risks

Water Supply & Demand Risks

Percent of total global water supplies available as freshwater (97 percent is salt water). Growing water contamination may soon make the amount less than one percent.[21]

<1%

Projected gap between global supplies & demand for freshwater by 2030.[23]

40% Gap

1.2 Billion

Number of people (one-fifth of the world's population) **that live in areas of physical scarcity** (<500 cubic meters of water per capita per year).[22]

Portion of California now experiencing severe drought conditions as of February 17 2015.[24, 25]

93%

Investment & Corporate Statistics

Proportion of Global 500 company respondents to CDP's 2014 water questionnaire that report exposure to water-related risk that could generate a substantive change in their business, operations or revenue.[26]

68% CDP DRIVING SUSTAINABLE ECONOMIES

Growth in the amount **of freshwater expected to be consumed for world energy production** within the next 25 years.[28]

x2

60%

Energy industry leaders surveyed by the Global Electricity Initiative that now consider water availability as their number one challenge.[27]

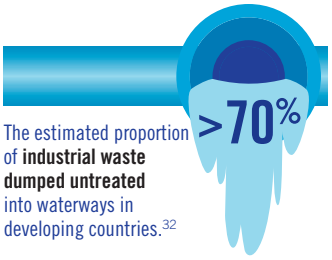
$1.7 Trillion

Water Infrastructure investment required in the U.S. according to the American Water Works Association over next several decades.[29]

Cost of Jakarta land reclamation project trying to prevent the city from sinking further due to over-pumping of groundwater and sea level rise.[30]

Number of times the word "drought" was mentioned during earnings calls by S&P 500 companies over the past year.[31]

Water Quality & Resource Deterioration



The estimated proportion of **industrial waste dumped untreated** into waterways in developing countries.[32]

The proportion of **nitrogen & phosphorus contamination in global water supplies due to agriculture** run-off.[35]

50-70%

Estimated amount of **China's groundwater in agricultural growing regions that is severely polluted**.[33]

Proportion of U.S. rivers & streams that do not support healthy populations of aquatic life.[36]

55%

Number of **personal care & pharmaceutical products** that have been found in North American drinking water, including antibiotics, hormones, steroids, diabetic, acid reflux & diuretic drugs.[34] Many contaminants are not yet regulated.

165

Decline of freshwater species populations over the last 30 years (representing over a third of the planet's vertebrates)—a far greater degradation than both land and ocean species.[37]

-55%

Number of **microbeads per liter of river sediment** found recently in a major Canadian river. Microbeads are put into personal-care products and initially were thought to only contaminate oceans.[38]

1000+

Human Health

2010

The year the United Nations recognized the Human Right to Water.

Annual deaths due to inadequate water supply, sanitation and hygiene.[39]

3.5 Million

162 Million

Children stunted in their growth due to water contamination and poor sanitation, with water contamination being a bigger cause of stunting than poor nutrition.[40, 41]

- Newmont Mining (NEM) suspending a $4.8 billion expansion project in Peru after losing its social license due to community water concerns.[42]
- Coca-Cola (KO) suspending bottling operations and expansion plans on several occasions in India due to concerns over excessive groundwater use.[43, 44]
- Several national, state and municipal bans and moratoria (e.g. France, Scotland, Quebec, State of NY) on shale energy development and hydraulic fracturing due to environmental concerns about groundwater impacts.
- Credit rating risks for California utilities as they enter a fourth year of drought.[45, 46]
- UN officials accusing the city of Detroit of violating the human right to water due to residential water shutoffs.[47]

Climate change exacerbates these existing problems. Rising global temperatures accelerate and intensify water cycles, creating longer and drier droughts, and more frequent and heavier precipitation and flooding.[48] Higher atmospheric temperatures and carbon levels are also increasing the likelihood of decades-long mega-droughts, contributing to declining water quality **(Figure 1.3)**, and are radically changing the chemistry of the oceans.[49, 50]

Figure 1.3: Toxic algae blooms, like this one threatening Toledo's water supplies in Lake Erie, are expected to become more frequent due to climate change.

Source: Janet Lee, "Driven by Climate Change, Algae Blooms Behind Ohio Water Scare are New Normal," *National Geographic News*, August 4, 2014. Photo credit: Peter Essick, *National Geographic*

Many investors are proactively trying to manage these risks and capitalize on climate-resiliency investment opportunities. Pension funds have an especially strong impetus to integrate climate change and water risks into their analyses due to their long-term investment horizons.

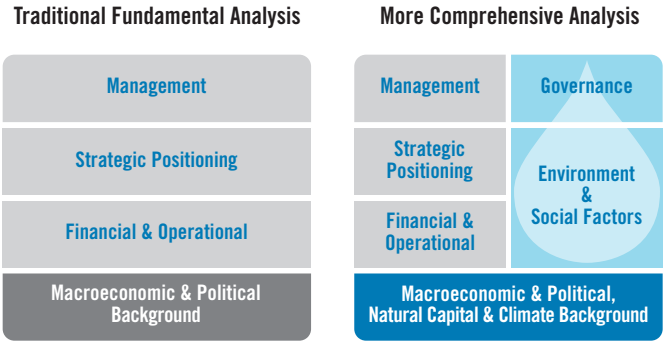
Guide for ESG Integration: *The 21st Century Investor: Ceres Blueprint for Sustainable Investing*

Based on decades of experience working with institutional investors and after extensive consultation with a broad cross-section of asset owners and asset managers, *The 21st Century Investor: Ceres Blueprint for Sustainable Investing*, provides 10 actionable steps for investors who understand that the 21st century economy will be shaped by powerful forces such as climate change, population growth, rising demand for energy, declining supplies of freshwater and other natural resources, and protection of human rights and worker health and safety.

The Current Landscape: Integration Practices Lag Water Concerns

Managers interviewed indicated that they are increasingly integrating non-financial ESG information into their investment processes. While traditional fundamental analysis of corporations considers management, strategic, financial and operating variables **(Figure 2.1)**, ESG analysis builds on this by adding environmental, social and governance considerations. Traditional macro-economic, market and political analysis can also be strengthened by integrating broad ESG issues such as climate change impacts, natural resource vulnerabilities and social risks. Water risk analysis touches on every aspect of non-financial analysis, including strength of governance, and ties into social, environmental and broad macroeconomic and climate issues (areas in blue in Figure 2.1).

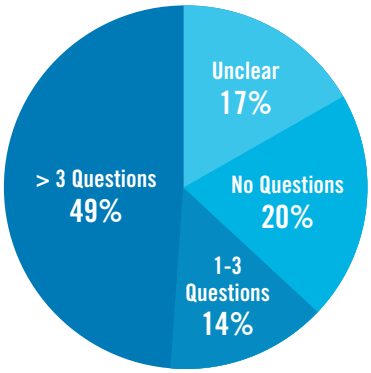
Figure 2.1: Integrating Non-Financial ESG Information into the Investment Processes



Investors Making Water a Higher Priority

Many managers acknowledged that although they regarded water as a potentially material issue, their water research methods were still insufficient. Of the 35 managers interviewed, about one-third captured less than three water metrics **(Figure 2.2)**. The most common water metrics captured related to whether the corporation was disclosing any water data at all, if management understood the water risks it faced, and if there was a corporate water management policy in place. Most managers acknowledged that these questions were too simplistic to effectively capture real water risk exposure, but viewed them as a worthwhile starting point.

Figure 2.2: Number of Water Questions Integrated into Investment Decision-Making



Proportion of investors integrating water metrics into their decision-making. Only about half capture three or more data points on water.

Reasons for Lag in Integration

Three reasons were given as to why integration of water risks and opportunities were lagging. First, greenhouse gas (GHG) and energy-related risk analysis has been a higher priority for many managers due to regulatory drivers and client pressures. Second, there is a lack of consistent corporate disclosure of water metrics. And third; many managers felt that they lack an effective framework for conceptualizing water risks.

Lack of Mandate to Integrate Water

Although many managers felt water was indeed a material issue, they did not feel they were getting strong enough signals from asset owners to make water integration a top priority. Although this feeling was not universal, many managers aspired to see asset owners, consultants and the greater market become more interested and engaged on ESG and water issues. Also, several managers of smaller funds felt that dedicating the additional research resources required to integrate ESG and water issues would only be possible once there was sufficiently large-scale demand from the market and clients to cover the costs of these resources.

"At a high-level, Ceres, NGOs and several investor groups have identified legitimate sustainability issues. As fund managers we are not getting strong market signals to integrate water. Global water scarcity must first be a priority with the gatekeepers of Requests for Proposals [the asset owners]. Exacerbating the problem is that consultants are disengaged on ESG and water. We are ready, but the market is not functioning."

A select number of managers indicated that in a world of competing demands and priorities, water, although important, had not yet risen to the top. With greater media attention on investor issues related to carbon and fossil fuels, along with potential large-scale carbon policy drivers—water sometimes took a back seat.

"Water risks have a pattern of a slow death-spiral, which are hard to prioritize for analysis in a world of many investor risks and limited analyst and portfolio manager time and resources."

Lack of Consistent, Comparable Data

Many managers cited inconsistent availability and quality of corporate water data as a challenge to deeper integration. Similarly, some identified difficulties in accessing comparable, relevant information on local-level water risk issues that may affect corporate risk exposure.

"Getting accurate data across companies is really a challenge. There is good data on carbon intensity, but water intensity is often missing. There are too many blanks. A traditional analyst will only get comfortable with a concept if there is strong data. And we are not going to pay five different research providers to get environmental data."

"We've had frustrations with water and ESG data not being associated with proper security identification numbers [e.g. CUSIPs, SEDOLs etc.]."

Although water-related data has been lagging energy reporting, overall corporate disclosure has been growing.[51, 52] In the CDP's most recent global corporate water questionnaire, 48 percent of the over 2,200 companies surveyed provided a broad range of water data, including risk profiles, mitigation actions, opportunities, governance strategies, and targets, in addition to total and site-based water accounting data. Disclosure grew by 79 percent year-on-year, likely driven by an ever-larger group of investors requesting CDP disclosure—now representing 573 institutional investors with over $60 trillion in assets.[53]

Ideas for Systems Change: Standardizing Corporate Water Data Disclosure

Managers interviewed anticipated they would more fully integrate water analysis if corporate water data were more consistently captured, meaningful and internationally recognized (comparable units, scales and reporting formats), and disclosed to platforms already in use by the investment community, such as regulatory filing websites and to data providers such as Thomson Reuters, Bloomberg, FactSet, etc. Data would optimally be in a format that allows for large scale downloading and analysis, and integration into existing investor tools (e.g. spreadsheets or portfolio analytics platforms).

"We need information that is relevant [e.g. scalable], reliable and comparable [units, geographies], and generally far more available. It's good to see GRI, CDP and other third-party providers of ESG data continuously refining and broadening their scope and analysis."

Need for an Effective Water Analysis Framework

Even in a perfect world of full data disclosure, more work is needed to conceptualize and contextualize water risk exposure. Although many managers had a strong "sense" of what their optimal approach to water risk analysis should be, very few had mapped out detailed research approaches and objectives. The survey also revealed that there was little consensus among managers on which metrics or elements should make up a robust water risk analysis. Like the story of the blind men and the elephant, investor water analysis means something different to each end user and suffers from the lack of a common language or effective framework **(Figure 2.3)**.

Figure 2.3: Varying Conceptualizations of Investor Water Risk Analysis

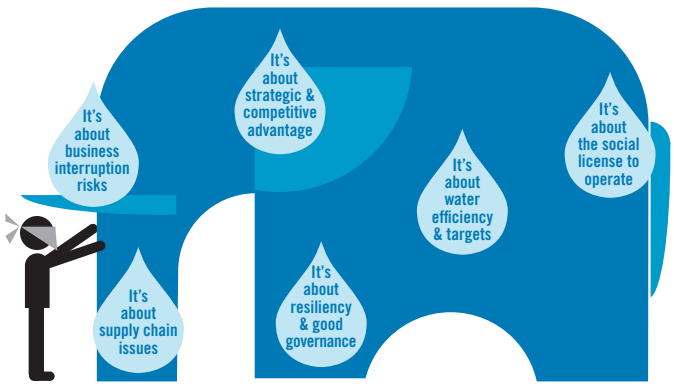
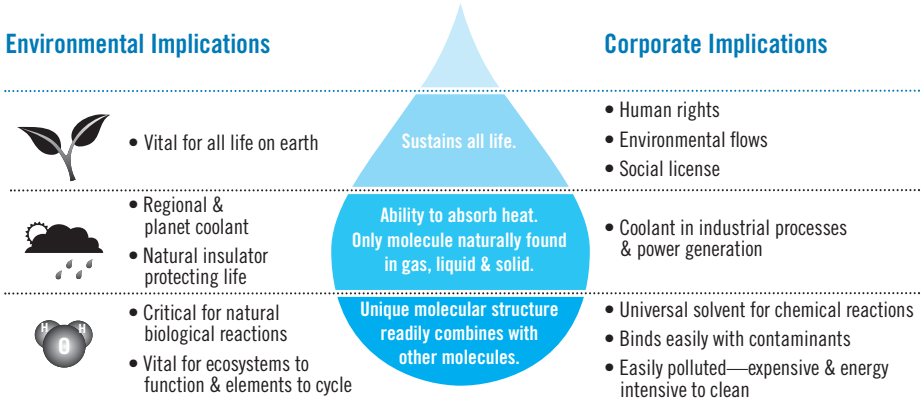


Figure 2.4: Water's Unique Properties



A practical example of the resulting frustration was shared by a fixed income manager who sought to make sense of General Electric's (GE) water efficiency policies, targets and performance.

"GE recently released new water targets and our analysts are now struggling with how to interpret these targets. They are frustrated by a lack of context. Are GE's targets the right ones? Are they ambitious enough, should they be reaching higher?"

Several managers interviewed recognized that the investment community needs to have a broader framework for understanding water risks—one that includes social license to operate risks, as well as the resiliency of the water resources relied upon by corporations.

"Investor focus on water use and efficiency is too narrow a view. A company can be very water efficient but still be screwed. Enhancing security of the water resource is key, as is engaging with local stakeholders and understanding cumulative impacts on resources."

Water Risk Analysis Remains a Challenge

Risks associated with water—whether too little, too much or poor quality—can influence all aspects of corporate performance. It is one of those pervasive non-financial factors that can have material strategic, operating and financial impacts for corporations, communities and the overall economy. Analyzing water risk is complex because water itself has many complex characteristics. Unlike almost any other element, water has a non-substitutable function in a large cross-section of social, economic and environmental activities. Water's unique properties make it fundamental in sustaining life, a universal solvent, a very effective coolant and moderator of air temperatures and stabilizer of climate patterns. Due to these and many other unique properties, corporate water use is tied to bigger issues of social, community and economic well-being and carries a greater responsibility—making it much more than a commodity or a minor component of "cost of goods sold" **(Figure 2.4)**.[54]

"License to operate [risks] manifests itself disproportionately in certain industries: energy, consumer staples and extractives."

"Water is very emotive; you have to be aware of stakeholders and the greater community. Companies without active stakeholder engagement on water in high-risk sectors are exposed to considerable risks."

Recognizing growing issues related to competition for water and stakeholder concerns, many managers in our survey expressed an interest in more deeply understanding the human right to water and its implications for companies.

"We have done a lot on environment risks related to water, but want to do more on social and human rights."

"The human right to water—it's easy for a corporation to have a policy, but what questions should investors be asking to make sure they are following through?"

The Human Right to Water

In 2010, the UN's General Assembly and Human Rights Council explicitly recognized that access to clean drinking water and sanitation are essential human rights.[55] There are various responsibilities companies have with respect to these rights, although their primary responsibility is to do no harm—i.e. to not negatively affect through their operations (or those of their suppliers) the ability of others to obtain sufficient, safe, clean, affordable and physically accessible drinking water. Various resources have been developed to help guide action in this area.[56, 57, 58]

Leading Practice in Corporate Water Risk Analysis

Based on leading practices shared by managers interviewed, this section introduces a framework for comprehensively capturing corporate water risk exposure. In addition, ways to simplify comprehensive water risk analysis—such as applying shadow water prices or creating an independent institution to assess water risks—are also examined.

A Framework for Corporate Water Risk Analysis

Several managers recognized that robust analysis requires capturing not only corporate management's response to water risks, but also the factors that shape a company's fundamental risk exposure. Corporate risk exposure was typically seen as a function of "water dependency" (company or sector-specific characteristics such as the water intensity of production) and "water security" (specific water conditions that influence the relative security of a company's water supplies or ability to discharge wastewater).

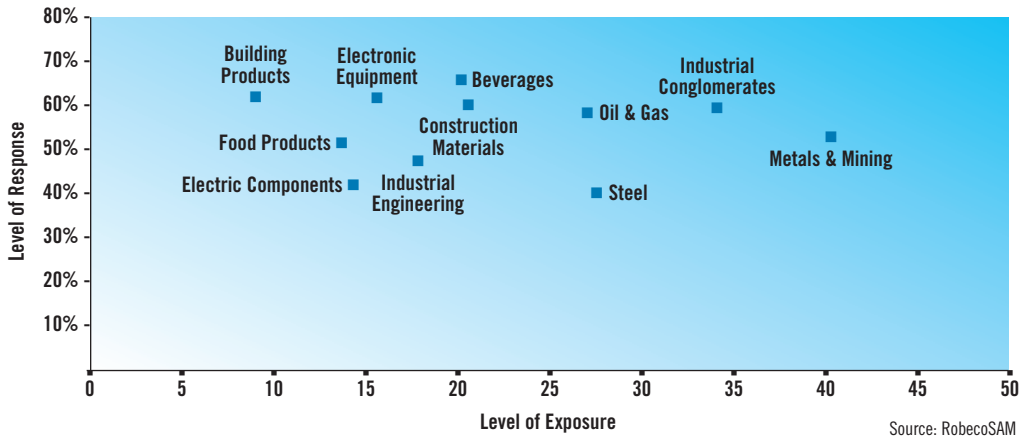
An example of this risk-response analysis is shown in **Figure 3.1** where water risk exposure by sector (X-axis) is plotted against response (Y-axis). This information can then be used to prioritize deeper analysis, engagement with industries or management, or to underweight industries or companies deemed high-risk, but with inadequate response levels. In the example below, the steel and mining sectors showed both high water risk exposure and relatively low response.

Another manager using a risk-response framework found that 22 of their portfolio companies were exposed to high water risks, but were not disclosing any water data or information to CDP. They wrote requests to these companies asking them to begin disclosing water information to CDP's water survey. Another manager using a quantitative model approach also felt the risk- response framework was critical.

> *"We are working to calculate corporate water management [response] per unit of risk. We can then optimize this factor and run it through our models."*

A comprehensive water risk-response analysis could optimally provide an overview of corporate water dependencies, balanced against the security of water supply and management response to risks. This analysis can provide information on corporate vulnerabilities to water risk, as well as highlight opportunities for reaping competitive advantage.[59]

Figure 3.1: Level of Exposure Versus Response by Sectors



Level of water risk response of certain sectors. Industries to engage could be prioritized by those lying on the far right with below average levels of response (such as the steel, mining, and oil & gas sectors).

Corporate water dependency

Water dependency analysis involves capturing information on corporate water needs—both for use, and as a receiving body for discharge. This analysis should extend down the supply chain and include the full product life cycle. Water dependency tends to be very industry-specific, with some requiring high volumes of high-quality water (e.g. semiconductor manufacturers), and others requiring physical access to water resources to assimilate wastewater discharge (e.g. meat processing). For a detailed analysis of sector-specific water risks and issues, see Cere's Sector Water Cheat-sheet **(Appendix B)**.

Corporate water security

Water security refers to the water-related physical, regulatory and reputational/social risks associated with locations where companies have operations or important supply chain links. Water security can be undermined by the company's own impacts, or by cumulative impacts from others within or across different sectors, and can weaken a company's ability to operate profitably, especially when combined with high corporate water dependency.

Response

After evaluating water dependency and security, it is important to evaluate how company management is preparing to mitigate these risks. Companies have a host of options available for mitigating water risks in the short-term, such as using financial hedging strategies and adopting water efficient technologies. Long-term strategies include improving suppliers' water resilience and investing in projects and communities that improve water basin health in key operating regions.[60] For example, General Mills systematically assessed risks in critical watersheds for its operations and agricultural supply chain, and is developing long-term strategies for improving water resources in the most high-risk regions.[61]

More details on the three key elements are listed below and in **Figure 3.2**.

Enhancing water risk analysis by mapping probability and materiality

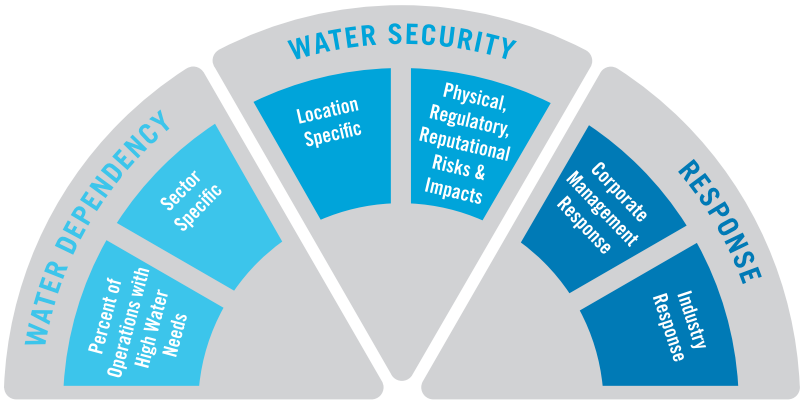
Comprehensive corporate water risk analysis can be enhanced through a probability-materiality analysis that highlights which water risks have the highest probability of occurring, and, of those, which have the largest material impact to investors, or on water resources.[62] As an example, one firm maps the probability and materiality of scenarios linked to ESG or water issues. They then look for companies or products that can offer solutions to the forecast problems or that have effective response strategies.

> *"If ESG and water issues are viewed as being low-probability 'black swan' events, then investors won't systematically integrate water risks into decision-making."*

Other managers map where they have the most power to influence change. For example, water risk analysis can also be studied by asset class to get a sense of where the investor has the highest leverage points. For example, as a majority owner in real estate, forestry and agricultural lands, an investor has far greater exposure and direct control over mitigating water risks than as an investor holding short duration bonds in utility companies.

> *"What issues are most material? Where do we have the most leverage points? Where can companies change their behavior? We prioritize where we, as managers, can have the most impact."*

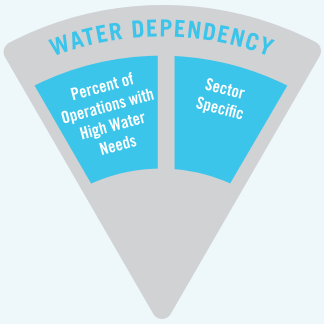
Figure 3.2: Key Elements of a Corporate Water Risk: Water Dependency, Security & Response to Risks



Corporate Water Risk Dashboard

Key Elements of Corporate Water Risk

Water Dependency



Corporate water dependency provides an overview of a business' reliance on water resources.

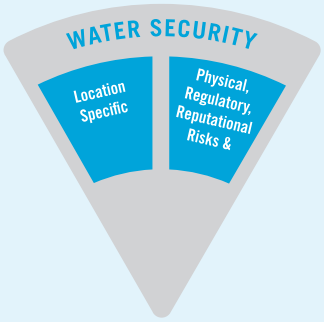
Operational & Financial Exposure

It is important to first assess how much financial and operating exposure a company has to high water dependency operations or sectors. For some companies, such as in the food and beverage sector, this can be full exposure. For others such as conglomerates or companies selling a variety of products or services, this exposure may only apply to a portion of operations.

Sector Specific

Water dependency is unique to each sector.[63, 64] Some sectors may require large volumes of water, such as in power generation for cooling plant operations, whereas others require very high-quality water for input into products such as beverage production or in pharmaceutical manufacturing.[65] Other industries rely on water resources' ability to assimilate large volumes of wastewater, along with governmental (through permits) and community acceptance of these practices.[66] It is also important to know at which point in the corporate value chain water dependency lies. For some sectors, water needs are highest in the supply chain, whereas for others water intensity peaks at the use stage of the product lifecycle.[67]

Water Security



The security of water refers to the physical, regulatory and reputational/social risks associated with locations where companies have operations or important supply chain links. Water security can be undermined by the company's own impacts, or by cumulative impacts from others within or across different sectors, and can weaken a company's ability to operate profitably, especially when combined with high corporate water dependency.

Location-Specific

In order to fully understand physical, regulatory and reputational risks, disaggregated data on financial and operating exposure to local regions (especially those with high water risks) must be captured. Quantifying a corporation's financial and operating exposure to regions of high water risk are key.

Shaped by Physical, Regulatory, Reputational or Social Risks

Physical water security refers to the ability of local water resources (surface or groundwater sources) to consistently provide the volume and quality of water required, as well as the ability of water bodies to assimilate wastewater discharged. Growing competition for water and climate change increase risks to physical water security.

Regulatory security refers to the ability of local laws and regulations to ensure physical security of supplies and ensure adequate treatment of wastewater to maintain water resource health. It also refers to the ability of companies to predict future changes in water-related regulations. Investors and companies should be aware of trends in water regulation, including water scarcity hot spots that may be a catalyst for regulatory changes. In many regions of the U.S. Southwest and California, for example, groundwater pumping has been only loosely regulated for decades. Those regulations have been rapidly tightening, however, due to the prolonged droughts in those regions.[68]

Reputational or social factors can potentially be among the largest and least predictable risks facing companies. Community opposition to industrial water withdrawals, water contamination events and resentment over perceived or real inequities in water use can proliferate quickly and affect businesses profoundly. Local conflicts can damage brand image, or, in some instances, even result in the loss of companies' social license to operate, which can have large financial impacts.[69, 70]

Impacts

Corporate and cumulative impacts on water resources are important to understand as potential drivers of water resource depletion or contamination, which lead to physical, regulatory and reputational risks. Assessing corporate and industry impacts are very challenging, as corporations may be unwilling to disclose information in this area, and this analysis may require a scientific skill set.

Key Elements of Corporate Water Risk

Management Response

The following categories reflect critical information about a corporate management's response to water risks.[71] Investors should analyze corporate action in these categories to capture the overall strength and resilience of corporate response to water risks.

Measurement & Awareness

Data gathering and risk assessments are the first critical steps of corporate stewardship. Water management strategies need to be based on data that reflect both current, and projected, water-related performance, impacts and risks. Companies should gather both internal data, such as regulatory compliance, water use and discharge data, as well as external data, such as the conditions of local watersheds and stakeholder perceptions related to water issues. Once this data is available, risk assessment can commence by identifying risks across the water value chain.

Governance & Management

Managing these issues requires governance and accountability structures, policies, standards and performance goals, as well as business planning activities. Robust governance of sustainability and water begins with board oversight and commitment, followed by management systems and specific processes for tracking day-to-day decision-making. Management also means integrating water into business planning, including decisions related to capital expenditures, facility siting, mergers and acquisitions, budgeting, supply chain and strategic planning.

Stakeholder Engagement & Collaboration

Given the shared nature of water and the complex mix of political, social and environmental values involved, stakeholder engagement and collaboration are vital in corporate water risk management. Relevant stakeholders should include local communities, employees, suppliers, other industries and water users, local regulators, customers, NGOs and community organizations. Activities should include everything from working with suppliers to help them improve water management, to educating customers to help them minimize product impacts.

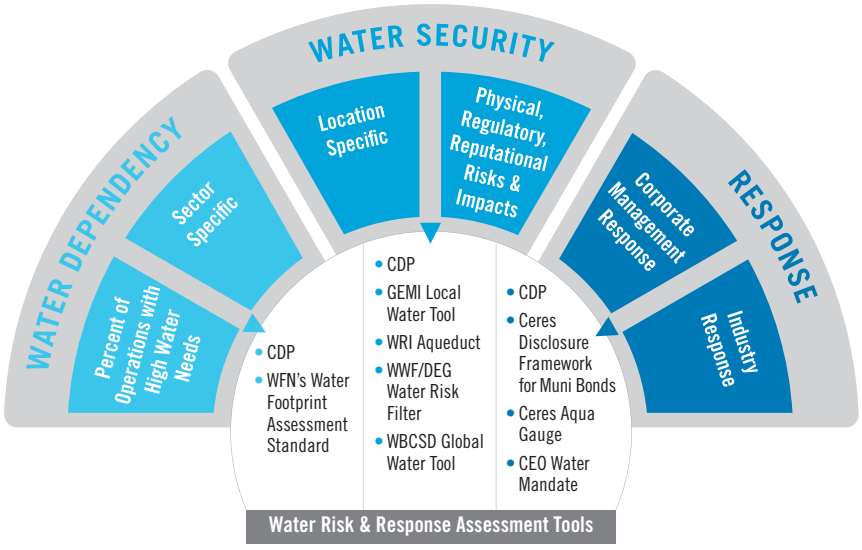
Tracking Results

Finally, the company should be disclosing publicly if all of the above efforts in governance, measurement, water management and stakeholder engagement are yielding results.

Industry Trends

Security of water resources can depend on the collective, inter- or intra-industry response, especially in regions of low water security. Technology changes within an industry can significantly mitigate water risks—for example air cooling technology over water cooling for power generation.

Figure 3.3: Water Risk Analysis Dashboard with Publicly Available Corporate & Investor Water Risk & Response Assessment Tools



Data, Tools and Research Resources

Managers shared the data, analytical tools and research resources they use in conducting various aspects of corporate water risk analysis. Several helpful corporate and investor water analysis tools or frameworks are publicly available, each with a specific purpose and scope of water analysis **(Figure 3.3)**.[72, 73]

Water Risk Analysis

Managers found it challenging to capture water risk information related to dependency and security. As previously noted, managers felt that there was poor disclosure of water risk data, overall, and that stronger conceptual frameworks for water dependency, security and overall risk analysis are needed. Nevertheless, many were still trying to assess corporate water dependency through information such as the percentage of revenue, or operations with high water requirements, or the intensity of water required per unit of revenue generated. Only a few managers had tailored their water dependency and risk analysis by sector, with one manager even modifying their risk analysis by sector and subsector.[74]

"We analyze and score 59 different sectors for ESG metrics. Fourteen of those industries we've singled out as having particularly high water risk exposure. We create a set of water questions specific to each of these industries."

Managers source the data for conducting water risk analysis from proprietary internal surveys sent to corporations, publicly available information from sustainability reports or ESG research reports, or CDP Water **(see CDP Data & Analytics)**. The need to capture location-specific risks and enlist stronger scientific expertise to conduct this analysis was stressed time and again by managers interviewed. Likewise, a number of managers stressed that there is not enough systematic analysis of environmental and water resource impacts from corporate activities.

"Investor environmental and water risk analysis is too often driven by issues in the media. A better approach would be to systematically assess industry and corporate risks and impacts on water resources."

Conducting Location-Specific Water Analysis

A number of managers in our survey stressed that to understand physical, regulatory and reputational risks, disaggregated data on financial and operating exposure to local regions (especially those with high water risks) must be captured.

"The way investors are currently looking at water risks, through the analysis of company-wide water volumes used, is like trying to repair a watch with a sledgehammer. The key is to disaggregate the number."

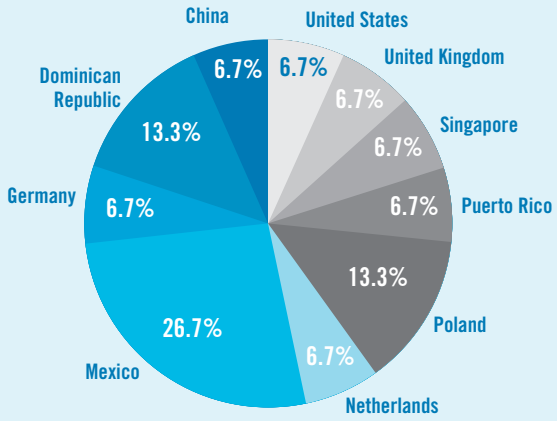
A subset of managers interviewed were attempting to do just that.

"We created a proprietary 'heat map' of where there are drought conditions, the cost of moving water in the region and where future water risks may arise."

CDP Data & Analytics

CDP's water data was mentioned frequently by managers in our survey as a useful source for corporate water information. Publicly traded corporations are asked to disclose data to CDP's water program on various topics such as their water use, dependencies, risks, opportunities and management responses. Over 500 publicly listed corporations, representing 32 percent of the MSCI All Country World Index (ACWI) by market capitalization, reported water data to CDP in 2014.[75] Aggregate and individual results are shared through CDP's annual water report, via their public website, and also through an investor platform, CDP Analytics, where data can be parsed via online analytical tools and Excel. CDP Analytics allows for deeper analysis of water use trends, including aggregating water risk and response data by sector. In this example, an investor holding seven companies in the electric equipment subsector has relatively high exposure to water risks and issues in Mexico compared to other countries **(Figure 3.4)**. This analysis should prompt the investor to prioritize researching water risks, as well as corporate and industry responses to these risks, specific to Mexico.

Figure 3.4: Country Location of Facilities at Risk for Seven Companies in a Sample Subsector

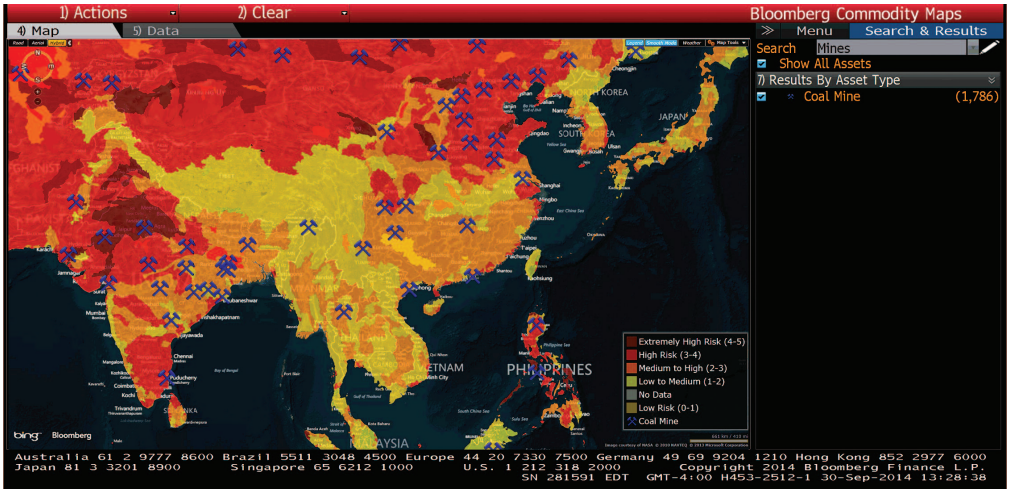


As reported by those companies to CDP Water survey 2014. Data available to investors via the CDP Analytics platform.

Managers mentioned several tools available for location-specific water risk analysis, such as the WWF Water Risk Filter and the World Resources Institute's Aqueduct™ water risk mapping tool. The Aqueduct™ is a publicly available water risk-mapping tool, with 12 water risk indicators that are mapped by major watershed across the globe. In addition to the tool's accessibility on the internet, it is now also available via the Bloomberg terminal using the BMAP function, which allows investors to map infrastructure assets such as pipelines, mining operations or power generation facilities over regions of high water risk **(Figure 3.5)**.

Another way to capture regional water risk information is through the WaterBeta™ and WaterVaR™ concepts currently being developed by Equarius Risk Analytics.[76]

Figure 3.5: Mining Assets Overlaid on Regions of High Water Risk in Asia



Source: WRI Aqueduct™ Water Risk Atlas available online at http://www.wri.org/our-work/project/aqueduct/aqueduct-atlas via Bloomberg terminal's BMAP function.

Ideas for Systemic Change: Capturing More Location-Specific Corporate Data

The effectiveness of current tools would greatly improve if far more data were systematically available on locations of company operations, markets and supply chains. Corporate regional information could be made more accessible through: 1) increased corporate self-reporting in corporate sustainability reports, financial reports and websites or to data sources such as CDP Water, and through 2) third-party data collection by other means, such as scouring public databases or mapping websites.

Seeking Scientific Expertise for Water Risk Analysis

Given the complexity of water risk analysis, several fund managers expressed the need for stronger engagement with experts from the academic and scientific communities on environmental and social risks, and impacts from corporate activities. Scientists not only have the expertise to fully study risks and impacts, but can also provide effective frameworks for understanding and responding to environmental, and in this case, water risks.[77]

"We should not rely so much on the company for water risk analysis, as it can be biased or self-serving. It would be optimal to get more information on water resource impacts and risks related to particular industries or companies from independent academic institutions or governments."

Some managers are starting to do this by creating formal and informal partnerships with academic institutions, regional technical experts and consultants. One fund manager has created an advisory board heavily weighted with independent scientific and sustainability experts.

"We have established an advisory board, which meets quarterly and is responsible for reviewing research results and investment decisions. Four out of the six members of the board are external, independent and experts in sustainability."

"We team up with international water experts using their knowledge, including expertise in water resource economics and natural resource risk assessments, to determine if the right corporate response programs are in place."

A Few Words on Water Metrics

A basic understanding of commonly used water metrics and data sources is important for investors studying corporate water risks and responses. To capture information on corporate water dependency, water accounting metrics such as water use and wastewater practices are helpful. For capturing water security information related to physical, regulatory and reputational (social license) water risks, context or external metrics are helpful. Below are examples of both types of metrics:[78]

Water Accounting Metrics— Suited for Corporate Water Dependency Assessment

- **Water withdrawals:** Generally refers to the volume of freshwater taken from surface or groundwater. Part of the freshwater may return to the source where it was withdrawn.
- **Water consumption:** The volume of freshwater used or incorporated into a product and not returned to its source.
- **Water intensity:** Ratio between a process, product, business, or freshwater use or consumption and a defined unit of production or financial metric. E.g., water consumed per USD 1 million of revenue.
- **Water discharge:** Water effluents discharged to subsurface waters, surface waters, or sewers that lead to rivers, oceans, lakes, wetlands, treatment facilities, and groundwater either through a discharge point (out of a pipe) or overland in a dispersed or undefined manner (e.g. run-off from a parking lot or farm field). Can be expressed in both total volumes as well as in terms of concentrations of specific contaminants.
- **Water footprint:** An indicator of water use that looks at both direct and indirect water use to produce its goods and services (i.e. includes supply chain water use). A water footprint can be a geographically explicit indicator, not only showing volumes of water use and pollution, but also the locations.

Context or External Water Metrics— Suited for Water Security Assessment

- **Water scarcity:** Refers to the volumetric abundance, or lack thereof of freshwater resources.
- **Water stress:** Broader indicator of availability or competition for water. The indicator can include quality, quantity and accessibility for human use and environmental needs.
- **Water risks:** Broadly defined as physical, regulatory and reputational (social license) risks facing companies.[79]

One asset owner with high exposure in the mining and extractive sectors has a scientist on staff and often engages additional experts on an ad hoc basis as issues and questions arise.

"We were going to invest in a mining company with ambitious growth plans in an arid region of Mexico. We hired a hydrogeologist [groundwater specialist] to study if the company could realistically secure the water required to meet expansion targets. We determined that the company would not be able to secure the water in a timely manner, and therefore remained under-weight in the stock until news finally did break that they, indeed, could not meet expansion targets. The stock sold off, and we then fully weighted the stock at a lower price once we determined that they could solve their water problems."

The potential need for a scientific skill set to support water risk analysis is a sign of its complexity. The establishment of an independent, credible body that assesses water risks on behalf of the investment community could make water risk integration more efficient and effective.

Ideas for Systems Change: Creating an Independent Body to Assess Portfolio Water Risks

Understanding water risks not only requires time and resources, but also an entirely different set of skills than those required for financial analysis or portfolio management. The establishment of an independent organization, staffed with water experts to evaluate portfolio water risk exposure could be very helpful to the investment community. This model has been used in the real estate sector through the establishment of the Global Real Estate Sustainability Benchmark (GRESB), an organization that assesses the sustainability of real estate portfolios.[80]

Seeking Regional Expertise

In addition to collaborating with the scientific community, it is also important to capture and cultivate local knowledge to understand water security risks. Several managers said they rely on local research resources, and a broad network of NGOs and local technical experts, as the best sources for understanding complex, local environmental and social issues related to water and other ESG themes. One manager, highly exposed to companies operating in China, relies on a network of environmental and labor NGOs for information on corporate practices. Other managers regularly conduct on-site visits.

"You have to look at NGO research and news flow to capture community impact information. They are the only ones doing this capably, and credibly."

Many managers said they identified potential social license and regulatory risks by subscribing to news services that track local controversies and regulatory violations. This news tracking ideally incorporates local language media outlets, as these are often the first to break news about impacts on communities before mainstream, international news outlets. Several managers also track regulatory fines related to contamination and spill events using tools such as the EPA's TRI (Toxics Release Inventory) or ECHO (Enforcement and Compliance History Online) databases.

"We subscribe to a news aggregator and use a word string like '…violation, fines, harassment, discrimination…' that we run on our entire portfolio of companies on a weekly basis."

Climate and Water Risks

One asset owner with large investments in fixed infrastructure assets, such as roads, utilities and airports has realized that climate change and related water risks will likely affect the assets' performance, both operationally and financially.[81] The firm is doing an in-depth assessment of seven of its large infrastructure investments to evaluate how these risks could impact those assets by 2030 and 2070, and which regions are most vulnerable. The assessment will include determining the level of capital expenditures required to climate-proof these assets.

As managers assess both water and carbon risks simultaneously, they should weigh how mitigating one type of risk may exacerbate the other. For example, producing freshwater using desalination technologies can have a very high energy and carbon footprint. On the other hand, investments to lower carbon footprint may, in several cases, also lead to lower water impacts—such as moving from coal to solar or wind power.[82] A number of managers recognize that water should more often be part of climate change analysis.

"Water variability and delivery are amplified by climate change. It would be good if every passive and active investor were asking companies: 'What is your water policy in the context of climate change?'"

Ideas for Systemic Change: Aggregating NGO Environmental and Social Research

Independently cultivating and maintaining a steady stream of information from NGOs and regional networks requires time and resources. Managers expressed strong interest in finding a more systematic and efficient way to access NGO data.

"I dream of the day when these broad information sources could be aggregated together, where searches by company name or issue area would bring up all relevant NGO information."

Applying Shadow Water Prices to Simplify Water Risk Analysis

Many managers in our survey believe that water is undervalued, and therefore subject to overuse, and abuse. Undervalued water, in combination with arcane water property rights, has often acted as a disincentive to conservation in many regions.[83]

"I believe that water is the most mispriced and misunderstood asset on this planet. The problem is that it consistently comes out of a faucet, with few people, investors included, aware of what is required to make that happen."

Some companies use shadow pricing to assist in water risk mitigation strategies. For example, Nestlé uses an internal "shadow price" of just over $1 per cubic meter for sites where there is abundant water and approximately $5 in drier regions.[84]

"Investors should be integrating full cost water pricing—polluter pays. Investors should be measuring what's coming in, what's coming out, and making sure that water going out is cleaner than coming in."

Shadow water prices can replace the need to conduct water security analysis, especially if prices fully capture externalities and risks. The higher shadow price for water can then be used to modify financial or risk models, especially if there are large differences between current and shadow prices. One manager reported applying a higher shadow price of water to companies operating in water-stressed regions of Brazil and analyzing likely future water costs and the capital expenditure required to become more water efficient under various scenarios. These scenario analyses often found company market capitalization to be significantly affected. The manager then shared this analysis with company management, which turned out to be very effective in starting productive conversations on water risk **(see the case study: Water Shadow Pricing & Scenario Analysis in Chapter 4)**.

"We really capture the attention of corporate management when we show them how much the company's market capitalization may be impacted under a scenario of higher water prices. Given the rapid degradation of water resources and growing competition for water in some of the regions of analysis, we view these prices hikes as becoming more probable."

Higher Value of Water and Water Infrastructure

For the water infrastructure sector itself, a higher value of water, along with other regulatory and structural reforms, could lead to more innovations and investment.[85] Today, this sector lags most others in terms of patent filings, corporate research, development commitments and venture capital flows.[86]

"The market is always seeking solutions, and if water efficiency reduces the cost of doing business, then the private market will offer solutions."

Others expressed concern that higher water values would put economics in the driver's seat on environmental issues, and also potentially undermine the human right to accessible and affordable water.

"If there is a drive to price water higher, it is important to couple this with the establishment of lifeline rates [lower charges for low-income households] that ensure affordable access to those most vulnerable."

Ideas for Systemic Change: Establish Regional Shadow Water Prices

Investors would benefit from a universally accepted method for calculating and applying regional shadow prices. Data and research providers that currently map water risk data by region (e.g. WRI Aqueduct™, WWF Water Risk Filter, etc.) could potentially "translate" some of those water risks or externalities into a shadow price that can more easily be applied to financial analysis and forecasting. Data providers and others are beginning to step into this role by providing investors with shadow water prices such as Trucost's Water Risk Monetizer tool and the Natural Capital Declaration's research on shadow prices for corporate bonds.[87] There are several commonly used approaches to valuing water availability.[88] Shadow pricing is appealing as a potentially efficient way of capturing and incorporating the complex scientific and social elements of water.

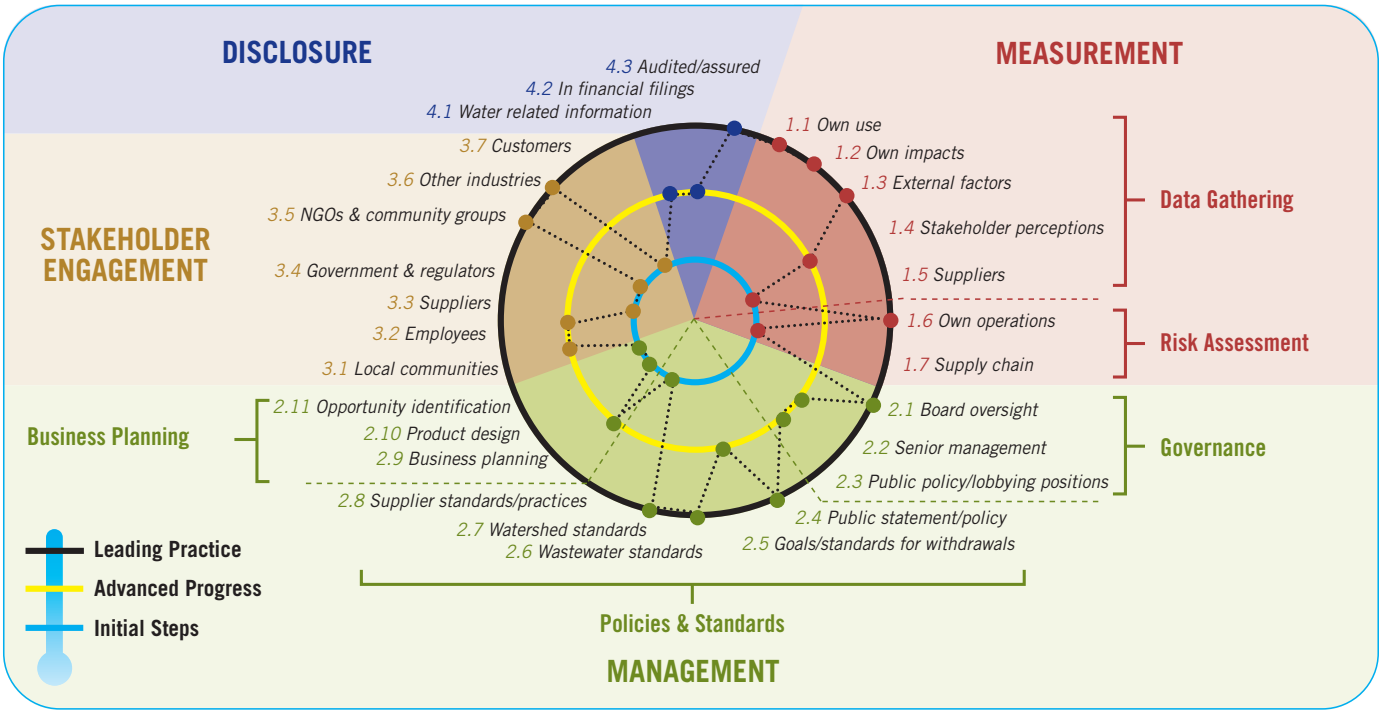
Corporate Risk Response Data and Analysis

Managers reported that their first stop for response data was corporate sustainability reports, voluntary disclosure to CDP Water or direct conversations with company management. Many reported asking two key questions: 1) If corporations understood the water risks they faced, and 2) if they had a water management policy in place.

The Ceres Aqua Gauge was mentioned as a tool that provides a systematic way to assess corporate disclosure, measurement, engagement, and management practices **(Figure 3.6)**. It can be readily converted to a numeric scoring system if needed. Several managers in our survey have also evolved corporate water benchmarking templates, while others publish water management expectations **(see Asset Owner Expectations for Corporate Water Management)**. CDP plans to release a corporate water response score later in 2015.

"Aqua Gauge can be a useful tool if quantifiable metrics are applied, and investors can judge corporate water maturity versus industry peers."

Figure 3.6: Assessment of Corporate Water Risk Management Using the Ceres Aqua Gauge



Water risks are often best addressed collectively, by region or by industry. Several managers are engaged with industry associations to drive better water management practices. For example, the Beverage Industry Environmental Roundtable (BIER), the apparel industry's Roadmap to Zero Discharge of Hazardous Chemicals (ZDHC), the Mining Association of Canada, and IPIECA, the global oil and gas industry association for environmental and social issues, are all working on mitigating water impacts at the industry level. The UN CEO Water Mandate's Water Action Hub is another resource for corporations and industries to share information and potentially collaborate in regions of mutual importance and interest.[89]

"We brought in the Mining Association of Canada to explain their response to ESG and water risks. We now encourage member companies to be involved with the Association on mitigating risks."

Other data and research resources for capturing metrics and information on corporate water dependency, security and response shared by managers are listed in **Table 3.1 & Appendix C**. Public databases from government and regulatory agencies, financial and sustainability reporting issued by companies, ESG research reports and controversy tracking services, along with regional and issues based NGO research were also mentioned as valuable.

The majority of managers subscribe to ESG research from providers such as EIRIS, MSCI, Sustainalytics, Trucost, Vigeo, and others. Several managers consider sector or issue-themed research reports published by these providers as particularly valuable. Many expressed wanting to see greater sell-side investment in ESG-oriented research and analysis, although several recent water-themed reports were seen as valuable.[90, 91]

"It's incredible how small the sell-side's ESG research departments have remained in relation to the head-counts of other research and investment departments."

Asset Owner Expectations for Corporate Water Management

One asset owner makes expectations for its portfolio companies on water very clear by publishing a detailed guide of "Investor Expectations: Water Management" publically.[92] The investor uses these guidelines to regularly assess progress of companies. Some of the specific expectations are condensed here:

A. Clear Water Management Strategy

Investors should be able to assess how water scarcity could affect company's operations and profits. Water as an input and output factor in the production process needs to be assessed. They should also conduct a water footprint analysis covering direct operations, supply chains, and products and services. Understanding the full extent of corporate water-related risks also requires assessing factors outside the company's immediate operations.

B. Sustainable Water Management

Companies in high-risk sectors and/or regions that have the best systems and technologies to deal with water challenges are better positioned to mitigate water-related risk, identify new market opportunities and create long-term shareholder value. Sustainable water management should include assessing social and environmental impacts on communities surrounding the companies' direct operations and supply chains.

C. Governance Structure

Corporations must have a corporate governance structure that facilitates realistic strategies and responses to water management. Key elements should include board-level involvement, board committee structures, management responsibilities, risk management and internal control processes, reporting lines, timelines and clear targets.[93]

Table 3.1: Resources on Corporate Water Dependency, Security & Response Shared By Managers

WATER SPECIFIC	
CDP Water	www.cdp.net/water
CEO Water Mandate Corporate Water Disclosure Guidelines	www.ceowatermandate.org/disclosure/
CEO Water Mandate Guidance for Companies on Respecting the Human Rights to Water and Sanitation	ceowatermandate.org/files/business-hrws-guidance.pdf
Ceres Aqua Gauge	www.ceres.org/aqua-gauge
Circle of Blue*	www.circleofblue.org/waternews/
EPA Enforcement and Compliance History Online	echo.epa.gov/
EPA Toxics Release Inventory Program	www2.epa.gov/toxics-release-inventory-tri-program
Food and Agricultural Organization of the United Nations (FAO Aqua stat)	www.fao.org/nr/water/aquastat/main/index.stm
Global Water Intelligence*	www.globalwaterintel.com
GEMI Local Water Tool*	www.gemi.org/localwatertool/
Institute of Public and Environmental Affairs Water Pollution Maps	www.ipe.org.cn/en/index.aspx
ISO 14046 Global Water Footprint Standard*	www.bsigroup.com/en-GB/ISO-14046-Water-footprint/
Maplecroft Global Water Security Risk Index*	www.maplecroft.com/about/news/water-security.html
Pacific Institute	pacinst.org/
Palmer Drought Severity Index & Drought Monitor via National Integrated Drought Info System	www.drought.gov/drought
Political Economy Research Institute, University of Massachusetts, Amherst	www.peri.umass.edu/toxic water/
Stockholm International Water Institute	www.siwi.org
The Water Impact Index (Veolia)*	www.veoliawatertechnologies.com/en
Vital Water Graphics*	www.unep.org/dewa/vitalwater/
Water Action Hub*	wateractionhub.org
Water Footprint Assessment Tool (Water Footprint Network)*	www.waterfootprint.org/tool/assessment/
WaterBeta™ and WaterVaR™ analysis by Equarius Risk Analytics	www.equariusrisk.com
Water Resources Group	www.2030wrg.org/
World Business Council for Sustainable Development Global Water Tool	www.wbcsd.org/home.aspx
World Resources Institute Aqueduct Water Risk Mapping Tool	www.wri.org/our-work/project/aqueduct
WWF - DEG Water Risk Filter	waterriskfilter.panda.org/
REGION SPECIFIC	
ASrIA ESG Investor Network	asria.org/
Australian Bureau of Meteorology Climate	www.bom.gov.au/climate/
Business Environment Council (Hong Kong)	www.bec.org.hk/
China Water Risk	chinawaterrisk.org/
Credit Lyonnais Securities Asia (CLSA)	www.clsa.com
Comprehensive Assessment System for Built Environment Efficiency (Japan)	www.ibec.or.jp/CASBEE/english/
Greenpeace (China and Textile Industry)	www.greenpeace.org/usa/en/
Indian Water Resources Society	iwrs.org.in/
Instituto Ethos (Brazil)	www3.ethos.org.br/
Japanese Research Institute	www.jri.co.jp/english/
SITAWI Finance for Good (Brazil)	sitawi.org.br/en/finance-for-good/
Solaron (India)	www.solaronworld.com/
Stockholm Environment Institute (Global water issues facing Nordic companies)	www.sei-international.org/
SECTOR SPECIFIC	
American Water Works Association (AWWA) Water Conservation Measurement Metrics Guidance Report*	www.awwa.org
Beverage Industry Environmental Roundtable (BIER)*	www.bieroundtable.com
Ceres' Hydraulic Fracturing & Water Stress, Shareholder, Lender & Operators Guide to Water Sourcing (Gas & Oil)	www.ceres.org/shalemaps
Ceres' Water Disclosure Framework for Water & Sewer Enterprises	www.ceres.org/resources/reports/disclosure-framework-for-water-sewer-enterprises/view
Comprehensive Assessment System for Built Environment Efficiency (Real Estate, Japan)	www.ibec.or.jp/CASBEE/english/
Electronic Industry Citizenship Coalition	www.ibec.or.jp/CASBEE/english/
Global Real Estate Sustainability Benchmark	www.gresb.com/
The Mining Association of Canada	mining.ca
International Council of Mining & Metals, water management resources*	www.icmm.com
The Global Oil and Gas Industry Association for Environmental and Social Issues (IPIECA) Water Framework*	www.ipieca.org/water-management-framework
WWF-DEG Water Risk Assessment for Agriculture and Commodities*	waterriskfilter.panda.org

*Not explicitly mentioned by survey participants but often referenced throughout Ceres investor and corporate discussions.

Ideas for Applying Water Analysis to Investment Action

Upon completion of corporate water risk analysis—along with other ESG research—managers apply their findings to investment decisions in a variety of ways **(Figure 4.1)**.

Shrinking the Investment Universe

Several managers mitigate ESG and water risks by excluding low-scoring ESG companies from their investable universe. An example is scoring firms on a list of ESG factors by sector or sub-sector and eliminating the bottom performers.

"We score the 4,000 plus companies in our universe on a variety of ESG factors, with the only water question being, 'Does management have water programs and targets in place to reduce water use?' We'd certainly like to ask more. We then eliminate the bottom 10% of ESG performing companies by industry, to reduce tracking error, and then give portfolio managers one year to improve performance of an eliminated company if they insist on holding it."

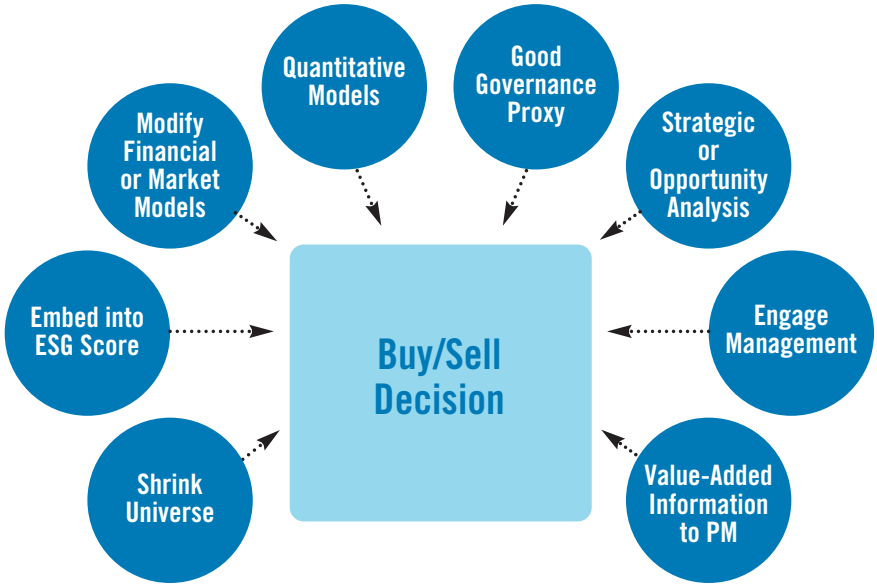
Using ESG Scores

ESG analysis styles vary across the firms interviewed, from a very entrepreneurial approach, with each portfolio manager creating their own process, to a highly standardized process applied across the entire firm. The methods most often used include:

- ESG research templates where ESG analysts answer a set of questions on material issues by sector, producing an ESG investment opinion, (e.g. high risk, low risk, neutral) for each company.
- Internally created ESG scoring systems that either capture quantitative or qualitative data, or a combination of both, with many requiring analysts' input.
- ESG scores provided by third-party research services.

Many managers favor scoring systems because they help instill rigor into ESG-driven investment decision-making and allow quantifiable metrics to be created. ESG scores can then be applied directly to financial decision-making models and are more easily digestible for portfolio managers (PMs), who tend to rely on quantitative metrics to filter large amounts of market information.

Figure 4.1: Different Approaches in Applying Water & ESG Analysis to Buy & Sell Decisions



"It can be very delicate bringing up ESG information to certain PMs in our firm. ESG scores present them with a quantifiable number that can give them something tangible to focus on. They are a starting point for deeper conversations about underlying investment risks behind the scores."

Scoring systems have some weaknesses—such as providing a false sense of precision and comprehension. To overcome these, managers must understand and communicate the fundamental drivers of the scores. Ultimately, they can be used as a starting point for further discussions of the factors underlying low or high scores.

"You have to be careful not to create a sausage machine of meaningless numbers that no one understands in the end. You have to know how to judge the score. The discipline and rigor of scoring is good, but it needs to come with a certain level of flexibility. It's also important to know the roles of the teams of people involved in creating the scores [e.g. research, risk group, compliance, etc.]."

Scoring frameworks used by managers in our survey varied in the number of questions being asked, the weighting of the 'E', 'S' or 'G' factors, and if questions were sector-specific. The following examples provide an overview of different approaches and water weightings in building ESG scores **(for more details and examples see Appendix D)**.

Example 1: Centralized and Consistent ESG Scores

"We have an ESG scoring system that consists of 100 key ESG metrics, weighted 50 percent toward 'G' and 25 percent toward 'E' and 'S,' respectively. Companies with a combined threshold score of 66 or lower (out of 100) cannot be considered for purchase. Water is not yet embedded in our scores, but we are researching water metrics now. To promote consistency, scoring is done in a central research department, in collaboration with a designated analyst from each fund to incorporate valuable regional, industry and company-specific information."

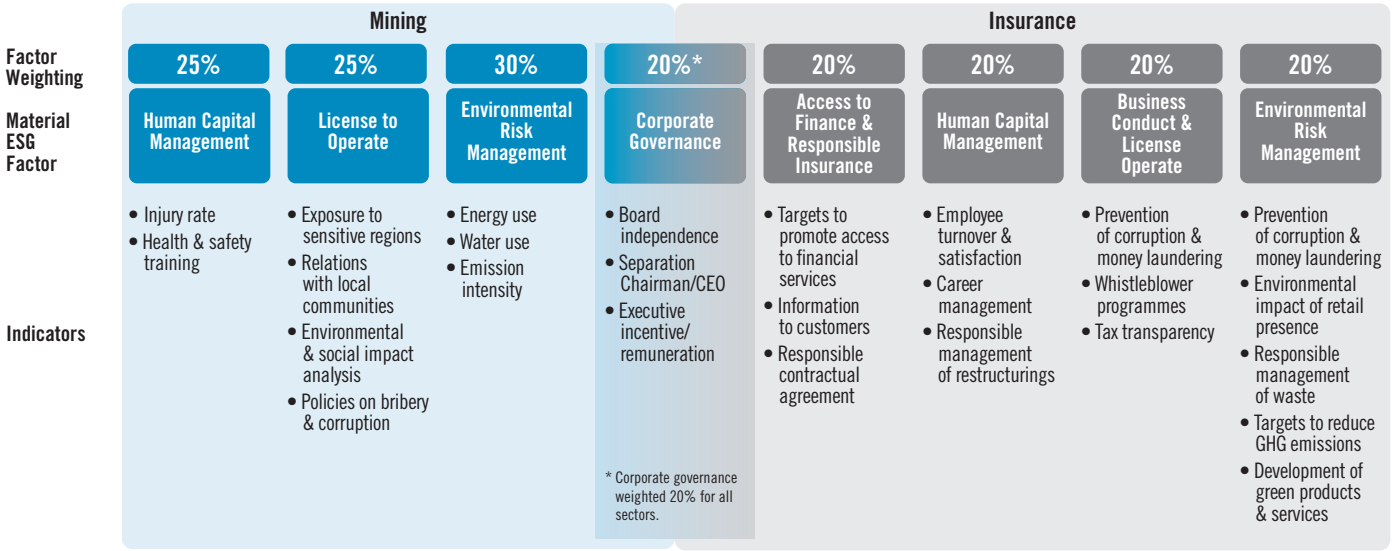
Example 2: ESG Scores Combined with Fundamental Equity Scores

"We weight the overall ESG score at 20 percent of the entire company rating, with the remaining 80 percent coming from fundamental equity [financial] analysis. Fundamental analysts across the organization are trained by a centralized ESG department to apply the ESG scores and do the analysis. ESG scores also help prioritize company engagement activities."

Example 3: Sector-Specific ESG Scores

"We modify our ESG scoring process for each sector. For example, for the mining sector we weight 'Environmental Risk Management (ERM)' the highest, at 30 percent, as we see this as most material. Under this category, we capture data such as water use, emissions intensity and energy use. In addition, 'License to Operate' is weighted heavily at 25 percent and we capture information such as exposure to sensitive regions, relations with local communities, environmental and social impact analysis and policies on bribery and corruption **[Figure 4.2]**."

Figure 4.2: Sector Specific ESG Scoring Framework



Source: Allianz Global Investors Presentation, *Act 3. Investments in Sustainability, The secret path towards future growth*, July 9, 2014. Available at: http://www.allianzinvest.at/assets/files/produktinfos/14-1610%20SRI%20and%20ESG%20at%20Allianz%20Global%20Investors%20BK1606.pdf

Example 4: Fixed Income Scores

One fixed income fund manager has developed scoring templates for eight different types of municipal bonds, including water and sewer, school districts, higher education and so on. For each sector, 12 to 21 different indicators are collected. For example, data collected on municipal water and sewer systems include age of facilities, timeliness of data disclosure, exposure to drought (using the National Oceanic and Atmospheric Administration's Palmer Drought Severity Index), and reservoir levels.[94] The scoring template is mostly quantitative, but does have some subjective components, i.e. individual analyst interpretation of corporate sustainability report data and of controversial news flow related to water.

One manager noted it was important to continually improve ESG scoring methods as knowledge and experience is gained over time. After collecting a decade's worth of data, they created an algorithm that adjusts their financial analysts' price targets based on ESG scores. The power of this approach is that it eliminates random allocations of variations in discount rates or target prices by utilizing historical data to make the case for ESG-induced model adjustments.

"If a company has a low ESG score, we adjust our target price by minus 10 percent and if it scores well, then we adjust upward by plus 5 percent. We apply this toward equities and fixed income instruments. Through our long ESG experience and robust database, we are able to create ESG alpha for our clients this way."

A fundamental portfolio management question is how much weight the ESG score carries in influencing the investment decision-making. This varied greatly among survey participants—from being able to override fundamental analysis to being informational only for use at the discretion of each fund manager.

Table 4.1: Example of a Portion of an ESG Scoring System for Municipal Water & Sewage System Bonds

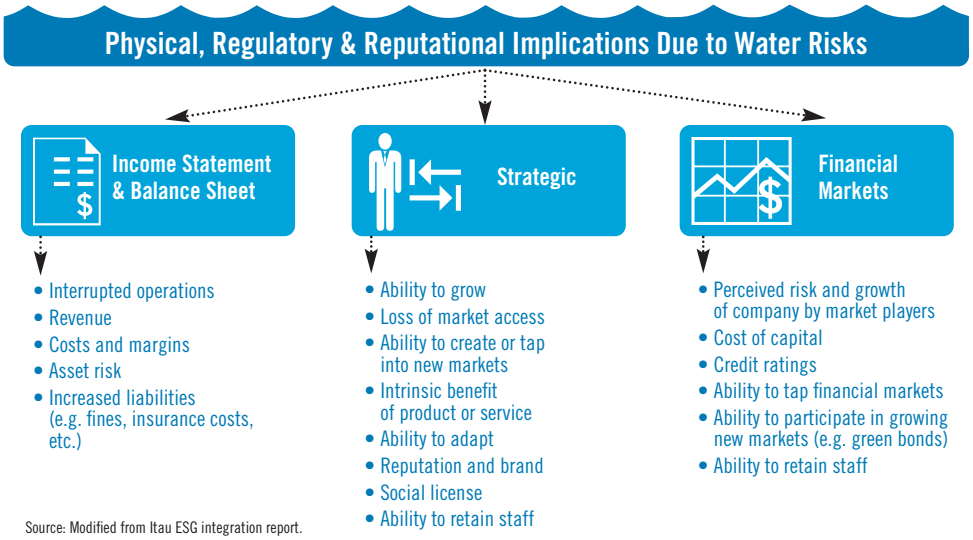
Framework	Category	% of Total	Sample Indicator
Water & Sewer System	Social	20%	Drought Risk
	Economy	15%	Rate Affordability
	Environmental	40%	Age of Plant
	Governance	10%	Quality/Timeliness of Disclosure
	Qualitative Assessment	15%	News Stories, Other
Total Water & Sewer		**100%**	**Total # of Indicators: 12**

Source: Breckinridge Capital Advisors

Adjusting Financial Models and Conducting Scenario Analysis

Several fund managers use ESG scores and related information for adjusting financial models and risk measurements, and in scenario analysis. For example, several fund managers apply water risks data to influence financial income statements, balance sheets and risk variables **(Figure 4.3)**. One approach is to apply ESG scores to the weighted average cost of capital, reflecting higher perceived risks of low-scoring companies or entities. ESG scores at another firm assist fixed income analysts in creating "shadow" credit ratings, which are then compared to Moody's or S&P's credit ratings.

Figure 4.3: Modification of Financial Statements or Market Forecasts Due to Water



Source: Modified from Itau ESG integration report.

"We take our ESG sustainability score and adjust the cost of capital. Cost of capital for the bottom ESG performers rises one percent, implying they are higher risk, and the top performers decreases by one percent. These adjustments to the perceived risk of an entity can have a material impact on the buy and sell decision and the final weighting of the security within a portfolio."

"Our average weighted cost of capital [WACC] for the oil and gas industry is six percent. However, Chevron's WACC, is seven percent, having, in our view, higher than average levels of ESG risks."

There are several ways water risks could affect financial statements, including:[95]

1. Decrease revenue projections
2. Increase costs of production
3. Impact margins
4. Impact operations
5. Adjust capital expenditures
6. WACC (weighted average cost of capital)

Scenario and sensitivity analysis and stress testing related to ESG factors are increasingly being used, and are methods that could provide valuable information on financial exposure to water risks.[96] Scenario analysis has the advantage of providing insights on potential financial impacts of ESG and water risks on revenues, earnings and valuations against "business as usual" scenarios.[97]

"Stress testing needs to be done, especially to assess the ability to maintain operations linked to water risks. We also conduct pre-project stress testing."

"We conduct scenario analysis linked to the potential future higher price of water in high water competition areas or in regions with low water quality."

ESG & Water Data in Quantitative Strategies

Three of the firms surveyed have very strict, rules-based, quantitative processes for integrating ESG and water data. One, in particular, explicitly leaves any subjective elements out of ESG analysis. This approach identifies factors that represent greater determinants of alpha than conventional fundamental analysis alone. Only fully transparent quantitative data that doesn't need interpretation, such as company disclosure of environmental metrics in specific units or in binary form (a particular policy exists: yes or no) are considered. A firm lacking ESG data or failing to disclose ESG policies scores low. Companies that score higher in ESG data disclosure potentially perform better due to strong internal data systems and long-term planning horizons, according to one of the managers interviewed.

"We seek to leverage collective brainpower of the world's analysts from stock selection and ESG research. We are currently collecting 20 million ESG data points and seek financial materiality through quantitative modeling."

This firm also worked with Corporate Knights, a Toronto-based media and research company, to assist with modeling. Ultimately over 2,000 financial and over 1,000 ESG variables, including some water metrics, are incorporated into their quantitative factor model that looks for unexplained returns.

Case Study: Water Shadow Pricing and Scenario Analysis

Ninety-five percent of Brazil's population has access to only 27 percent of Brazil's water resources. Put simply, while the country is water rich in aggregate, water is mostly unavailable to the most economically active regions far south of the Amazon basin.[98] The national agency in charge of freshwater has established a "theoretical price" for water that reflects water competition in a region and the costs to fully treat wastewater for industrial users. One manager reported undertaking scenario analysis by applying this higher cost of water to the income statements of companies they own, and then assessing the impact on company market value through discounted cash flow analysis.[99]

"Some companies pay almost nothing for water and there is a real risk that in approximately three or four years' time they will be charged a much higher price. We determine where the company operates, how much water it uses in this region, and then apply the new shadow price proposed by regulators. We also assess how many water fines and violations the company has been charged and forecast those forward. Our team then runs these assumptions through a discounted cash flow model. This results in an adjusted market capital valuation for the company."

"If a company's value is greatly reduced due to our water analysis, we then make an appointment with the Investor Relations department to share our findings, engage management and assess if the company is able to mitigate these risks. Often management is very surprised by how significantly their valuation can be impacted."

For some sectors, water was found to be a useful explanatory factor. One challenge with ESG quantitative analysis, however, is that scoring lower (from a sustainability perspective) may actually drive short-term stock performance, therefore necessitating inclusion of "do-no-evil" rules into the models.

Water Stewardship as a Proxy for Good Governance

Several managers stressed that they focus on picking companies with strategic vision and internal systems in place to promote resilience in their business models. Having the proper incentives, communication channels and policies in place equips a company to better handle unforeseen risks—environmental, social or otherwise—and to take advantage of market opportunities. Two fund managers stressed that understanding internal management systems and governance is far more important than tracking individual environmental metrics.

"We simply believe that transparency on ESG improves management decision-making and thereby our own investment returns. Water risk management, in particular, is an excellent proxy for strong governance and corporate resilience."

Another fund manager conducts forensic analysis, studying how companies reacted to material water risks over historic five-year periods, in order to assess if past management reactions signal strong governance and risk management systems.

Opportunity Analysis

For one fund manager, ESG and water risk integration means seeking out companies, whose products provide intrinsic benefits to the environment and society. The manager looks for investments with long-term opportunities in areas such as resource or energy efficiency, or new technologies with strong "E" and "S" benefits. Another manager identifies companies that are well positioned to withstand more volatility—environmental as well as societal—and have strategies to capitalize on potential opportunities (such as taking market share from less prepared competitors), or have products that will be in greater demand in time of crisis (e.g. certain irrigation technologies during droughts).

Managers also expressed a need for more product-centric research to promote greater understanding of sustainability impacts, not just by a company as a whole, but by its individual products and services. Analyzing product lines, or key corporate strategies in terms of sustainability factors and environmental or social benefits, would also allow investors to seek out investment opportunities.

"We want more analysis of ESG factors related to core products or strategies that can help us find investment opportunities that intrinsically have sustainability benefits. Water data currently seems focused on capturing behavior, versus strategy or opportunity."

Several managers believe their analysis of ESG and water factors helps them identify investment opportunities in companies with a competitive advantage.

"In our methods, we investigate the nature of a company's product and if that product is solving a sustainability challenge."

For example, identifying electrical utilities that require less water-intensive generation, which could be a real competitive advantage in the medium- to long-term. One challenge to this analysis is that discounted cash flow models tend to project only three to five years out, where some sustainability issues and investments require longer-term horizons.

Water can also be a large barrier to entry (e.g. utilities requiring large reservoirs for cooling), and one manager views the associated first-mover advantage as an important analysis factor.

"We view access to high quality water resources as a strategic advantage."

Pursuing Engagement Strategies to Drive Systems & Corporate Change

To drive stronger disclosure of material ESG and water risks and broader discussion of the issues and mitigation responses, some managers are actively engaging key institutions, as well as corporate management.

Driving Systems Change

Many managers commit time and resources to work with standard-setting organizations and external stakeholders on improving the integration of extra-financial (and water) risk data and issues in the greater market. In addition, two large asset owners in our survey consider it important to play a role in deepening understanding and consideration of ESG and water issues within their national academic and standard-setting bodies. The following institutions are being engaged with a view to drive systems change:

- National fund management regulations and standard-setting bodies (e.g. the Securities and Exchange Commission in the U.S. and the King III Code in South Africa)
- Finance industry associations (e.g. CFA Institute)
- Stock exchanges on listing standards[100]
- Industry organizations (e.g. Mining, Oil and Gas)
- Sustainability Accounting Standards Board (SASB)
- International Integrated Reporting Council (IIRC)
- Global investor networks such as the Ceres Investor Network on Climate Risk (INCR) and others[101]
- The Global Real Estate Sustainability Benchmark (GRESB)
- Local universities (collaborating on joint projects to create centers of excellence in investment and corporate sustainability, train the next generation, and leverage innovative thinking, etc.)[102]

"We would like to see the integration of ESG and responsible investing practices be part of undergraduate and MBA class curricula. Too often it is not."

"The CFA Institute should play a bigger role in training on ESG integration."

"More and better information on material ESG issues should be put in front of pension fund trustees. In particular, information on complex issues such as carbon, stranded assets and on water."

Corporate Engagement

In addition to engaging the organizations driving systems change, many managers have an active corporate engagement strategy, aimed at gathering information on potential risks, and improving portfolio company practices and policies that ultimately mitigate ESG and water risks. Direct engagement activities are often part of a comprehensive ESG and water risk engagement strategy with some, or all, of the following four elements: 1) leveraging collaborative corporate engagement with other investors, 2) filing shareholder resolutions when appropriate 3) benchmarking corporate progress and 4) establishing proxy and investment guidelines on water.

"We stress in our dialogues with companies that we can help management reduce risk and potentially make more money. We want the shareholder and company relationship to be collaborative and productive."

Leveraging Collaborative Engagement

Managers reported engaging portfolio companies both independently and in collaboration with other shareholders. Coordinating shareholder requests was cited as effective in leveraging resources and helping motivate companies to respond. Coordination also helps determine top issues of concern and prevents companies from excluding shareholder resolutions from their proxy statements.[103] Many investor networks have water working groups, focused on deepening their understanding of material water issues and on collaboratively engaging companies when needed **(see Examples of Collaborative Engagements on Water)**.

Examples of Collaborative Engagements on Water

Example 1: Requesting greater disclosure from oil and gas, and mining companies

The Investor Group on Climate Change (IGCC) sub-committee on water spearheaded a collective effort requesting that all Australian-listed companies in the oil and gas, and mining sectors, not yet responding to CDP's water questionnaire, do so.

Example 2: Improving best practices and understanding of the human right to water

The Interfaith Center on Corporate Responsibility (ICCR) hosted a multi-stakeholder roundtable on the Human Right to Water in 2013,[104] bringing together about 70 civil society organizations, affected community members, faith-based investors and company representatives, including Campbell Soup, Peabody Energy, Veolia Water and others. The meeting provided a platform for improving best practices related to corporate water use, and helped develop frameworks and programs that support the human right to water for communities and reduce corporate impacts.

Example 3: Engaging food companies on water risk

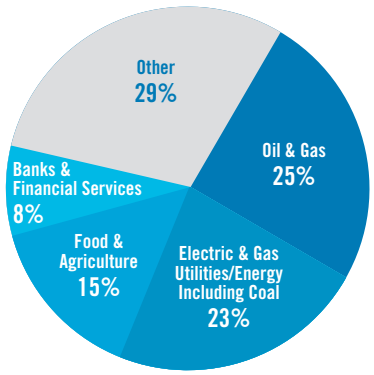
Sustainable agriculture has become a key focus for many investor groups, including ICCR, the Investor Network on Climate Risk (INCR), and the UN PRI. In 2014, PRI developed an investor guidance document, *PRI-Coordinated Engagement on Water Risks in Agricultural Supply Chains*,[105] with input from its steering committee and other investors.

Filing Shareholder Resolutions

Filing a shareholder resolution is an engagement tool used, especially in the United States,[106] to try and influence corporate behavior and mitigate financial risks. Resolutions provide an opportunity to highlight substantive risk and management issues, and to ask for increased disclosure, policies and action on a particular issue. Ultimately, resolutions are often a means to engender a productive dialogue between investors and company management to eventually lead towards better corporate management.

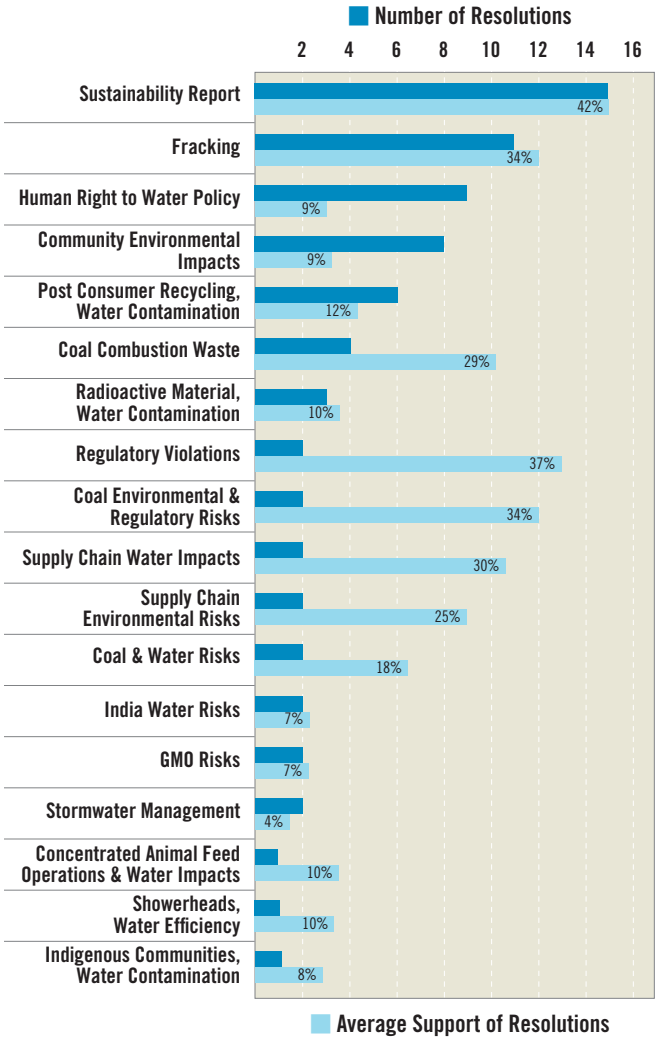
There are many resources and organizations available to aid investors on filing shareholder resolutions.[107] In a separate study, Ceres analyzed U.S. shareholder resolution trends since 2003 and found that there have been 238 shareholder resolutions linked to water, either directly (75 with "water" in the resolve clause) or indirectly (163 with "water" in supporting language). The majority of targeted companies were in the oil and gas, electric utilities, coal, food and agriculture sectors **(Figure 4.4)**.

Figure 4.4: Number of Resolutions By Sector with "Water" in the Resolution's Resolve Clause—2003-2014



Source: Fund Votes and Ceres analysis.

Figure 4.5: Resolutions with Water in Resolve Clause (2004-2014)



Number of shareholder resolutions with term "water" or "wetlands" in resolve clause and average percentage support.

Source: Ceres analysis using proxy information from Fund Votes. http://www.fundvotes.com/ .

Most frequently, resolutions involved requests for sustainability reports and risk disclosure related to hydraulic fracturing (with both, on average, gaining over 30 percent support), followed by human rights and community impact concerns and risks **(Figure 4.5)**. There were also a large number of resolutions related to water contamination concerns in the coal industry. Further resolution trends and details are available in Appendix E and www.ceres.org/investorwaterhandbook.

Establishing proxy-voting guidelines on water helps guide corporate engagement and sets clear expectations to clients, consultants and corporate management. Ceres has identified 30 institutions with water-related language in their proxy voting guidelines (see **Appendix F** for details).[108] This language directly encourages responsible and consistent voting on water-related shareholder proposals **(see Examples of Water Issues in Proxy Voting Guidelines)**.

"As a large universal owner we are able to only engage actively with one to two percent of our companies. Water must be valued and understood appropriately across the whole system—from companies to consultants and analysts, stock exchanges, the SEC and beyond."

Benchmarking Engagement Progress and Divestment Decisions

Managers have wide-ranging approaches and methods in prioritizing their water-related engagements, from benchmarking company progress to selling off their shares. Duration of engagement with companies on particular issues also varies greatly among managers. For example, at one firm, fund managers are given one year to engage with low-performing ESG companies and improve performance before a divestment decision is made. In another instance, the deadline is three years. One manager stressed that it can take two or three years just to get key corporate staff to the table to engage on specific issues of concern. It takes time, they stressed, to establish a platform of mutual trust, awareness and understanding of the issues. Several fund managers or owners believe strongly in the value of continual, long-term engagement.

Engagement has to go beyond the Investor Relations department. It takes work to get the right people in the room—senior level management at the table is critical.

> *"It sometimes takes a while for management to stop being defensive and to work with you. A good starting point is 'why it's important to investors' and getting a recognition of risks. We've read back to management their 10-K's describing material risks [such as water] as a starting point."*

Several managers who are very committed to corporate engagement have benchmarks or milestones for tracking progress against goals. The Interfaith Center on Corporate Responsibility, (ICCR), is a coalition of faith and mission-based investors that has been actively engaging with companies across a broad range of ESG and water issues, in some cases for decades. Dialogues with some companies have evolved into deeply collaborative relationships, some of which span a decade of work and cover a wide set of issue areas. In engagements such as these, it is important for investors to track and benchmark progress to ensure efforts are productive. **(see ICCR's Water Engagement Goals)**.

> *"We worked with management for over a decade; there was then a period of staff turnover and a whole new team was put in place. The leadership team asked if we could train their new senior staff on the environmental and social issues that were relevant to the company—this request reflected the value of relationship building with the company."*

Examples of Water Issues in Proxy Voting Guidelines

"Pax World will generally vote in favor of proposals that request that companies acknowledge and report on their water-related risk, or that request disclosure or development of policies and programs to mitigate those risks."[109]

– Pax World Investments

"Proposals may be filed that ask a company to prepare a report evaluating the business risks linked to water use and impacts on the company's supply chain, including subsidiaries and water user partners. Such proposals may also ask companies to disclose current policies and procedures for mitigating the impact of operations on local communities or ecosystems in areas of water scarcity.

The Fund advisor will support proposals seeking the preparation of a report on a company's risks linked to water use or impacts to water.

The Fund advisor will support proposals seeking the adoption of programs and policies that enhance access and affordability to safe drinking water and sanitation."[110]

– Calvert Investments, Inc.

Another manager currently focused on water risks in agricultural supply chains, uses a set of SMART criteria (Specific, Measureable, Attainable, Relevant, Time-bound) to track their engagement progress. Finally, other managers stressed that it is important to not only engage poorly performing companies, but also to encourage industry leaders to continually raise the bar among peers.

> *"It's important to illustrate positive corporate leadership on sustainability and water issues. So we try to get management to help lead their industry forward."*

Providing Value-Added Information

At roughly half of the firms interviewed, ESG scores and water research analysis are informally considered a way of providing additional information that investment committees and fund managers can use at their discretion.

ICCR's Water Engagement Goals[111]

Benchmark 1: Company acknowledges importance of issue

Tier 1 Goal: Company clarifies board responsibilities for oversight of water, and involves senior executives directly in management of water-related issues.

Tier 2 Goal: Company assesses water risks or related issues (environmental and social) in direct operations and throughout its supply chain (using the World Business Council for Sustainable Development Global Water Tool, Global Environment Management Initiative's or GEMI® Local Water Tool™, the Water Footprint Assessment Tool, WRI's Aqueduct™, etc.).

Benchmark 2: Company adopts policy and engages stakeholders

Tier 1 Goal: Company sets a publicly available water management policy that recognizes the importance of water to the business, with clear goals and guidelines.

Tier 2 Goal: Company engages with stakeholders in an open and transparent manner to develop consensus around environmental, social and economic impact of its water use. Company communicates and works with local communities on water-related issues at an operations and suppliers level.

Benchmark 3: Company begins to implement policy with programs/plans, goals

Tier 1 Goal: Company sets business-wide targets for reductions in water withdrawals /consumption for all facilities, and for facilities deemed high risk, has set more aggressive targets.

Tier 2 Goal: Company has set a global wastewater standard at least equivalent to the most stringent regulatory wastewater standards faced by its facilities globally.

Tier 3 Goal: Company assesses the ratio between water availability and its water consumption in a watershed, and has set a goal to offset its water use.

Benchmark 4: Company publicly discloses data metrics, starts measuring and disclosing info

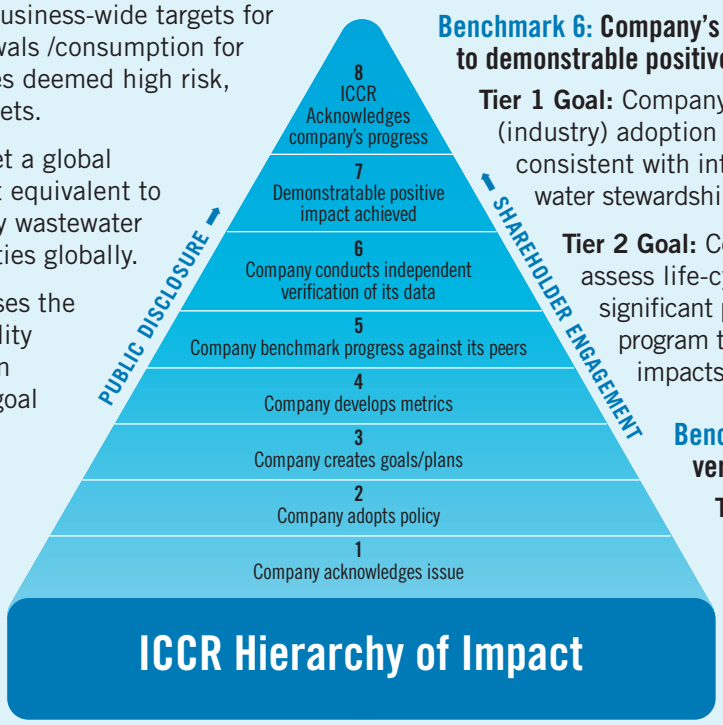
Tier 1 Goal: Company discloses data on regulatory compliance, water withdrawals, water consumption, water reuse/recycling, and wastewater discharge for all direct operations (GRI EN8, 9, 10, 21, 25). Channels for making data publicly available include, but are not limited to sustainability/CSR reports, CDP Water Disclosure, CEO Water Mandate Communication on Progress (relevant for signatories of the Mandate), company websites, annual reports, regulatory filings, analyst meetings and presentations.

Tier 2 Goal: Supply chain: Company measures and discloses (disaggregated figures) amount of water it uses, replenishes, recycles and treats, prioritizing water-stressed and water scarce areas. Company discloses wastewater discharge by destination, by treatment method and by quality, using standard effluent parameters.

Benchmark 5: Company benchmarks its progress against industry/sector peers

Tier 1 Goal: Company continually assesses its progress with key improvements in reporting over years.

Tier 2 Goal: Company leads efforts to work within, or across, industries to address water risks and impacts. Additionally, the company collaborates with other businesses and water users in key watersheds to drive improved stewardship.



Benchmark 6: Company's strategic focus leads to demonstrable positive impact

Tier 1 Goal: Company works to encourage wider (industry) adoption of policy positions consistent with internationally recognized water stewardship and development.

Tier 2 Goal: Company has program to assess life-cycle water impacts of all significant products, and has systematic program to reduce the life-cycle water impacts of all significant products.

Benchmark 7: Independent verification

Tier 1 Goal: Company conducts independent review and verification of data related to the company's direct and indirect water use / discharge and impacts.

Addressing Water Beyond the Buy/Sell Decision

Many managers interviewed use ESG and water analysis to drive decisions and policies in their institutions that go well beyond the buy/sell decision. In several institutions, ESG and water analysis informs the creation of investment policies, portfolio water footprint analysis, strategic planning, client relationship management and product development.[112]

Portfolio Water Footprint Assessment

A small number of fund managers conduct portfolio level monitoring and assessments related to ESG factors, or characterize their entire portfolios in terms of carbon and water intensity. One manager interviewed did this by collaborating with an ESG research provider and two NGOs **(see case study)**, which assessed the funds' carbon and water intensity relative to their benchmark.

Carbon or water footprinting results are likely to vary greatly across asset classes. Given the growing scrutiny and interest in ESG issues,[113] it is likely that more managers will be systematically conducting portfolio monitoring of aggregated carbon and water footprints.

> *"There is an increasing demand from consultants [retained by asset owners such as pension funds, foundations and endowments] asking us to demonstrate the ESG characteristics of our portfolios."*

Data service providers now enable managers to compare their portfolios on a variety of ESG factors against their benchmarks. Several tools on the market, such as MSCI's BarraOne performance and risk management platform and Bloomberg's portfolio analytics platform (PORT), now facilitate in-depth analysis of ESG exposure, as well as allowing managers to upload proprietary ESG scoring methodology for comparison.

Portfolio optimization tools allow managers to limit or eliminate particular ESG portfolio risks while still tracking a mainstream benchmark. This allows for analysis of portfolio performance and composition under certain scenarios, such as low water use and/or low carbon emissions.

One fund manager has found using ESG data for risk management to be the best integration approach. The analysis couples a water risk exposure score with a water management score, and then optimizes the portfolio, selecting stocks with the highest water management score per unit of risk.

> *"We run tracking error at a cap of four percent, with 85 percent of the risk based on asset selection. We diversify away company risk using a multi-factor risk model. We then optimize based on ESG risk, by minimizing exposure to low ESG scores or increasing exposure to high scores. Seven ESG vendors provide scores or individual data points, such as greenhouse gas intensity."*

Another option is to upload proprietary ESG information directly into one of the financial data platforms. This allows managers to continually track and evaluate their investment universe according to internal criteria. ESG scores can then be combined with financial, credit and technical market data to produce a new eligible universe based on both investment and fundamental criteria. For example, an investor can create a screen for best-in-class stocks with low carbon emissions and efficient water use, and then layer this search with specific market criteria, such as emerging markets companies with low price to earnings ratios, to generate a new target list based on these combined criteria. Back testing can then be used to estimate how individual stocks or entire portfolios would have performed over a period of time.

Case Study

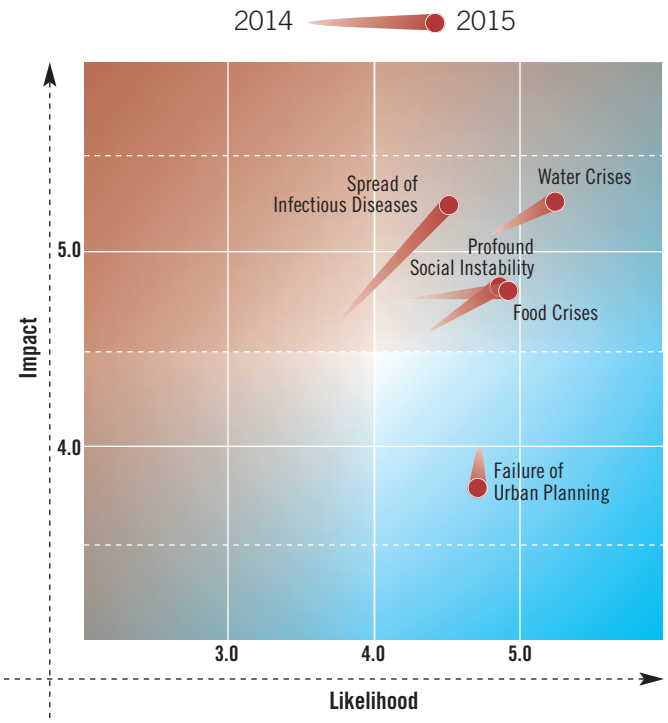
Pension Fund Conducts Portfolio Level Water Intensity Analysis

South Africa's Government Employees' Pension Fund (GEPF) collaborated with WWF (World Wildlife Fund), Carbon Tracker and Trucost to assess their portfolios' (both equity and fixed income) water and carbon footprints against a key index. GEPF had a carbon footprint of 72 tons of carbon per million Rand (~USD 100,000) invested, which was nine percent smaller than the FTSE/JSE All Share Index (ALSI) top 100 footprint. The pension fund's equity water footprint was 3,300 cubic meters per million Rand (USD 100,000) invested, or six percent smaller than the FTSE/JSE ALSI top 100.[114]

Water and ESG Risk Informing Strategic, Cross-Asset Class Decision-Making

A few institutions have created a top-down process to examine big themes in ESG and water trends. One manager formed a firm-wide committee comprised of leadership from all asset classes to study ESG risks to the entire firm. Another organization has taken a similar approach in organizing an ESG strategic research committee to prioritize its research on highest-impact and highest-likelihood risks facing all asset classes. This committee uses the World Economic Forum analysis of global mega risks as a prioritization guidepost, which recently identified water risks as having the highest societal impact and likelihood **(Figure 5.1)**. Cross-asset class analysis of ESG themes and issues can not only provide information on cross-firm exposure to ESG risks, but can also serve as a map, assessing where the firm has the most risk and leverage, in terms of ownership or influence, to mitigate ESG risks.

Figure 5.1: The Changing Global Risks Landscape—Societal Risks



Source: World Economic Forum, "The Global Risks 2015 Report" http://reports.weforum.org/global-risks-2015/top-10-infographics/

Institutional Structures and Policies that Support Integration

Managers shared some recommendations on institutional support structures, policies and programs that support ESG and water risk integration. These include establishing investment philosophies and policies related to water, senior management support in building ESG and water integration research infrastructure, and incentivizing integration through longer-term thinking and compensation structures.

Establishing Public Investment Philosophies, Policies and RFPs Related to Water

Across the investment community, asset owners and managers are making public their sustainability-oriented investment philosophies, proxy voting practices and corporate expectations and guidelines. The public disclosure of policies and guidelines can inform investment staff, trustees, companies and third parties on ESG and water expectations.[115]

In addition to working on establishing guidelines in investment policies and proxy guidelines, some of the managers in our survey, and others, have also committed to conserve water and energy in their own offices and operations—putting into practice what they preach.[116]

A sample of the asset owners in our survey, who do not manage funds internally, have put in place measures to ensure ESG factors are being considered by their fund management firms. One set up an ESG working committee to track how investment managers are fulfilling their mandates of ESG integration. Asset owners expressed that they would like to see more UN PRI reporting information made public on integration practices.

Asset owners expressed the need for greater external fund manager oversight on ESG integration in some instances. There was frustration in not knowing whether an external manager was just "ticking off all the right boxes," but not deeply integrating ESG analysis into their investment processes. One owner very much wanted to see fund managers incorporate a weighting criteria for ESG into buy/sell decisions.

> *"The need to monitor the implementation of ESG factors is very important for the future—not just having firms 'check boxes' as to what they are doing but more on 'how' they are doing it."*

High-level Commitment and Support

Policies alone will not result in driving integration practices. Managers shared their opinions on institutional support structures, policies and programs that they view as fundamental in supporting ESG and water risk integration.

Senior leadership commitment to, and investment in, research and communication infrastructure supporting ESG integration is seen as key. Ideas recommended by managers for boosting ESG and water research capabilities included: investing in data and communication systems that allow for ESG data to be disseminated, collected and shared across the organization; giving ESG specialists a voice in the organization; and developing a shared communication platform.

"ESG analysts participate and contribute to the daily morning investment meeting, such as sharing upcoming analysis of risks in a particular sector, evolving ESG issues or engagement on an issue with management of a visiting company. We can attend any meeting."

"We have an internal social media tool where we can share ESG ideas, analysis and data. Staff across the organization can search using hash tag, by research specialist, topic, industry or company, thereby distributing ESG and water knowledge broadly and quickly in an effective manner across the organization."

Tilting Compensation Toward Long-Term Performance and Integration

Over the past 40 years, portfolio turnover has more than tripled, which means that the average holding period is close to only one year. Yet influencing the way corporations manage environmental and water risk exposure requires a longer time horizon. Therefore, some managers in our survey are aligning research and incentive programs toward long-term performance. Some managers were either linking compensation directly to levels of effort in ESG integration or exclusively to long-term performance.

"The level of effort in integrating ESG practices into daily fund management is part of the bonus calculation."

"Senior investment staff is rewarded only for three to five year performance metrics and beyond. Analysts in their first two to three years at the firm are not rewarded by their buy/sell decision, but rather by how well they worked with the entire investment team."

Client Relationship-Building and New Product Development

Several fund managers aspired to have clients see the value proposition of ESG integration and dispel the misconception that ESG is only about shareholder advocacy.

"We'd like to see clients [asset owners, foundations and endowments] engaging consultants on the need for more ESG integration and themed products. Everyone is too style box-driven, and the converted talk only with the converted."

"There seems to be 'brand' confusion between socially responsible investing and advocacy, and its history, and current practices integrating non-financial ESG metrics. The two streams of different investment practices may overlap, or inform each other, but ultimately tend to appeal to two very different types of clients."

Several managers on the other hand were hopeful that recent client trends are a sign that ESG integration is gaining traction. In many cases, constructive engagement with clients on water and ESG strategies is helping managers improve their research processes, as well as develop new product offerings.

"The advantage of integrating sustainability into a hedge fund strategy is that we can go long [buy] sustainability winners and go short [sell] ESG losers."

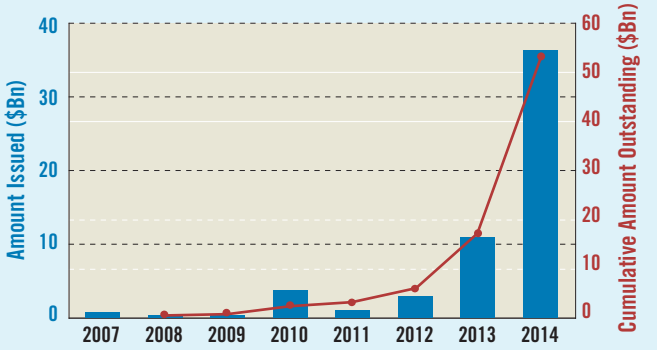
Several new thematic investment products (such as low carbon ETFs and mutual funds) and new markets **(see Green Bonds Linked to Water)** have recently been created due to growing client demand. Although there are many water infrastructure or solutions funds in the market, the opportunity exists to create new low-water risk exposure themed products (a type of smart beta product). Driving the development of these new products and markets is a growing segment of clients becoming more engaged with their own portfolios, and looking beyond traditional investment objectives. An example of this is the growing demand from foundations to align their investment goals with their grant making priorities.[117]

"We view our ESG value-add as getting down to the brass tacks of what it is that a client really wants to influence or achieve. The relationship with the client is a mutual, evolving, and collaborative education process on ESG issues of concern."

Green Bonds Linked to Water

The nascent green bond market tripled in size in 2014, with $36.6 billion in new obligations from 73 different issuers. Several of those new issues included projects related to water infrastructure. A consortium of NGOs, including Ceres, the Climate Bonds Initiative, CDP and WRI is convening water experts to formulate issue standards that reflect sustainable water investments, and therefore build confidence in this market—a fundamental element for continued growth and development.[118]

Figure 5.2: Green Bond Issuance by Year



Exponential growth takes the total amount of green bonds outstanding to $53.2 billion by the end of 2014.

Source: Tess Olsen-Rong, "Final 2014 green bond total is $36.6bn," *Climate Bonds Initiative*, January 14, 2015 http://www.climatebonds.net/2015/01/final-2014-green-bond-total-366bn-—-that's-more-x3-last-year's-total-biggest-year-ever-green

A small number of firms have long historic ESG data sets that are seen as a real asset in alpha creation, allowing for back testing of investment ideas, researching ESG factors that drive performance, and evaluating long-term industry and company trends.

"We have a 15-year dataset that we can now apply to quantitative investing using ESG data and to potentially create new investment products."

For one firm, client requests linked to ESG and water risk reporting provide a competitive advantage. Each fund must report the percentage of its holdings linked to six ESG performance indicators. The performance indicators revolve around holdings with over 50 percent of their revenue sourced from positive sustainability solutions, such as renewable energy development, water and wastewater solutions. This manager's long-term practice of characterizing portfolios based on ESG solutions has been useful in engaging existing clients and attracting new ones.

"The next generation will be looking at investment products and approaches that incorporate the values and visions of society."

Interview Questions

The Ceres ESG and Water Risk Integration Survey was conducted via phone or in-person interviews, with occasional follow-up emails. Not every question was asked of each participant. When participants had specific areas of focus and interest (e.g. engagement practices or ESG scoring), the discussion tended to center around these topics.

Sample Questions

- Can you describe how ESG information and water analysis is embedded into your investment process?
- Please provide specifics on investment methods, including quantitative approaches in integrating ESG metrics into screens, rating systems, discount rates, risk management, engagement practices.
- At what level of the portfolio management process is ESG and water analysis most embedded?
- Provide specifics on organizational structure around ESG and water integration in the investment process, such as centralization of ESG analysis, flow of information, feedback from fund managers and analysts, etc.
- Are any water metrics specifically tracked or integrated into the above processes? Be specific as to which metrics are captured and how they are applied.
- Are any water tools integrated into the process?
- From where do you source ESG data and/or water data? What is most helpful about this research and what improvements are necessary?
- What trends would you like to see in the future, internally, and overall in the investment industry, in regards to water integration?
- How would you like to see water data, tools and analytics related to water specifically, evolve?
- Is there any other information we should know about the firm's approach?

Ceres Sector Water Cheat-Sheet

The following Ceres-developed resource highlights sector-relevant water issues and recommended starting questions for engaging portfolio companies in high water risk industries.

INDUSTRY	DRIVERS	TOP ENGAGEMENT QUESTIONS
FOOD & BEVERAGE 	• Food & beverage operations require reliable quantities of high quality water, both as an ingredient and for processing. • Approximately 70% of global water use is in agriculture, with significant associated water pollution from runoff of fertilizer and pesticides into surface and groundwater.	• How does the company track and manage water-related risks in its direct operations and in its agricultural supply chain (including drought and water pollution)? • Can the company provide details on those risks and on how it plans to manage them across its various operating units?
CAPITAL GOODS **Chemicals** 	• The chemical industry requires significant quantities of water for cooling and heating. • Companies face high regulatory risks from spills and product lifecycle impacts, where chemicals in the product persist in the environment.	• What process is in place to assess water risks/impacts? • What potential water pollution impacts arise when the company conducts a product lifecycle analysis? Which measures have been considered (e.g. green chemistry) in trying to mitigate the possibility that chemicals from the product will persist in the environment?
METALS & MINING 	• Significant water requirements related to processing and transport of ore, cooling machinery, and managing waste tailings. • Contamination risks linked to dewatering of mines and tailing ponds, as well as acid mine drainage. • Flooding risks and costs related to removing excess water. • Community resistance to mine presence due to water competition or contamination concerns.	• Describe your approach to managing water risks and impacts from operations before, during, and after the life of the mine? • What are the company's procedures to ensure that the appropriate stakeholders have been identified and engaged, including local government and communities, on water rights and concerns?
ENERGY & UTILITIES **Electric Power** 	• Globally, electric power generation has the second largest water requirement (after agriculture), with large quantities needed for cooling of thermoelectric plants. • High water temperatures or low river flows can impede or reduce generation. • Reliable and steady water flows are needed for hydroelectricity. • Energy mix matters: water use/carbon emissions profiles vary for different fuels (i.e. coal vs. gas. vs. oil) and cooling systems.	• What is the company's water management strategy to mitigate risks from climate change, warmer water temperatures and/or decreased water availability? • How is the company considering water risks as part of its capital planning process? • If company is involved with managing and disposal of coal ash, describe practices to mitigate risk to water resources.
ENERGY & UTILITIES **Municipal** **Water Utilities** 	• Revenue models may overestimate future sales by extrapolating historical consumption patterns although per capita water consumption is consistently declining. • Water system revenues often are highly dependent on volumetric sales, creating a disincentive for deep conservation and vulnerability to sudden downturns in water consumption driven by drought or other supply shocks.[1] • Water systems may have significant losses in the transmission/ distribution network, resulting in non-revenue producing water. • Infrastructure deficit from decades of chronic underinvestment.	• How is the municipality balancing the need for reliable revenues with the need to price water services to convey the scarcity of the resource?[2] • How is the municipality accounting for water supply stresses in its water planning?

1 Jeffrey A. Hughes and Sharlene Leurig, *Assessing Water System Revenue Risk: Considerations for Market Analysts*, Ceres and University of North Carolina Environmental Finance Center, August 2013. http://www.ceres.org/resources/reports/assessing-water-system-revenue-risk-considerations-for-market-analysts/view

2 Sharlene Leurig, *Disclosure Framework for Water & Sewer Enterprises*, Ceres, August 2013. http://www.ceres.org/resources/reports/disclosure-framework-for-water-sewer-enterprises

INDUSTRY	DRIVERS	TOP ENGAGEMENT QUESTIONS
OIL & GAS 	• Large volumes of water are often required in conventional and unconventional energy production (oil sands, shale energy using hydraulic fracturing, enhanced oil recovery, etc.) • Industry requires use of toxic chemicals in hydraulic fracturing. • Water contamination risks from surface spills, transport, wastewater treatment, disposal wells and refining. • Oil and gas water disposal wells linked to earthquakes and contamination events. • Community stakeholder concerns around water competition.	• How much water is the company using for oil and gas development versus local water needs of other users? • What is the company's water risk assessment process and water management plan to mitigate sourcing, and wastewater production and disposal risks? • Describe the company's engagement strategy with local stakeholders on water risks?
RETAIL & CONSUMER Apparel 	• Large amounts of water embedded in supply chain inputs (e.g. cotton, leather, etc.) • Wastewater associated with dyeing and milling (metals, dyes, persistent chemicals, etc.) • Consumer water use for garment washing (including drycleaners, chemical cleaners, etc.) • Competitive advantage via sustainability branding, appeal to environmentally-conscious buyers.	• How does the company manage and mitigate water risks in its supply chain—including sourcing of raw materials (e.g. leather, cotton) and risks stemming from low levels of control over shared contract facilities? • What is the company's wastewater mitigation strategy and is it collaborating with others in the industry to collectively improve environmental impacts from the supply chain (e.g. Sustainable Apparel Coalition, Roadmap to Zero Discharge of Hazardous Chemicals, Clean by Design program, etc.)?
INFORMATION TECHNOLOGY Semiconductors 	• To make a single 300-millimeter wafer, approximately 2,000 gallons of ultrapure water are required.[3] • Wastewater management is crucial due to corrosive chemicals used for etching wafers.	• What is the company's strategy for mitigating large water sourcing needs? • Has an assessment been made to ensure future supply, considering climate change and local stakeholder and community concerns over competition for water?

3 Mou Peng et al, *A Physical process for recycling and reusing waste printed circuit boards*, Institute of Electrical and Electronics Engineers, Proceedings for of the International Symposium on Electronics and the Environment, 2004

Other ESG Data & Research Resources

ESG & OTHER	
Bank of America Merrill Lynch water research	Client resource
Bloomberg Platform	www.bloomberg.com/professional/
Ceres 21st Century Investor Blueprint	www.ceres.org/resources/reports/the-21st-century-investor-ceres-blueprint-for-sustainable-investing/view
Ceres SEC Climate Disclosure Search Tool*	www.ceres.org/resources/tools/sec-climate-disclosure/sec-climate-disclosure
Chevreau	Client resource
Citibank (Elaine Prior analysis)	Client resource
Company reporting and filings (10-Ks, bond disclosure documents, sustainability reports, websites)	
Corporate Knights Capital	www.corporateknightscapital.com
U.S. Energy Information Administration (EIA)	eia.gov
EIRIS Foundation and Ethical Investment Research Services	www.eiris.org/
FactSet FirstRain	www.firstrain.com
Goldman Sachs Sustain	Client resource
HSBC ESG and water research	Client resource
InVEST Integrated Valuation of Ecosystem Services and Tradeoffs*	www.naturalcapitalproject.org/InVEST.html
United States Department of Labor, Occupational Safety & Health Administration - enforcement & fines pages	www.osha.gov
LexisNexis	www.lexisnexis.com
Life Cycle Assessment*	ceowatermandate.org/water-assessment-tools-methods/what-tools-are-available/life-cycle-assessment/
MSCI	www.msci.com/products/esg/about_msci_esg_research.html
Natural Capital Declaration*	www.naturalcapitaldeclaration.org
Oxfam	www.oxfam.org
Resource Investment Optimization System*	www.naturalcapitalproject.org/RIOS.html
Reuters Platform	thomsonreuters.com/financial/trading-platforms/
Sustainalytics	www.sustainalytics.com
Vigeo	www.vigeo.com/csr-rating-agency/
World Bank	worldbank.org

*Not explicitly mentioned by survey participants but often referenced throughout Ceres investor and corporate discussions.

Examples of ESG Scoring Templates

An example of various ESG scoring frameworks shared during conversations with managers.

Scoring Structure	Influence on Buy/Sell Decision	Water-Related Components	Data Sources for Scoring
Detailed analysis of eight ESG categories with specifics varying by sector: 1) business practices such as product liability and sustainability reporting, 2) corporate governance, 3) community involvement, 4) environmental stewardship, 5) labor, health and safety, 6) human rights and anti-discrimination, 7) diversity, 8) supply chain management. All questions answered as "yes/no/NA" to produce score. Analyst then produces 4-10 page qualitative analysis.	PM can overrule negative ESG score.	• Corporate acknowledgement that water is a risk, Takes steps to mitigate risks • Water Use • Percentage of water recycled • Percent reductions in water use • Human Right to Water Policy • Eco-efficiency environmental ratios specific to each industry	• Company data • 10-K reports • NGO reports & research • Media/newsflow • U.S. Occupational Safety & Health Administration website • U.S. Department of Labor • FactSet • FirstRain
Corporate or municipal bonds scored on 100-point scale, by major sector (e.g., general obligation, school district, water and sewer, etc.).	ESG score creates a shadow "credit rating," which is compared to existing market rating and influences whether bond is under- or over- weighted.	• Drought risk • Reservoir levels • Water rate affordability • Age of plant	• Questionnaires sent to company management • Bloomberg ESG data linked to an internal Excel template • Drought data risk via the Palmer Index • Bond disclosure documents
ESG template unique to each sector assessing corporate "exposure to water risks" and "management of water risks."	Scores produce an A-D rating. Companies below C shouldn't be purchased, but PM can overrule.	• Corporate awareness of water risks • Corporate mitigation of water risks	• MSCI • EIRIS • Solaron (India) • Sell-side ESG research
ESG score is derived from environmental, social and governance factors that are weighted differently for each sector and according to materiality. Corporate governance is weighted at 20% for all sectors.	Produces conviction rating of 1-5, with 3 being neutral. ESG analysts can override the scoring system. PM is given separate "conviction ratings" from the fundamental analyst and the ESG analyst, and can weigh the information any way they like. Rating is viewed as "conversation starter" and catalyst to deeper analysis.	None currently	• Vigeo • Sustainalytics • Internal data gathering
ESG score is derived through measurement of ESG metrics adding to 100 point score ("G:" 50%, "E:" 25% and "S:" 25%).	If ESG score < 66, fund manager cannot buy the stock.	None currently	Unclear
ESG score by sector produces a score showing company performance relative to sector peers.	Unclear	• Human Right to Water • Water risk exposure • Water management systems	• MSCI • NGO information
Governance-only scoring, including tracking history of CEOs, CFOs and board members.	Key governance red flags, such as CEO being a member of the board, can prohibit a "buy".	None currently	• Company filings • LexisNexis • Reuters • Bureau of Labor Standards • EIA • DOE • World Bank • IMF

Trends in Water-Related Shareholder Resolutions

Filing a Shareholder Resolution in the U.S.

In accordance with Section 14a-8 of the Securities Exchange Act of 1934, any investor with $2,000 or one percent in shares held for 12 consecutive months can file a resolution calling on a company to take a particular action. While shareholder votes in support of these resolutions are non-binding to the board and management, this form of investor engagement openly challenges corporate policies and often persuades businesses to adopt changes. Once filed, resolutions can either be withdrawn by the company in agreement to take action, or challenged by the company before the Securities and Exchange Commission (SEC), or accepted for inclusion in the proxy statement for vote at the annual investor meeting.

Shareholders can file a resolution (or proposal) with the same ask over multiple years. In order for a proposal to be re-filed, it has to receive at least a three percent vote the first year, six percent for the second, and 10 percent for the third and each subsequent year.[1] If the proposal fails to garner the number of votes required for resubmission, the filer must wait three years to resubmit. Despite being non-binding, even low shareholder votes can prompt significant response from management.[2]

1 USSIF Shareholder Resolutions http://www.ussif.org/resolutions

2 http://www.ceres.org/files/in-briefs-and-one-pagers/proxy-power-shareholder-successes-on-climate-energy-sustainability

As of 2014, there were over 5,000 publicly traded companies in the United States[4]—many with varying degrees of exposure to water risks. Every year, these companies receive hundreds of shareholder resolutions—with 417 resolutions focused on social and environmental issues filed during the 2014 proxy season.[5] Between 2003-2014, a total of 238 resolutions included water directly in the resolve clause, or indirectly in the supporting statement. These resolutions were gathered and analyzed for industry trends by FundVotes and Ceres and can be accessed at www.ceres.org/investorwaterhandbook.

Number of Resolutions by Industry Sector, 2003-2014

The sectors receiving the highest number of shareholder resolutions on water risk were the oil and gas industry (accounting for 25 percent of resolutions), followed by electric utilities including gas and coal powered (23 percent), followed closely by food and agriculture, chemicals, and the financial sector **(Figure 4.4 in the report)**. These resolutions ranged considerably in scope, but often sought to drive better disclosure, as well as water management practices and policies related to water quality and quantity used. Some resolutions asked companies to mitigate water impacts, both in direct business operations, and throughout their supply chains.

Oil and Gas Sector

Over half of all water-related resolutions filed with the oil and gas sector over our study period focused on hydraulic fracturing (with an average of 34 percent support). Investors have been engaging the industry through dialogues (public, private and written correspondence), in-person meetings, public research reports and filing shareholder proposals for many years.[6, 7] Over the past several years, investors have also been collaboratively engaging operators on hydraulic fracturing (or fracking) risks, and have begun benchmarking companies on disclosure of these risks.[8, 9, 10] In addition,

4 Dan Strumpf, "U.S. Public Companies Rise Again," *The Wall Street Journal*, February 5, 2014. http://online.wsj.com/news/articles/SB10001424052702304851104579363272107177430

5 "Proxy Preview 2014: A Record of ESG Shareholder Resolutions Filed," *Green Money*, April 2014. http://www.greenmoneyjournal.com/april-2014/proxy/

6 Ross Kerber, "Apache CEO, Vermont Activist Build Alliance on Climate Issues," *Reuters*, April, 17, 2014. http://www.reuters.com/article/2014/04/17/us-apachecorp-shareholders-idUSBREA3G2D320140417

7 Katie Gilbert, "Institutions Demand Better Disclosure from the Fracking Industry," *Institutional Investor*, May 8, 2014 http://www.institutionalinvestor.com/Article/3339390/Investors-Pensions/Institutions-Demand-Better-Disclosure-from-the-Fracking-Industry.html#.U8M306FgbvY

8 "Groups: IEA 'Golden Rules' for Fracking Track Closely with Steps Already Called for By Investors," Boston Common Asset Management Press Release, May 29, 2012 http://www.bostoncommonasset.com/news/bcam-iccr.php

9 See footnote 7.

10 Richard Liroff et al, *Disclosing the Facts: Transparency and Risk in Hydraulic Fracturing, 2014*, As You Sow, Boston Common Asset Management, Green Century and Investor Environmental Health Network. http://disclosingthefacts.org

the U.S. SEC has issued over 75 letters calling for greater disclosure to investors regarding risks deemed material related to hydraulic fracturing.[11] Recently, in response to shareholder concerns, Anadarko, EOG and others have begun to disclose additional information on environmental risks (including water) and management practices related to fracking.[12, 13]

Electric Power Sector

Seventeen resolutions (with an average support of 28%) were filed with gas and electric utilities (including coal) over the past ten years. The resolutions primarily reflect investor concern about the water-related impacts of coal—from both coal extraction and coal ash disposal. For instance, in the wake of the 2008 Tennessee Valley Authority breech that spilled a billion gallons of toxic coal ash sludge onto nearby land and waterways, various investors took a risk-reduction approach, filing resolutions with companies with high coal exposure such as Ameren, CMS Energy, First Energy, MDU Resources Group, among others, asking for proactive management of coal ash and other environmental risks.[14]

Food, Beverage and Agriculture Sector

In the ten-year research period, 11 resolutions were filed with food and agriculture companies, ranging from requests for broad water risk disclosure, to corporate polices on the human right to water, to a focus on livestock operations and wastewater management. For instance, in 2010 Tyson Foods received a shareholder resolution requesting disclosure on "measures that our company is taking to prevent runoff and other forms of water pollution from all company-owned facilities and from facilities under contract to Tyson."[15] This investor request came after multiple company violations of the U.S. federal Clean Water Act in Missouri, where untreated wastewater was repeatedly dumped directly and indirectly into waterways, resulting in a $7.5 million fine to Tyson and other companies.[16] In 2014, shareholders filed a similar resolution pressing Tyson to "adopt and implement a water stewardship policy that outlines leading practices to improve water quality for all company-owned facilities, facilities under contract to Tyson, and suppliers."[17] The conversation with the company is ongoing.

Other Water Resolution Trends

Increasingly, water resolutions filed by investors are varied, ranging in topic and sector.

Water quality raised more frequently than water quantity

Water quality concerns were cited more frequently than water quantity or use. Water quality issues range from requests for disclosure of risks associated with bioaccumulative and toxic chemicals, to genetically modified organisms (GMOs), herbicide contamination and beyond. Investors trying to get ahead of regulatory risks recognize that many chemicals currently used in industrial processes or in products, although not currently regulated, may be more tightly controlled in the future.[18]

Community and indigenous issues related to water

Many resolutions targeted risks related to potential impacts on communities from water contamination, and the subsequent loss of the social license to operate. For example, shareholders filed a proposal with Honeywell International addressing water quality and community education initiatives in regards to the Lake Onondaga Superfund Site. Severely polluted by Allied Chemical—which later merged with Honeywell and adopted its name—the lake was contaminated by 17 heavy metals, known VOCs, pesticides and dioxin/furans. One of the most supported resolutions related to community impacts, capturing 95% of the shareholder vote, was related to Newmont Mining's Indonesia operations. In 2007, investors filed a resolution with the company after years of concerns regarding violations of human rights, waste disposal practices, water pollution and community unrest.[19]

11 Ceres analysis of SEC Comment Letters issued between January 1, 2010 and November 30, 2012.

12 Sophia Pearson and Christie Smythe, "Anadarko, EOG Strike Deal with New York AG on Fracking," *Bloomberg Business*, October 3, 2014. http://www.bloomberg.com/news/2014-10-03/anadarko-eog-strike-deal-with-new-york-ag-on-fracking.html

13 *NYC Comptroller Stringer and As You Sow Reach Agreement with ExxonMobil on Fracking Disclosure*, Office of NYC Comptroller Press Release, April 2014. http://comptroller.nyc.gov/wp-content/uploads/2014/04/NYC-Comptroller-Stringer-and-As-You-Sow-Reach-Agreement-with-ExxonMobil-on-Fracking-Disclosure.pdf

14 As reported in press release (link below) and seen in shareholder resolution trends in Excel weblink, "Shareholders Urge Southern Company to Come Clean on Coal Ash," Green Century Capital Management Press Release, May 24, 2010. http://yubanet.com/usa/Shareholders-Urge-Southern-Company-to-Come-Clean-on-Coal-Ash_printer.php

15 Available at http://www.sec.gov/Archives/edgar/data/100493/000119312509257547/ddef14a.htm

16 "Tyson Pleads guilty to 20 felonies and agrees to pay $7.5 million for Clean Water Act Violations," Department of Justice Press Release, June 25, 2003. http://www.justice.gov/archive/opa/pr/2003/June/03_enrd_383.htm

17 Available at http://www.sec.gov/Archives/edgar/data/100493/000074377315000001/cvppx14a6g011615.htm

18 The EPA has a website tracking contaminants that potentially may be more tightly regulated in the future. See *Drinking Water Contaminant Candidate List (CCL) and Regulatory Determination* at http://www2.epa.gov/ccl

19 Available at http://www.sec.gov/Archives/edgar/data/1164727/000119312507046484/ddef14a.htm

Examples of Water in Proxy Guidelines

Utilizing data from Fundvotes.com, an independent project that tracks mutual fund proxy voting and provides access to proxy voting guidelines of funds listed in the *Fund Votes* database, Ceres analyzed voting recommendations on water, climate and other ESG criteria.[20]

Ceres identified specific language and proxy voting recommendations on water for the 108 funds listed on the *Fund Votes* website (which include the largest and best-known US and Canadian mainstream mutual fund brands, as well as a number of public pension funds, faith-based investors, labor unions, foundations and proxy advisory firms—**see full list below**). Thirty of the 108 firms had specific, water-related recommendations in their guidance documents. Although many other firms had guidelines specific to "environment," "ESG," and "Ceres Principles,"[21, 22] this subset specifically provides guidance language for water.

Examples of Proxy Voting Guidelines that reference Water

Firm / Organization	Language on Voting Rules Specific to Water
California Public Employees' Retirement System US (2011)	"Specifically, investors urge companies to begin by disclosing how climate and weather generally affect their business and its operations, including their supply chain. These effects may include the impact of changed weather patterns, such as increased number and intensity of storms; sea-level rise; water availability and other hydrological effects; changes in temperature; and impacts of health effects, such as heat-related illness or disease, on their workforce. After identifying these risk exposures, companies should describe how they could adapt to the physical risks of climate change and estimate the potential costs of adaptation" (62)
California State Teachers' Retirement System US (2011)	"The investment's long-term profitability from activities and exposure to environmental matters such as; depleting or reducing air quality, water quality, land protection and usage, without regard for remediation. Consideration should be given to how a company is dealing with the impact of climate change, including whether the government is taking steps to reduce its impact, exacerbating the problem, or oblivious to the risk." (28) Limited access to safe drinking water is also listed as a "social injury" to be considered. (21)
Calvert Asset Management US (2011)	"• The Fund advisor will support proposals seeking the preparation of a report on a company's risks linked to water use or impacts to water. • The Fund advisor will support proposals seeking the adoption of programs and policies that enhance access and affordability to safe drinking water and sanitation." (21)
Christian Brothers Investment Services, Inc. US (2006)	"We support resolutions asking companies to report on efforts to preserve the global supply of fresh water." (25)
Colorado PERA – Public Employees' Retirement Association of Colorado US (2014)	Water mentioned in voting rules specific to hydraulic fracturing. "PERA will review all fracking disclosure proposals on a case-by-case basis and vote pursuant to the Voting Guidelines." (10)
Connecticut Office of State Treasurer US (2011)	(…) vote FOR shareholder resolutions that request companies to assess their current and future water usage, evaluate whether sufficient water will be available in the future, develop plans to reduce water usage, and report to shareholders on these assessments. (…) vote FOR shareholder resolutions that request companies to respond to the Carbon Disclosure Project's water disclosure questionnaire and similar investor-backed initiatives." (42)
Domini Social Investments US (2013)	"We will support resolutions requesting companies to report on the business risks associated with water use and its impact on the corporation's supply chain, and steps taken to mitigate the impact on water supplies of communities near company operations." (30)

20 Information on this portion of the website (http://www.fundvotes.com/VotingGuidelines.php) is updated by FundVotes staff on a rolling basis as proxy voting guidelines are updated. Information in this spreadsheet was researched as of December 2014.

21 The "Ceres Principles" include water guidelines. Of the firms listed on *Fund Votes* and analyzed for this report, 34 had voting criteria aligned to the principles outlined in Ceres' report *Proxy Voting for Sustainability*.

22 See: Kirsten Snow Spalding and Jackie Cook, *Ceres Guidance: Proxy Voting for Sustainability*, Ceres, Summer 2011 (updated as of April 2013). http://www.ceres.org/resources/reports/proxy-voting-for-sustainability

Firm / Organization	Language on Voting Rules Specific to Water
Everence (MMA Praxis) US (2013)	"Vote for shareholder proposals seeking greater disclosure of a company's natural gas hydraulic fracturing operations" (25) "Vote for requests that companies report on the sustainability and the environmental impacts of both company-owned and contract livestock operations." (26) "Vote for shareholder proposals seeking the preparation of a report on a company's risks linked to water use. Vote for shareholder proposals requesting that companies report on or adopt policies for water use that incorporate social and environmental factors." (27)
First Affirmative Financial Network US (2012)	"Support proposals requesting a report on the risks related to the company's use of water in regions of water scarcity or conflict." (15)
Florida State Board of Administration US (2012)	"Vote for shareowner proposals seeking disclosure of water supply dependency or preparation of a report pertaining to sustainable water supply for company operations." "Water Supply, Utilization and Conservation Disclosure: FOR" (74) Mentions water in CAFO section, vote FOR sharing risks/liabilities (75) China Principles: vote AGAINST – "Our facilities and suppliers shall use environmentally responsible methods of production that have minimum adverse impact on land, air, and water quality" (76)
Goldman Sachs Asset Management US (2013)	"Shareholder proposals considered under this category could include: Reports asking for details on 1) labor and safety policies, 2) impact on the environment of the company's oil sands or fracturing operations or 3) water-related risks[:] When evaluating social and environmental shareholder proposals the following factors should be considered: • Whether adoption of the proposal is likely to enhance or protect shareholder value; • Whether the information requested concerns business issues that relate to a meaningful percentage of the company's business; • The degree to which the company's stated position on the issues raised in the proposal could affect its reputation or sales, or leave it vulnerable to a boycott or selective purchasing; • Whether the company has already responded in some appropriate manner to the request embodied in the proposal; • What other companies have done in response to the issue addressed in the proposal; • Whether the proposal itself is well framed and the cost of preparing the report is reasonable; • Whether the subject of the proposal is best left to the discretion of the board; • Whether the company has material fines or violations in the area and if so, if appropriate actions have already been taken to remedy going forward; • Whether the requested information is available to shareholders either from the company or from a publicly available source; and • Whether providing this information would reveal proprietary or confidential information that would place the company at a competitive disadvantage." (9)
Green Century Capital Management US (2010)	"Green Century will support resolutions requesting companies to report on the business risks associated with their use of water, and steps taken to mitigate the impact on water supplies of communities near company operations." (4)
ISS 2013 Policy Updates (2013)	"Vote CASE-BY-CASE on proposals requesting a company report on, or to adopt a new policy on, water-related risks and concerns, taking into account: • The company's current disclosure of relevant policies, initiatives, oversight mechanisms, and water usage metrics; • Whether or not the company's existing water-related policies and practices are consistent with relevant internationally recognized standards and national/local regulations; • The potential financial impact or risk to the company associated with water-related concerns or issues; and • Recent, significant company controversies, fines, or litigation regarding water use by the company and its suppliers." (67)
Maryland State Retirement & Pension System US (2013)	"Generally vote for shareholder proposals seeking the preparation of a report on a company's risks linked to water use." (44)
Mercy Investment Services US	"We support resolutions calling for reports addressing environmental impact and risks resulting from company operations, such as greenhouse gas emissions, climate change, water usage and health risks." "We support resolutions requesting the company acknowledge that access to safe and adequate water is a basic human right. We support resolutions calling for the company to issue a report on its water use, footprint and risks."
NEI Investments Canada (2012)	"NEI supports proposals to report on water use and efforts to reduce consumption to sustainable levels. NEI supports proposals to review and disclose risks associated with water consumption and access as well as proposals asking companies to reduce ground and surface water extraction. NEI supports proposals asking companies to refrain from locating facilities with high demand for water in water-scarce areas. The CDP Water Disclosure questionnaire aims to increase awareness of how the world's largest companies use water, with the intent to help drive investment towards sustainable water use, given that water demand is predicted to outstrip supply by 40% by 2030. NEI supports proposals requesting companies to respond to the CDP Water Disclosure questionnaire." (35)
New York State Common Retirement Fund US (2011)	"The Fund will support proposals that ask corporations to evaluate business risks linked to water use. Rationale: Community concner about corporate water use can have a negative impact on a corporation's public reputation and long-term financial performance." (19)

Firm / Organization	Language on Voting Rules Specific to Water
Ontario Public Service Employees' Union (OPTrust) Canada (2012)	"In many instances, shareholders ask management to provide disclosure on a variety of issues including; labour relations, workplace health and safety, human rights, greenhouse gas emissions, water consumption, product safety, and political contributions." (30)
Pax World Management Corp. US (2013)	"Pax World will generally vote in favor of proposals that request that companies acknowledge and report on their water-related risk, or that request disclosure or development of policies and programs to mitigate those risks." (13)
Presbyterian Church (USA) Mission Responsibility Through Investment (MRTI) US (2011)	Past votes in favor of "Human Right to Water Policy" and "Mountain Top Removal Mining – Water Impacts"
Rockefeller Brothers Fund US (2005)	"The RBF will vote in favor of resolutions that call on companies to manage their use of renewable resources such as water, soils, forests, and fisheries in sustainable ways that do not exceed rates of regeneration and that protect the health of ecosystems." (4)
Schroders Europe (2013)	"On occasion some ESG issues may have direct financial relevance (e.g. carbon emissions, water scarcity) and in these instances we will endeavour to integrate these considerations into our valuation process. We recognise that there is no set way for integrating ESG into the investment process, and as such different teams have developed varying approaches, and that these approaches may evolve over time." (5)
Sentinel Investments US (2013)	"With respect to proxies on shares held in the Sustainable Funds, SAM will SUPPORT proposals that ask management to control, reduce or minimize emissions of pollutants into the air, water and soil." (10)
Shareholder Association for Research & Eduction (SHARE) Canada (2012)	"The potential returns from shale gas extraction are considerable, but so are the potential risks. The process requires enormous amounts of water, which can deplete local water supplies.[3]" (44) "[The fund] will vote for proposals that ask companies to improve the sustainability of their shale gas extraction methods. • [The fund] will vote for proposals that ask companies to disclose any litigation or penalties they face in relation to their shale gas extraction operations." (45)
Trillium Asset Management Corporation US (2013)	"Vote for shareholder proposals seeking the preparation of a report on a company's risks linked to water use." (24)
United Church of Christ Pensions US (2010)	"We support proposals requesting companies to evaluate technologies and approaches which could result in significantly reduced water consumption." (7)
United Methodist Church General Board of Pension & Health Benefits (Wespath Investment Management) US (2012)	"Wespath supports resolutions asking companies to report on strategic business risks related to water." "Wespath supports resolutions asking companies to adopt a policy articulating respect for and commitment to the human right to water" (4) "We are deeply concerned about the privatization of water resources, the bottling of water to be sold as a commodity for profit, and the resources that go into packaging bottled water. We urge all municipalities and other governmental organizations to develop processes for determining sustainability of water resources and to determine the environmental, economic, and social consequences of privatization of water resources prior to the licensing and approval thereof." (19)
Vermont Office of the State Treasurer US (2013)	"Shareholders may ask for a company to prepare a report evaluating the business risks linked to water use and impacts on the company's supply chain, including subsidiaries and bottling partners. Such proposals also ask companies to disclose current policies and procedures for mitigating the impact of operations on local communities in areas of water scarcity. • Vermont managers should generally vote FOR shareholder proposals seeking the preparation of a report on a company's risks linked to water use." (59)
Walden Asset Management US (2012)	"Vote for shareholder proposals seeking the preparation of a report on a company's risks linked to water use." (28)

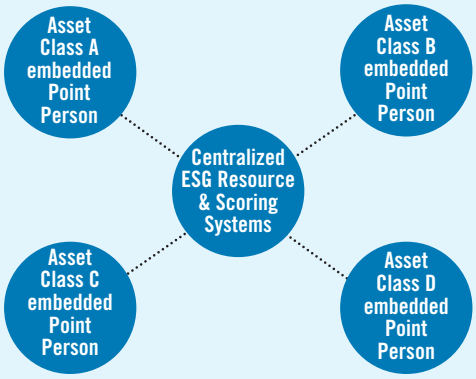
Embedding and Disseminating ESG and Water Research in Fund Management

The integration of ESG and water factors requires institutional support structures—from financial and human resources, to data reporting and tracking mechanisms. Survey participants shared opinions and ideas on possible approaches to embedding and disseminating ESG and water research within existing fund management research departments. Below are a few examples of the ESG research structures shared:

Centralized Structure

One approach commonly practiced and utilized by survey participants is a centralized department that conducts ESG research, whose corporate ESG scores and analysis can be accessed by anyone across the organization. In addition, the centralized system tracks the history of engagement with management **(Figure G.1)**.

Figure G.1: Entrepreneurial Approach to ESG Integration



Entrepreneurial approach to ESG integration with each PM evolving their own approach and having support from a centralized ESG resource center.

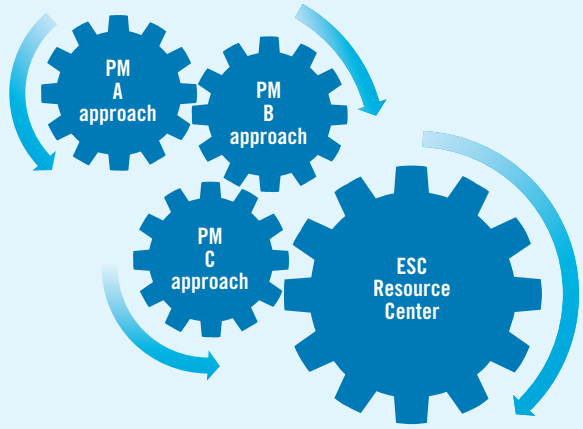
One benefit of centralized ESG analysis is the maintenance of consistent scoring systems and research, as well as ease of protecting proprietary information and controlling sensitive data flows.[23] Firms that kept ESG and fundamental analysis separate also made the case that the skill set, knowledge base and network of contacts, peers, tools and research resources were so different between the two types of analysis that it was best to leave them as separate roles. One firm found having two separate perspectives on a stock (one from the ESG specialist and the second from the fundamental analyst) at the investment committee meetings to be invaluable in enriching the discussion and analysis among the team.

"ESG researchers have entirely different networks, peer groups, research resources and analytical tools and skills versus fundamental analysts."

Decentralized Structure

Another approach is to use a more decentralized system, which allows investment professionals across the organization to deposit information into a centralized institutional database, while encouraging an entrepreneurial approach when it comes to applying the data, with each PM free to evolve their own integration strategy **(Figure G.2)**. This approach may sacrifice data consistency, but benefits from more staff involvement and potentially greater information sharing. One firm uses an internal social media platform, where analysts can research and comment on companies and issues by "hashtagging" key words such as company names, research analyst names or issues (e.g. water).

Figure G.2: Non-Uniform ESG Integration



Non-uniform ESG integration where PMs evolve their own independently supported integration approaches.

Overall, there was broad recognition that integrating ESG and water analysis doesn't happen overnight. As an example, one manager stressed that it is truly an incremental process that takes many years to accomplish.

"We are finally at a point where we feel ESG analysis is comprehensively integrated into our investment processes—it has taken us eight years."

23 Camilla Hall, "Goldman weighs ban on message services," *Financial Times*, January 24, 2014.

Report Endnotes

1 Although the focus of this report is corporate water risk analysis and application, some ideas were shared on municipal and fixed income water analysis, and ideas shared throughout could potentially be applied to other asset classes.

2 Managers interviewed were not selected randomly or in a format to conduct rigorous statistical analysis.

3 Brett Walton, "World Economic Forum Ranks Water Crises as Top Global Risk," Circle of Blue, January 15, 2015. http://www.circleofblue.org/waternews/2015/world/world-economic-forum-ranks-water-crises-as-top-global-risk/

4 For more governance, asset stewardship and investment practice recommendations, see Peter Ellsworth and Kirsten Snow Spalding, *The 21st Century Investor: Ceres Blueprint for Sustainable Investing*, June 2013. http://www.ceres.org/resources/reports/the-21st-century-investor-ceres-blueprint-for-sustainable-investing

5 For a working list of responsible investment standards, codes and regulations, see the UN PRI website: http://www.unpri.org/areas-of-work/policy-and-research/responsible-investment-standards-codes-and-regulation/

6 See the Principles for Responsible Investment Signatories page at http://www.unpri.org/signatories/signatories/. Accessed on February 18, 2015.

7 Gordon L. Clark, Andreas Feiner and Michael Viehs, *From the Stockholder to the Stakeholder, How Sustainability Can Drive Financial Outperformance*, University of Oxford and Arabesque Partners, September 2014.

8 Deutsche Bank, *Sustainable Investing, Establishing Long-Term Value and Performance*, June 2012. https://institutional.deutscheawm.com/content/_media/Sustainable_Investing_2012.pdf

9 Douglas Y. Park, "Investor Interest in Nonfinancial Information: What Lawyers Need to Know," *Business Law Today*, January 15, 2015. http://www.americanbar.org/publications/blt/2015/01/05_park.html

10 KPMG found that 78 percent of companies interviewed used GRI Guidelines in 2013. See https://www.globalreporting.org/information/news-and-press-center/Pages/GRI-is-the-global-standard-as-sustainability-reporting-goes-mainstream-says-KPMG-survey.aspx

11 For example, the SEC mandates disclosure of material financial risks linked to climate. http://www.iasplus.com/en/news/2014/04/eu-esg

12 Ceres and Sustainalytics, *Gaining Ground: Corporate Progress on the Ceres Roadmap for Sustainability*, Ceres 2014. http://www.ceres.org/resources/reports/gaining-ground-corporate-progress-on-the-ceres-roadmap-for-sustainability/view

13 CDP, *From Water Risk to Value Creation, CDP Global Water Report 2014*. https://www.cdp.net/CDPResults/CDP-Global-Water-Report-2014.pdf

14 See the United Nations Environment Programme Finance Initiative and Global Canopy Programme, *The Natural Capital Declaration* http://www.naturalcapitaldeclaration.org

15 Dominic Barton and Mark Wiseman, "Focusing Capital on the Long Term," *Harvard Business Review*, January 2014. http://hbr.org/2014/01/focusing-capital-on-the-long-term/ar/1

16 Over an 18-year period, 180 companies with high sustainability performance outperformed low-scoring firms by 4.8 percent annually and significantly higher ROE and ROAs. See Robert G. Eccles, Ionnis Ioannou and George Serafeim, *The Impact of Corporate Sustainability on Organizational Processes and Performance*, Working Paper 12-035, Harvard Business School, July 29, 2013.

17 Brianna Lee, "Brazil's Historic Drought is Showing No Signs of Abating," *International Business Times*, January 30, 2015. http://www.ibtimes.com/brazils-historic-drought-showing-no-signs-abating-1799738

18 Simon Romero, "Taps Start to Run Dry in Brazil's Largest City," *The New York Times*, February 16, 2015. http://www.nytimes.com/2015/02/17/world/americas/drought-pushes-sao-paulo-brazil-toward-water-crisis.html?_r=0

19 "Companhia de Saneamento Basico do Estado de Sao Paulo's (SBS) Management on Q3 2014 Results" Earnings Call Transcript, *Seeking Alpha*, November 14, 2014. http://seekingalpha.com/article/2684005-companhia-de-saneamento-basico-do-estado-de-sao-paulos-sbs-management-on-q3-2014-results-earnings-call-transcript?page=2

20 Christopher Donville, "Canada Mine Probe Sees More Spills Unless Changes Made," *Bloomberg Business*, January 30, 2015. http://www.bloomberg.com/news/articles/2015-01-30/canada-mine-probe-sees-more-spills-unless-changes-made

21 National Oceanic and Atmospheric Administration, http://oceanservice.noaa.gov/facts/wherewater.html

22 UN Factsheet on Water Scarcity, http://www.un.org/waterforlifedecade/scarcity.shtml

23 2030 Water Resources Group, *Charting Our Water Future: Economic frameworks to inform decision-making*, 2009.

24 Lydia O'Connor and Chris McGonigal, "Watch California Dry Up Right Before Your Eyes in 6 Jaw-Dropping GIFs," *The Huffington Post*, September 18, 2014.

25 US Drought Monitor, California, September 16, 2014. http://droughtmonitor.unl.edu/Home/StateDroughtMonitor.aspx?CA

26 *From Water Risk to Value Creation, CDP Global Water Report 2014*, CDP https://www.cdp.net/CDPResults/CDP-Global-Water-Report-2014.pdf

27 Dawn McGregor, "2014 World Water Week: Takeaways," *China Water Risk*, October 16, 2014. http://chinawaterrisk.org/resources/analysis-reviews/2014-world-water-week-takeaways/#sthash.bCbDCBIS.dpuf

28 Lavelle and Grose, "Water Demand for Energy to Double by 2035," *National Geographic News*, January 30, 2013. http://news.nationalgeographic.com/news/energy/2013/01/130130-water-demand-for-energy-to-double-by-2035/

29 American Water Works Association, *Buried No Longer: Confronting America's Water Infrastructure Challenge*, February 2012. http://www.awwa.org/Portals/0/files/legreg/documents/BuriedNoLonger.pdf

30 Yudith Ho and Rieka Rahadiana, "Sinking Jakarta Starts Building Giant Wall as Sea Rises," *Bloomberg Business*, November 12, 2014.

31 Transcript earnings calls keyword search using the Bloomberg terminal TA function, conducted September 18, 2014.

32 "Water Pollution: Find Out What's in the Water," *National Geographic.com*. http://environment.nationalgeographic.com/environment/freshwater/pollution/

33 Debra Tan, "The War on Water Pollution," *China Water Risk*, March 12, 2014.

34 Kelly Crowe, "Drinking Water Contaminated by Excreted Drugs a Growing Concern," *CBC News*, September 22, 2014. http://www.cbc.ca/news/health/drinking-water-contaminated-by-excreted-drugs-a-growing-concern-1.2772289

35 UN Water, Factsheet on Water Quality, http://www.unwater.org/fileadmin/user_upload/unwater_new/docs/water_quality.pdf

36 US EPA, National Rivers and Streams Assessment (NRSA) 2008-2009

37 UN Water, Fact Sheet on Water and Biodiversity, http://www.unwater.org/fileadmin/user_upload/unwater_new/docs/water_and_biodiversity.pdf

38 "Plastic microbeads polluting St. Lawrence River McGill researchers find," *CBC News*, September 26, 2014. http://www.cbc.ca/news/canada/montreal/plastic-microbeads-polluting-st-lawrence-river-mcgill-researchers-find-1.2779096

39 http://water.org/water-crisis/water-facts/water/

40 Gardiner Harris, "Poor Sanitation in India May Afflict Well-Fed Children with Malnutrition," *The New York Times*, July 13 2014.

41 Joint UNICEF – WHO – The World Bank *Child Malnutrition Database: Estimates for 2012* http://www.who.int/nutgrowthdb/jme_2012_summary_note_v2.pdf?ua=1

42 Trefis Team, "Newmont's Conga Project In Peru Faces Uncertain Fate," *Forbes.com*, April 12, 2013.

43 "Indian officials order Coca-Cola plant to close for using too much water," *The Guardian*, June 18, 2014.

44 Archana Chaudhary, "Farmers Fight Coca-Cola As India's Groundwater Dries Up," *Bloomberg Business*, October 9, 2014.

45 Ty Schoback, "How will California's drought affect water utility revenue bonds?" *Columbia Management Muni Perspectives Blog*, November 5, 2014. http://blog.columbiamanagement.com/how-will-californias-drought-affect-water-utility-revenue-bonds

46 Tim Reid, "Long California drought could hit utility ratings, Fitch says," *Reuters*, March 28, 2014.

47 Emily Badger, "The U.N. Says Water is a Fundamental Human Right in Detroit," *The Washington Post*. October 23, 2014. http://www.washingtonpost.com/blogs/wonkblog/wp/2014/10/23/the-u-n-says-water-is-a-fundamental-human-right-in-detroit/,

48 For a map of water cycle impacts and climate change see: Ben Schiller, "Be Horrified At All The Ways Climate Change Will Destroy Us, Kindly Collected in one Map" *Fast Company*, August 1, 2014. http://www.fastcoexist.com/3033566/visualized/be-horrified-at-all-the-ways-climate-change-will-destroy-us-kindly-collected-in-o#2

49 Benjamin I. Cook, Toby R. Ault, and Jason E. Smerdon, "Unprecedented 21st Century Drought Risk in American Southwest and Central Plains," *Science Advances*, February 1, 2015. DOI: 10.1126/sciadv.1400082

50 BloombergView Editors, "Climate Change Goes Under Water," *Bloomberg*, June 29, 2014. http://www.bloombergview.com/articles/2014-06-29/climate-change-goes-underwater

51 Corporate Knights Capital, *Measuring Sustainability Disclosure: Ranking the World's Stock Exchanges,* October 2014. http://www.corporateknights.com/wp-content/uploads/2014/10/2014_World_Stock_Exchange.pdf

52 Berkley Adrio, *Clearing the Waters: A Review of Corporate Water Risk Disclosure in SEC Filings*, Ceres, June 2012. http://www.ceres.org/resources/reports/clearing-the-waters-a-review-of-corporate-water-risk-disclosure-in-sec-filings

53 CDP, *From Water Risk to Value Creation: CDP Global Water Report 2014*. https://www.cdp.net/CDPResults/CDP-Global-Water-Report-2014.pdf

54 For a full exploration of the unique and beneficial properties of water see "Water and the Fitness of the Environment," Chapter 3 in *Biology*, 8th Edition, by Neal A. Campbell and Jane B. Reece, Benjamin Cummings, 2008.

55 United Nations General Assembly, Resolution 64/292, August 3, 2010. http://www.un.org/waterforlifedecade/human_right_to_water.shtml

56 United Nations Human Rights, *The Right to Water, Fact Sheet No.35*, August 2010, p.31. http://www.ohchr.org/Documents/Publications/FactSheet35en.pdf

57 Interfaith Center on Corporate Responsibility, *The 2013 ICCR Water Roundtable: Stakeholder Responsibilities in Managing Access to Water* http://www.iccr.org/sites/default/files/resources_attachments/ICCRStakeholderWaterResponsibilities.pdf

58 United Nations Global Compact, The CEO Water Mandate, *Guidance for Companies on Respecting the Human Rights to Water and Sanitation: Bringing a Human Rights Lens to Corporate Water Stewardship*, January 2015. http://ceowatermandate.org/files/business-hrws-guidance.pdf

59 For an illustration of the concept of corporate dependency and water security, see World Resources Institute and HSBC, *Over Heating, Financial Risks from Water Constraints on Power Generation in Asia*, 2010. http://pdf.wri.org/over_heating_asia.pdf

60 Wendy Larson et al, *Mitigating Corporate Water Risk: Financial Market Tools and Supply Management Strategies*, Water Alternatives 5(3), 2012.

61 "General Mills CEO Says Water is Critical to Business and Engagement is Key," General Mills Press Release, November 20, 2014. http://www.marketwatch.com/story/general-mills-ceo-says-water-is-critical-to-business-and-engagement-is-key-2014-11-20

62 See consequence and probability framing example in Dustin Garrick and Jim W. Hall, *Water Security and Society: Risks, Metrics and Pathways*, Annual Reviews, 2014.

63 The Sustainability Accounting Standards Board is evolving ESG metrics by sector and industry. See www.sasb.org

64 For a framework for assessing overall material ESG risks by sector, see Steve Lydenberg, Jean Rogers and David Wood, *From Transparency to Performance, Industry-Based Sustainability Reporting on Key Issues*, The Initiative for Responsible Investment at Harvard University, June 2010.

65 For resources on investor water security risks by sector see Berkley Adrio, *Clearing the Waters, A Review of Corporate Water Risk Disclosure in SEC Filings*, Ceres, June 2012. http://www.ceres.org/resources/reports/clearing-the-waters-a-review-of-corporate-water-risk-disclosure-in-sec-filings/view

66 An example of this is hydraulic fracturing operations, which rely on the ability to discharge waste through the relatively inexpensive method of deep well disposal.

67 Recently, investors have become more engaged in studying water risks in corporate supply chains. See Brooke Barton and Sarah Elizabeth Clark, *Water & Climate Risks Facing U.S. Corn Production, How Companies and Investors Can Cultivate Sustainability*, Ceres, June 2014. http://www.ceres.org/issues/water/agriculture/the-cost-of-corn and UN Principles for Responsible Investment, *PRI-Coordinated Engagement on Water Risks in Agricultural Supply Chains*, Investor Guidance Document, July 2014. http://www.unpri.org/publications/pri-coordinated-engagement-on-water-risks-in-agricultural-supply-chains-investor-guidance-document/

68 The prolonged drought in California has been a catalyst for comprehensive groundwater reform in the state, which goes into effect January 2015. See: http://opr.ca.gov/s_groundwater.php

69 Mitra Taj, "Peru protesters push to stop $5 billion Newmont Mine," *Reuters*, June 17, 2013.

70 KPMG International, *Sustainable Insight, Unlocking the Value of Social Investment*, 2014. http://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/sustainable-insight/Documents/unlocking-value-social-investment.pdf

71 For more information on analyzing corporate water response, see Brooke Barton, et al, *The Ceres Aqua Gauge: A Framework for 21st Century Water Risk Management*, Ceres 2013. Available at http://www.ceres.org/issues/water/corporate-water-stewardship/aqua-gauge

72 UN Global Compact, The CEO Water Mandate, *Corporate Water Disclosure Guidelines, Toward a Common Approach to Reporting Water Issues*, September 2014. http://www.ceowatermandate.org/disclosure/

73 United Nations Global Compact, The CEO Water Mandate, *Guidance for Companies on Respecting the Human Rights to Water and Sanitation: Bringing a Human Rights Lens to Corporate Water Stewardship*, Beta Version, January 2015. http://ceowatermandate.org/files/business-hrws-guidance.pdf

74 Many managers mentioned ESG and water analysis using GICS® (Global Industry Classification Standard) sector classification as developed by MSCI and S&P. See http://www.msci.com/products/indexes/sector/gics/

75 As per direct communication with CDP.

76 Equarius Risk Analytics, *Value-at-Risk (VaR) Methodology to Quantify Water Risk for Equity and Portfolio Risk Management*, Water Risk Analytics, October 11, 2013. http://waterriskanalytics.com/articles/waterVaR_whitepaper101113.pdf

77 An example of a decision framework is the DPSIR model (Driving Forces, Pressures, States, Impacts and Responses) adopted by the European Environment Agency and others, see Edith Smeets and Rob Weterings, *Environmental indicators: Typology and overview*, Technical report No 25, European Environment Agency, 1999.

78 Modified from *The Ceres Aqua Gauge*, October 2011 and the CEO Water Mandate *Corporate Water Disclosure Guidelines, Toward a Common Approach to Reporting Water Issues*, September 2014.

79 For a deeper discussion on water metrics see: a) *The Ceres Aqua Gauge*, October 2011, b) CEO Water Mandate *Corporate Water Disclosure Guidelines, Toward a Common Approach to Reporting Water Issues*, September 2014, c) Garrick and Hall, Water Security and Society: Annual Reviews. 2014. 39:611–39, and d) Francis Gassert et al, *Aqueduct Metadata document for the Aqueduct Global Maps 2.0*, World Resources Institute, January 2013.

80 See: www.gresb.com

81 For an exploration of climate change and investor risks / shareholder value, see http://www.ceres.org/resources/reports/climate-change, and *Climate Change and Shareholder Value*, Investec Asset Management, 2012. http://www.investecassetmanagement.com/document/pdf/Climate_Change_and_Shareholder_Value.pdf

82 Marianne Lavelle and Thomas K. Grose, "Water Demand for Energy to Double by 2035," *National Geographic News*, January 30, 2013. http://news.nationalgeographic.com/news/energy/2013/01/130130-water-demand-for-energy-to-double-by-2035/

83 Shadi Eskaf et al, *Measuring and Mitigating Water Revenue Variability: Understanding How Pricing Can Advance Conservation Without Undermining Utilities' Revenue Goals*, Ceres with University of North Carolina, July 2014. http://www.ceres.org/resources/reports/measuring-mitigating-water-revenue-variability-understanding-how-pricing-can-advance-conservation-without-undermining-utilities2019-revenue-goals/view

84 For example see: Pilita Clark, "A world without water," *The Financial Times*, July 14, 2014. http://www.ft.com/intl/cms/s/2/8e42bdc8-0838-11e4-9afc-00144feab7de.html#slide0

85 Eduardo Porter, "The Risks of Cheap Water," *The New York Times*, October 14, 2014. http://www.nytimes.com/2014/10/15/business/economy/the-price-of-water-is-too-low.html?_r=0

86 Newsha K. Ajami, Barton H. Thompson, Jr., and David G. Victor, *The Path to Water Innovation*, The Hamilton Project at Brookings Institution, October 2014. http://www.hamiltonproject.org/papers/the_path_to_water_innovation/

87 Explore Trucost's Water Risk Monetizer, www.waterriskmonetizer.com and Veolia's Water Impact Index, http://growingblue.com/footprint-tools/water-impact-index/

88 The World Business Council for Sustainable Development, *Business Guide to Water Valuation*, September 2013. http://www.wbcsd.org/work-program/sector-projects/water/truevalueofwater.aspx

89 United Nations Global Compact, The CEO Water Mandate's Water Action Hub https://wateractionhub.org

90 Wai-Shin Chan and Zoe Knight, *No Water, No Food: Ensuring Food Safety and Food Security in China*, HSBC Global Research, March 2014. http://www.longfinance.net/images/reports/pdf/hsbc_no_water_no_food.pdf

91 Sarbjit Nahal and Valery Lucas-Leclin, *A Blue Revolution—Global Water*, Bank of America Merrill Lynch, November 2012 http://www.longfinance.net/images/reports/pdf/baml_water_2012.pdf

92 Norges Bank Investment Management, *NBIM Investor Expectations: Water Management*. http://www.nbim.no/globalassets/brochures/water_web.pdf

93 Ibid.

94 http://www.waterdatafortexas.org/reservoirs/statewide

95 *Guideline, Stress Testing*, Office of the Superintendent of Financial Institutions Canada, December 2009. http://www.osfi-bsif.gc.ca/Eng/Docs/e18.pdf

96 Stress testing includes scenario analysis and sensitivity testing. Sensitivity analysis involves incremental change to a limited number (one or two) of risk factors and analyzing the impacts (e.g. regulatory increase in water rates on operating costs), whereas scenario analysis is a hypothetical future state of the world with potential changes to many risk factors (e.g. changes to precipitation patterns and increasing competition for water due to climate change, etc.).

97 For a discussion of the advantages of scenario analysis over adjustments to discount rates and target prices using ESG factors see: Jeroen Bos, CFA "Using ESG Factors for Equity Valuation, *CFA Institute Magazine*, November/December 2014. http://www.cfapubs.org/doi/pdf/10.2469/cfm.v25.n6.5

98 *Water Resources Management in Brazil*, Agencia Nacional de Aguas, Brazil http://hidroweb.ana.gov.br/cd2/water/docs/part2.htm

99 A similar study was conducted in Brazil by a sustainability consultancy on entire sectors at risk from higher-expected water prices. Fred Seifert, *Projections on the Future of Water*, Ideia Sustentavel, January 2014. http://www.ideiasustentavel.com.br/2014/01/as-projecoes-sobre-o-futuro-da-agua/

100 http://www.ceres.org/investor-network/incr/sustainable-stock-exchanges

101 For a list of some of the major regional investor coalitions, please see the Global Investor Coalition website: http://globalinvestorcoalition.org

102 For an example of asset owner and fund manager engagement with the academic community, see Concordia University's Sustainable Investment Professional Certification Program, advised by a number of investment practitioners. https://www.lacaisse.com/en/nouvelles-medias/communiques/communique_110420

103 There are 13 grounds for omitting a shareholder resolution (or proposal) under SEC rule 14a-8, one of which relates to duplicate shareholder proposals. See Division of Corporation Finance: Staff Legal Bulletin No 14, *Shareholder Proposals*, U.S. Securities and Exchange Commission, July 2001. http://www.sec.gov/interps/legal/cfslb14.htm

104 Interfaith Center on Corporate Responsibility, *Multi-Stakeholder Roundtable on the Human Right to Water*, February 2013. http://www.iccr.org/multi-stakeholder-roundtable-human-right-water

105 UN PRI, *PRI-Coordinated Engagement on Water Risks in Agricultural Supply Chains*, July 2014. http://bit.ly/1zqDa5r

106 While filing shareholder resolutions is common in the United States, filing requirements in other parts of the world are often more onerous. For instance, in 2014 a group of global investors filed a proposal with BP and Shell in the UK on climate change and carbon asset risk. In order for the proposal to make it onto the ballot, more than 100 were required to co-file. Therefore, investors typically only pursue shareholder proposals when other engagement forms have failed.

107 Resources and websites include: Ceres' Shareholder Resolutions Online Tracker: http://www.ceres.org/investor-network/resolutions, Interfaith Center on Corporate Responsibility: www.iccr.org, the Investor Environmental Health Network: http://iehn.org/home.php, the Sustainable Investments Institute http://www.siinstitute.org/offerings.html, the Principles for Responsible Investment: http://www.unpri.org/about-pri/about-pri/, among others.

108 Ceres obtained and analyzed the Proxy Voting Guidelines of 108 major investor institutions, sourced from fundvotes.com in December 2014. Thirty of the 108 firms had specific water-related recommendations in their guidance documents.

109 Pax World Mutual Funds, *Proxy Voting Guideline*, March 2014, pg. 13. http://www.paxworld.com/system/storage/14/9a/7/2203/proxy_voting_guidelines.pdf

110 Calvert Investments, *Global Proxy Voting Guidelines for Calvert Family of Funds*, 2011, pg. 20-21. http://www.calvert.com/Documents/proxy-voting-guidelines-2011.pdf

111 The ICCR Water Engagement tool was developed as a tiered internal benchmarking system, so that it can be applied to all companies, from those just taking initial steps in water management, to those with a more advanced approach. Investors can use such tools to track their engagement process and set strong goals and expectations with their portfolio companies. Note the water-specific benchmarking tool is an example drawn from ICCR's larger engagement toolset.

112 Several managers expressed opinions on how best to structure and communicate ESG and water analysis within their institutions and these are shared in Appendix G.

113 For example, explore: Asset Owner Disclosure Project at www.aodproject.net, the divestment movement at www.350.org, or the Montreal Pledge at http://www.unpri.org/whatsnew/investors-take-montreal-carbon-pledge-to-footprint-portfolios/

114 *Carbon and Water Risk for South Africa's Top Companies, Bonds and Equity Funds*, Trucost Plc and WWF South Africa, November 2012. http://awsassets.wwf.org.za/downloads/carbon_and_water_risk_for_south_africa_s_top_companies__bonds_and_equity_funds_final_rep.pdf

115 Learn more about establishing engagement strategies and proxy voting guidelines in Ellsworth and Snow Spalding, *The 21st Century Investor: Ceres Blueprint for Sustainable Investing*, Ceres, 2014, Step 8 pg. 27. http://www.ceres.org/resources/reports/the-21st-century-investor-ceres-blueprint-for-sustainable-investing/view

116 See *Towards Sustainable Investment & Operations, Making Progress*, CalPERS, 2014, pg. 41. https://www.calpers.ca.gov/index.jsp?bc=/about/forms-pubs/calpers-reports/sustainable-investment.xml

117 Aaron Chan et al, *Navigating Environmental, Social & Governance Data for Foundations*, Columbia University Capstone Project, April 29, 2014. http://sustainability.ei.columbia.edu/files/2014/07/Navigating-ESG-Data-for-Foundations_FINAL.pdf

118 "New Climate Bonds Water Infrastructure Expert Committee," Climate Bonds Initiative Press Release, November 7, 2014. http://www.climatebonds.net/2014/11/new-climate-bonds-water-infrastructure-expert-committee-meets-today-first-time-discussing

Ceres
99 Chauncy Street
Boston, MA 02111
T: 617-247-0700
F: 617-267-5400
www.ceres.org