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Freshwater Resources: Managing the Risks Facing the Private Sector

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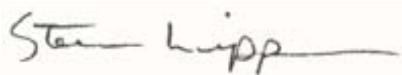
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Preface

Entering the new millennium, uninterrupted access to clean water has emerged as a critical issue affecting economic activity, development, and business around the world. Indeed, in the past year some multinational corporations have had to close major factories or change operations because of competition for scarce water resources or water quality concerns, and demand for water from overdrawn aquifers and rivers continues to rise.

In recognition of the growing importance of fresh water to business and investors, Trillium Asset Management and Calvert Group, Ltd. sponsored the preparation of this paper by the Pacific Institute, a leader in nonpartisan research on global fresh water resources. The paper, *Freshwater Resources: Managing the Risks Facing the Private Sector*, outlines key trends in water use and availability, the resulting new risks to businesses, and strategies companies can take to reduce the risks they face. We consider it an invaluable resource to help the investment community, the companies we invest in, and policymakers to understand and address the growing business, social, and environmental risks posed by water problems.

Trillium Asset Management and Calvert Group, Ltd. are already working to encourage greater corporate attention to these risks, and have plans for greater efforts in this area. The Pacific Institute is seeking additional opportunities to explore the business risks water problems pose to particular companies and industries in more depth. We encourage everyone who reads this report to consider actions they and their institutions can take to protect people, the planet, and investors from the increasingly real risks posed by global water resource problems.



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1. Introduction

In recent years, a broad set of national and international water issues has begun to receive significant attention at all levels of society, from leaders at the United Nations to local communities in the United States and around the world. In part, this is due to a growing understanding of the complex interconnections between water and almost every other major issue of the day, including energy, climate, economic development, environmental health, and peace and security. The media and policymakers are increasingly focusing on water supply disputes, water quality problems, natural disasters, and privatization.

Corporations and institutional investors face their own specific challenges relating to water. In some cases, these problems will lead to decreases in water allotments, more stringent water quality regulations, growing community activism, and increased public scrutiny of water-related corporate activities. All of these factors may impact site selection, license to operate, productivity, costs, revenues, and ultimately, profits and corporate viability. Water-related risks now pose a potential multi-billion dollar threat to a wide variety of businesses and investors.

Almost without exception, corporations and investors are unfamiliar with freshwater-related risks and are unprepared to implement the suite of measures available to reduce them. Neglecting these risks, however, is not prudent. Indeed, evaluating risks related to water is vital for sectors where water plays an important role in production and operations, or in the supply chain. It is increasingly critical that investors, managers, and directors work toward a better understanding of the business sectors at greatest risk from water-related problems and of approaches for reducing their exposure. Ultimately, organizations that fail to think strategically about water will find themselves embroiled in highly public and emotionally charged disputes over a resource considered by many to be a basic human right.

This paper provides a snapshot of current global water issues, assesses the water-related risks most relevant for the business community, and describes the general kinds of activities companies could and should be taking to address them. Ultimately, the Pacific Institute will seek opportunities to provide more focused analyses of sector- and industry-specific water risks.

2. Overview of the Changing “Waterscape”

As we enter the 21st Century, businesses face a growing risk of water scarcity and contamination. Indeed, the availability of safe and adequate water may be as crucial to economic development in the coming years as access to oil was to development in the 20th Century. There are a range of trends and factors that are behind this growing risk; we describe here six major water-related themes and trends that have direct bearing on the business community.

Water Resource Economics and Changing Valuations of Water

There is widely growing recognition of the ecological, cultural, and geopolitical value of freshwater resources, particularly as competing demands for limited supplies lead to growing scarcity. At the same time, among the most powerful and controversial new ideas in the

international water debate is that water should be considered an “economic good,” increasingly subject to the rules and power of markets, prices, multinational corporations, and international trading regimes.ⁱ In the last decade, this idea has been put into practice in many ways, in hundreds of places, affecting millions of people. Prices have been set for water that was previously provided for free. Markets in water have been proposed and implemented. Private entities are increasingly involved in water management previously dominated by public agencies. These ideas and trends have generated enormous controversy.

Because water is important to the process of economic development, essential for life and health, and laden with cultural or religious significance, it has often been provided at subsidized prices or for free in many situations. The proper use of subsidies can help provide water for the poorest populations, but subsidies also encourage wasteful use of water. As a result, there is a growing trend toward “full-cost” price of water. In many places, artificially low water prices are rising as subsidies are phased out. Here in the United States, water prices are increasing to cover the full cost of operating and maintaining water-delivery systems such as storage and treatment, and even the marginal costs of adding new supplies. Where the cost of water is a very minor fraction of the overall cost of production, these price increases alone may have little impact on large-scale enterprises. Yet, as outlined below, other water-related factors could have far greater economic impact on corporations.

At the same time that water is being treated as an economic good, there is growing recognition of its social value. In November 2002 the United Nations Committee on Economic, Social and Cultural Rights recognized that access to water is an essential human right. And the UN, working in conjunction with national governments, has laid out an ambitious set of goals, known as the Millennium Development Goals, which aim to halve the proportion of people without access to clean water or adequate sanitation by 2015. The economic costs of meeting these goals, or failing to meet them, are not well understood, and adequate financial resources have not yet been made available by governments or the world community. In regions of the world where substantial populations lack safe and affordable water for their basic needs, there is growing tension between public and private uses of water.

Increasing Demand

Freshwater resources around the world are under pressure from growing populations and significant increases in agricultural and industrial demand for water. Growing demand is increasing competition for a fixed resource, raising new concerns about water quality and contaminants, and fostering greater levels of public participation and concern about local control and management.

Today, an estimated 1.2 billion people lack access to clean drinking water, and 2.4 billion lack adequate sanitation. About one-third of the world's population already lives in countries with moderate to high water stress (i.e., where water consumption is more than 10 percent of the renewable freshwater supply). The problems are most acute in Africa and West Asia but lack of water is already a major constraint to industrial and socio-economic growth in many other areas, including China, India, and Indonesia.ⁱⁱ According to the United Nations, if present consumption patterns continue, two-thirds of the world's population will live in water-stressed conditions by the year 2025. Lack of clean drinking water leads to nearly 250 million cases of water-related

disease each year and between 5 and 10 million deaths. Merely to meet the Millennium Development Goals described above, the number of people served by water supply must increase by 1.6 billion (32 percent), and those served by sanitation must increase by 2.2 billion (59 percent).ⁱⁱⁱ

At the same time, the amount of water required to secure food for a growing population is likely to increase. The United Nations Food and Agriculture Organization (FAO) predicts irrigation water withdrawals in developing countries will grow by 14 percent by 2030.^{iv} And of the 93 developing countries surveyed by the FAO, ten are already using more than 40 percent of their renewable water resources for irrigation – a threshold used to flag the level at which difficult choices must be made between countries' agricultural and urban water sectors. Likewise, industrial water demand is expected to rise at a rate that parallels, if not exceeds, population growth. According to the International Monetary Fund, humans already use more than half of the world's available freshwater. By some estimates, that number could increase to 90 percent by 2025.^v

Environmental Impacts

There are a growing number of environment problems associated with human water withdrawals and use. Water scarcity often results in unhealthy aquatic ecosystems because of changes in the timing, quantity, and quality of freshwater flows needed to sustain their natural functions. Data looking at the number of endangered or threatened species of fish, amphibians, gastropods, and freshwater mussels show that aquatic species are exposed to higher extinction risk than other species.^{vi} Major dam construction and water withdrawals on river systems in arid parts of the world, including the Southwestern United States mean that virtually the entire flow of some of these rivers is now captured and used before reaching the rivers' mouths. This, in turn, desiccates their delta estuaries, shrinks wetlands, cuts off nutrients to the sea, reduces critical habitat for marine fisheries, and brings economic, social, and cultural ruin to coastal human populations.

Over the past century more than half of all wetlands on the planet have been lost to development and conversion, or have been lost due to human withdrawals of inflows. Wetlands are important to the health of natural systems and people because they act as filters and flood buffers. Annually, groundwater overdraft occurs in many parts of the world, with negative consequences for the environment and human health. Overuse of limited groundwater is unsustainable in the long run, threatening both agricultural and industrial production. Contamination of groundwater by biological and chemical pollutants is turning renewable water resources into unrenewable ones.

Climate Change

There is compelling scientific evidence that climate change will impact water supplies and pose formidable challenges to water systems.^{vii} Global warming threatens to disrupt traditional rainfall and runoff patterns and could increase the frequency and severity of both drought and floods. Changes in natural water availability will affect water management, allocations, prices, and reliability. Changing climate may also degrade water quality by changing water temperatures, flows, runoff rates and timing, with significant potential impacts on water users. By increasing temperatures in lakes and streams, melting permafrost, and reducing water clarity, climate change can also seriously threaten fish and other aquatic organisms, as well as harm critical

habitat like wetlands. In countries with robust biodiversity protection laws, this, in turn, could lead to reductions in available water supply, or changes in the reliability of current supplies. In addition, rising sea levels will threaten coastal aquifers and water supplies, with potential implications for businesses in coastal metropolitan areas reliant on groundwater resources. These effects will vary regionally, but at the least, climate change is expected to add more complexity and unpredictability to sustainable water-management efforts.

Emerging Role of the Public in Water Policy

There is a dramatic shift underway in the role of the public in setting water policy. In the 20th Century, water policy decisions were typically made by a small number of technical or engineering experts responsible for water systems. By the end of the century, however, many countries had witnessed a transformation in the way that water decisions are made. In support of this trend, numerous major international water conferences in recent years have called attention to the importance of public participation in water decision-making.

In part, this change has come about because of some spectacular and highly publicized water project failures or controversies, where decisions were made that affected large numbers of people, but without consultation. A high profile example of this is the displacement of between 1.3 and 1.9 million Chinese by the construction of the Three Gorges Dam. This project led to numerous public protests and opposition in a country where open public debate over government projects is rare. Similarly, opposition has arisen to large-scale water projects in India, Southern Africa, and much of the developed world. This public interest and activism is increasingly also targeting the private sector, with some high profile examples discussed briefly below. In short, this is a critical time for water management. Governments – and corporations – that fail to think strategically about water typically find themselves embroiled in highly public and emotionally charged disputes over a resource considered by many to be a basic human right.

Not surprisingly, as the public's interest has grown, so too has the attention of mainstream media. It is now not uncommon to see headlines on disputes among users in water-scarce regions, protests against water infrastructure proposals, or unusually severe droughts and floods. Growing public opposition to “globalization” has also brought renewed attention to the water area, especially bulk transfers of water from one region to another, and corporate control and use of water. As one local example, the media has widely covered protests and controversy surrounding a Perrier plant in Michigan, which is pumping substantial amounts of groundwater in the Great Lakes basin.^{viii} This increased attention has direct consequences for businesses, and the stakes, in terms of brand image and reputational capital, are growing. This phenomenon will likely have increased relevance in terms of companies' long-term strategic plans, markets, and public affairs.

Water Privatization

One of the most important – and controversial – trends in the global water arena is the accelerating transfer of the production, distribution, or management of water or water services from public entities into private hands – a process loosely called “privatization.” Increasingly, private companies have been invited to take over the management, operation, and sometimes even the ownership of previously public water systems. International development agencies that used to work with governments to improve water services are now pushing privatization efforts.

Treating water as an economic good, and privatizing water systems are not new ideas. What *is* new is the extent of privatization efforts underway today, and the growing public awareness of, and attention, to problems associated with these efforts.^{ix}

The privatization of water systems continues to increase across the globe. As of 2001, at least 93 countries had privatized part of their water systems. Proponents of privatization argue that private companies are better equipped to address many of the obstacles confronting public water agencies, including inefficiency and access to capital, and that privatization can fulfill unmet basic water needs. Accompanying the trend toward water privatization, however, has been rapidly growing opposition among local community groups, unions, human rights organizations, and even public water providers.

The economic and political implications of privatization for industrial water users are complex and regionally specific. Among the possible impacts for businesses (both positive or negative) are changes in the cost of water supply and/or wastewater services, quality of water, and reliability of supply. Furthermore, privatization may lead to real or perceived inequities between commercial and residential water users and increase public scrutiny of large water users. Public feelings over water are highly volatile, and much opposition to water privatization is based on emotional, yet very real, connections to water. Companies would be well advised to be aware of them in any region where they operate.

3. Water Risks for Business

As already outlined, increasing water prices is only one of a number of risks and challenges that water problems pose to business, and many may pose far more significant threats. We provide a general overview of some of these issues below. Note that each sector, and each specific industrial facility (with highly varied size, design, location, and production characteristics) will require more detailed, case-specific risk assessments and analyses to more clearly assess the water-related business risks it faces.

Decreasing Water Availability and Reliability of Supply

Growing populations, increased demand for water for both urban and agricultural uses, and economic development are putting pressure on limited water resources. The most important characteristic of water availability is the significant disparity in the distribution of water geographically and seasonally. Some regions are naturally arid, some are richly endowed with water, and others receive the bulk of their rainfall or snowmelt runoff at specific times of the year. The dramatic natural regional and seasonal differences in water availability can lead to significant disparities in the amounts of water that can be used in a given region at any one time and in the amounts of water that can be allocated to different users. In some places, particularly in countries with high populations and relatively limited water resources, these pressures are already constraining commercial and industrial uses of water. And as noted earlier, over the longer term, climate changes will likely exacerbate the frequency and severity of drought and floods and threaten to seriously impact water supplies and reliability in many parts of the world.

Water shortages are increasing as demand exceeds the available supply due to natural events or factors such as growth in population, new developments, or irrigated acreage. As an example of

how such shortages can dramatically affect business, both Pepsi and Coca-Cola lost their license to use local groundwater at bottling plants in Kerala, India, after drought raised competition for local aquifers. Coca Cola recently announced it might permanently shut down its Kerala facility – its largest bottling operation in India – after continuing difficulties regaining a groundwater-pumping permit from local authorities.^x

Declining Water Quality

The quality of water is a critical input in many industrial production systems and some products. Because of the importance of water quality, specific industries (such as high technology, biotechnology, pharmaceutical, and food processing) incorporate extensive water treatment prior to use. This pretreatment can include filtration, disinfection, reverse osmosis, and other water-purification techniques. Such industries can be particularly vulnerable to degradation or contamination of source water, which can lead to higher pretreatment costs. In cases where current high-quality input water precludes the need for pretreatment, degradation of supply can necessitate costly capital expenditures for treatment technology. The risks and costs associated with these kinds of water-quality problems are poorly assessed and managed at present.

Concern about water quality is not limited to surface water pollution. In some regions, groundwater is used as a main source of supply but is being extracted in amounts that exceed long-term replenishment rates. Generally, water quality declines as water levels drop, presenting a long-term risk in regions facing serious overdraft conditions. Groundwater overdraft in coastal urban areas can lead to saltwater intrusion, with long-term implications for businesses in the region. These problems, in turn, can lead to new regulatory actions, constraints on water availability, or higher costs for quality control.

In addition, growing concerns about water quality may lead to new and costly requirements on company's wastewater discharges. Some national governments impose strict water-quality standards for water supply or wastewater discharge; some impose both. In some countries, these standards are in a state of review and revision. Other governments have yet to develop, impose, and enforce water-quality standards. While most industrialized countries have managed to curtail concentrated "point source" pollution emitted from factories and sewage treatment plants, an estimated 90 percent of wastewater in developing countries is still discharged directly to rivers and streams without any waste processing or treatment.^{xi} As economic development continues in these countries, this is bound to change, and companies will likely have to absorb the costs associated with meeting new water-treatment requirements as they become increasingly stringent.

Supply Chain Interruptions

Understanding the full extent of water-related risks to a company involves assessing factors outside the company's immediate operations. For industries as diverse as apparel, forest products, and agriculture-based products, water is required to produce key upstream inputs that many companies use in production. Indeed, it can take more than a 1,000 times as much water to produce some inputs than is used in all onsite activities. However, traditional water usage estimates fail to address the water use and risks throughout the supply chain and entire production cycle.

As an example of the often-complex nature of water risk embodied in a company's supply chain:

In 2001, Anheuser-Busch, the world's largest brewer of beer, experienced business impacts from unexpected water shortages affecting its supply chain. A temporary drought in the US Pacific Northwest increased the prices and reduced the availability of key inputs to Anheuser-Busch's brewery operation – barley and aluminum. An unusually dry winter, coupled with a turbulent West Coast electricity market that is highly dependent on water for power generation, created intense short-term competition for limited freshwater resources. Reduced allocations of water for irrigation in Idaho resulted in reduced acreages of barley, a key brewery ingredient. At the same time, aluminum production, which relies on large amounts of low-priced energy generated from hydroelectric dams in the region, was drastically reduced as electricity prices skyrocketed. This experience in facing water-related challenges along the supply chain has expanded [Anheuser-Busch's] business case for taking a more comprehensive, strategic, and sustainable approach to water issues.^{xii}

No corporate water risk assessment can be considered complete unless it addresses these broader supply-chain issues.

Failure to Meet Basic Water Needs

Businesses operating in developing countries face a broader set of risks than those in richer nations. In addition to the deficit in water infrastructure discussed above, these risks include the failure of governments to meet basic human needs for clean water and sanitation services, widespread water-related diseases, inadequate intellectual and institutional capacity, and major economic problems finding the capital necessary to deal with these problems.

The failure of governments to provide 100 percent coverage for water services means that international and local businesses will increasingly find themselves with operations in regions where people lack some of the basic resources either used (or produced) by the company. This raises questions such as:

- What are the responsibilities of companies that use substantial amounts of water in regions where they operate if a significant fraction of the population has limited or no access to basic water services?
- Should companies offer some water services to local populations for free? As an economic product with a price?
- Should they work with local governments and provide expertise and infrastructure?
- Should companies develop corporate policy or strategy around these questions, or allow individual facilities to enter into *ad hoc* arrangements depending on local conditions?
- What are the risks to corporate reputation of the failure to develop and implement such a strategy? Are there examples where this has already been an issue?
- Will increased attention to water access from institutions such as the World Bank and the United Nations result in changes in project finance that will impact companies?

A related but less serious issue that can cause tensions between a company and communities in developing countries is when the relative cost of a unit of water for a commercial facility is negotiated to be below what local residents pay. This can lead to resentment and community opposition. Balancing these public and private benefits is a challenge increasingly facing corporations with facilities (and extensive water use) in poor communities.

4. Responding to Risk: Recommended Practices and Benchmarks

A small but growing number of companies around the world are taking steps to strategically address water-related risks in ways that protect long-term value. At many other companies, though, issues of water risk are not addressed or are addressed only in an *ad hoc*, piecemeal fashion. Although companies' water risks vary significantly depending on their business sector and areas of operations, many businesses would benefit from a strategic assessment of their current water-related business risks and developing a plan to mitigate them. This is particularly true for companies dependent on high quality, reliable supplies, or on large volumes of water; companies with key operations in arid areas; and companies that rely on inputs that are themselves highly water dependent.

We recommend an effective water-risk management approach include the ten components discussed below. And we believe that companies earnestly working to implement these elements can and should be deemed leaders in managing water-related risks.

Measure Current Water Use

As a first step, companies need to understand and measure their current water use and wastewater discharges associated with their own operations and production. While harder to track and quantify, they should also assess water use and discharges associated with key suppliers and inputs. This will provide the baseline data for assessing risks, prioritizing efforts, and measuring progress. In its first environmental report, Coca-Cola reported that it uses approximately three liters of water for every liter of beverage it produces, identifying both a benchmark of current use and a way to measure improvements in water-use efficiency over time.

Assess Water Landscape and Water Risks

For key areas of operation and sourcing, companies should assess local water conditions, including hydrological, social, economic, and political factors. This assessment should flag risk areas of current shortage, rapidly growing demand, and large disparities in water access and/or prices between large commercial users and local communities. Such an analysis of relative water conditions and prices around a company's facilities can permit some advance warning of places where tensions with the local community may appear during dry periods. In addition, renegotiating allocations and prices may help reduce these tensions without much added expense. For geographic risk areas, companies should develop plans to minimize their water use and impacts, and they should establish contingency plans to respond to water supply and related risks, such as decreasing water quality, higher water prices, extreme hydrologic events, and local economic development.

Consult Stakeholders

Communities often feel very strongly about the use of local water resources. While public participation in local water policy in the past has been limited, civil society representatives and non-governmental organizations now play increasingly important roles in water policy. There is growing recognition that communities should be part of water resource decision-making. In instances where a company plays a large role in a community, developing early and ongoing ties

with local groups can prevent or reduce the risks of future water-related disputes. In addition, proactive efforts by the company to improve water quality or water availability can help build positive relations with regional stakeholders. These efforts can include: direct participation in developing local water systems, provision of funds or appropriate technology, education, or water resource planning.

Like many policy debates, questions over water are often seriously polarized. Local conditions vary from region to region, making most generalizations difficult and inappropriate. In some water-scare regions, community backlash about corporate use of local water resources will likely occur, particularly during prolonged dry periods. Potential local problems should be identified early and efforts made to include the public in decisions over water, to improve company practices, and work with local groups on education and outreach. Experience has shown that early identification of local actors and their water-related needs, coupled with a policy of open communication, can reduce risks of controversy that in extreme cases can lead to loss of license to operate.

Engage Supply Chain

As noted above, many companies' most significant water impacts and risks may be embedded in their supply chain. To address this, companies should assess and evaluate water use in their supply chain and work collaboratively with suppliers to reduce water use and minimize risks of supply chain disruptions from water-related problems. As an example of one supply chain initiative yielding tangible business benefits, food products giant Unilever is providing tomato growers in Brazil with technical and financial support to convert to drip irrigation, which can help them cut water use by a third, reduce the need for pesticides, and significantly increase crop yields. As another example, Levi Strauss, Gap, and Nike joined with Business for Social Responsibility in the 1990s to develop a set of minimum water-quality guidelines to be met by apparel factories producing their products. The guidelines help protect human health and water quality in countries and regions without strong clean water standards, or where local standards are poorly enforced.

Establish a Water Policy and Set Corollary Goals and Targets

Top management, particularly in water-intensive industry sectors, should clearly articulate the organization's policy regarding water-resource issues. In addition, companies should establish supporting quantifiable goals and targets for water-use efficiency, conservation, and minimizing water impacts (and associated water-related risks). Efficiency programs can have multiple benefits, including cost savings, reduced energy use, and reduced regulation. As an example of the latter, "closed-loop" cooling systems in certain circumstances can reduce regulatory costs by eliminating the need for water-discharge permits. Aggressive water conservation programs developed within formal agreements with water-service providers or local governments can also offer the potential to reduce reliability risks during periodic drought periods.

As one example, Intel established the Corporate Industrial Water Management Group to develop and implement program elements to improve water-use efficiency at its major manufacturing sites, which use large amounts of highly treated water for chip cleaning. The group includes representatives from fabrication sites, corporate technology development experts, and regulatory compliance staff. For 2003 and beyond, Intel has set a goal to offset at least 25 percent of its total

incoming fresh water supply needs with reclaimed water and more efficient systems. In 2002, the company exceeded this goal for the year by achieving 35 percent water savings through reclaimed water and efficiency gains.

Implement Best Available Technology

There are numerous technologies that can reduce water use and improve water quality, including reclaiming and reusing process water, sophisticated filtration systems, replacing water cooling towers with air cooling, and more. Some changes involve significant capital outlays, while others do not. In either case, companies have often found that such technology investments can have very short payback periods and generate high returns on investment. This is likely to be increasingly true as water scarcity becomes more severe. Companies should assess best available technology for reducing water use and wastewater discharges and commit to using such technology in new facilities and retrofitting existing facilities in areas of significant water stress.

Factor Water Risk into Relevant Business Decisions

Given its growing importance, companies should consider water scarcity and water-related risks as an important input when making a range of strategic business decisions, from factory siting to new product development. As one example related to product development, Procter & Gamble estimates that nearly 85 percent of its product sales are associated in some way with household water use, and has thus focused product research and development on addressing water use efficiency. The company has directed its product development team, “As you improve current products, or develop new-to-the-world products and services, think about how you could apply our technologies to use less water, use water differently, or use no water at all.”^{xiii}

Measure and Report Performance

To meet increased expectations and demands for transparency, companies should publicly report key metrics on their water use and impacts and track how their performance changes over time. This information can help investors, customers, local communities, and other key stakeholders assess how companies are managing their water risks, and is often a useful tool for engaging employees across the enterprise in supporting water programs. In February 2003, the Global Reporting (GRI) initiative produced its “Water Protocol” to provide resource-specific guidance for organizations implementing the GRI’s 2002 Sustainability Reporting Guidelines. More recently, the Facility Reporting Project is in the process of developing facility-level reporting metrics (including for water) that are based on the GRI framework.^{xiv}

Form Strategic Partnerships

Because many water-related issues can best be addressed on a regional scale involving multiple sectors and stakeholders, some companies are working together through organizations like the World Council on Sustainable Development to promote watershed protection and improve access to water for impoverished communities. Another example is the “regional environmental management system” being developed by *Sustainable Silicon Valley* in California. This multi-stakeholder initiative has identified fresh water as one of the main environmental challenges facing the region and, in an effort to address this issue, companies in the Valley are working with other stakeholders to establish long-term objectives and implementation plans to work toward regional water sustainability.^{xv}

Commit to Continuous Improvement

Despite increased efforts from companies and other sectors of society, water scarcity and water-related business risks are likely to grow in the future. A commitment to continuous improvement in assessing and managing these risks and lessening impacts of the company's water use on local communities and the environment can help protect its operations (and long-term shareholder value) from unexpected water-related business disruptions. Such a commitment should be in written form and can be a stand-alone statement, or part of an organization's overall environmental policy, such as the one required in ISO 14001.^{xvi}

5. Conclusion

Few companies or investors have thought strategically about the risks to business posed by growing water scarcity. Corporations and investors are, in large part, unaware of both freshwater-related risks and the management approaches and tools available to reduce them. Yet water scarcity already poses serious challenges to many companies and will dramatically affect many more if current trends continue.

More research is needed to quantitatively evaluate water-related risk factors for a range of industrial sectors highly dependent on water resources or vulnerable to the problems identified in this paper. These sectors include, among others, beverage/bottling, textile/apparel, biotechnology, agricultural/food processing, refining, mining, electronics/high technology, forest products, and water services/management. And while water-related problems will affect water-intensive business sectors in particular, these problems will have implications for all businesses, especially those that rely heavily on the above sectors in their supply chain. Such research should include sector overviews of threats to productivity, competition, and performance, as well as provide detailed analyses of specific risks unique to certain regions of import to those industrial sectors. This will allow company directors and investors to assess whether individual companies are properly prepared for the inevitable water challenges that lie ahead.

We hope this paper will contribute to an emerging discussion in the private sector about the threats and opportunities posed by freshwater concerns. Understanding the business risks related to water is critical not only for businesses dependent on water, but for our entire global economy.

6. Some Useful Resources

Business for Social Responsibility. Issue Brief – Water Issues.

<http://www.bsr.org/CSRResources/IssueBriefDetail.cfm?DocumentID=49620>

Global Environmental Management Initiative. Connecting the Drops Toward Creative Water Strategies: A Water Sustainability Tool. <http://www.gemi.org/water/resources.htm>

Global Reporting Initiative Water Protocol. (For Use with the GRI 2002 Sustainability Reporting Guidelines) February 2003

<http://www.globalreporting.org/guidelines/protocols/WaterProtocol030501.pdf>

The World's Water: The Biennial Report on Freshwater Resources (Island Press, Washington, D.C.). This book is published every two years, starting in 1998. See also, The World's Water: Information on the World's Freshwater Resources. <http://worldwater.org/>

United Nations Educational, Scientific and Cultural Organization (UNESCO). World Water Assessment Programme. <http://www.unesco.org/water/wwap/>

United Nations Food and Agriculture Organization. Aquastat. <http://www.fao.org/waicent/faoinfo/agricult/agl/aglw/aquastat/main/index.stm>

Endnotes

ⁱ The International Conference on Water and Environment, held in Dublin, Ireland in January 1992, included the following principle among the four so-called "Dublin Principles:" "Water has an economic value in all its competing uses and should be recognized as an economic good."

ⁱⁱ See, for example Raskin, P., P. Gleick, P. Kirshen, G. Pontius, and K. Strzepek. *Water Futures: Assessment of Long-Range Patterns and Problems*. Comprehensive Assessment of the Freshwater Resources of the World. Stockholm Environment Institute, Stockholm, Sweden. 1997.

ⁱⁱⁱ "Threats to the World's Freshwater Resources," Gleick, P., A. Singh, and H. Shi. Pacific Institute and United Nations Environment Programme, November 2001.

^{iv} "Securing Food for a Growing World Population." (Chapter 8) In *UN World Water Development Report – Water for People, Water for Life*. <http://www.unesco.org/water/wwap/wwdr/pdf/chap8.pdf>

^v As cited in Business for Social Responsibility. Issue Brief – Water Issues.

<http://www.bsr.org/CSRResources/IssueBriefDetail.cfm?DocumentID=49620>

^{vi} "A fragile cornucopia assessing the status of U.S. biodiversity." Stein, B.A. *Environment* Vol. 43, pp. 11-22. 2001. and Riccardi, A and J. Rasmussen. 1999. "Extinction rates of North American freshwater fauna." *Conservation Biology* Vol.13, No. 5. October, 1999.

^{vii} Intergovernmental Panel on Climate Change (IPCC). 2001. *Climate Change 2001: Impacts, Adaptation and Vulnerability*. http://www.grida.no/climate/ipcc_tar/wg2/index.htm. See also the Water Sector Report of the U.S. National Assessment, "Water: The Potential Consequences of Climate Variability and Change." U.S. Global Change Research Program, Washington D.C. <http://www.gcrio.org/NationalAssessment/water/water.pdf>.

^{viii} See "Group doesn't want Perrier bottling Michigan water"

<http://www.uswaternews.com/archives/arcsupply/1grodoe3.html>.

^{ix} A comprehensive study of this issue, "The New Economy of Water" is available online from the Pacific Institute for Studies in Development, Environment, and Security, in Oakland, California.

www.pacinst.org/reports/new_economy.htm.

^x Kerala Govt undecided on Coke plant's future. Sun Network.

<http://www.sunnetwork.org/news/regional/Kerala/Kerala.asp?id=9945>

^{xi} *Comprehensive Assessment of the Freshwater Resources of the World*. World Meteorological Organization and Stockholm Environment Institute. Stockholm, Sweden. 1997. As cited in *Earth Trends* by the World Resources Institute. 2001.

^{xii} *Connecting the Drops Toward Creative Water Strategies: A Water Sustainability Tool*. Global Environmental Management Initiative. 2002.

^{xiii} Business for Social Responsibility. Issue Brief – Water Issues.

<http://www.bsr.org/CSRResources/IssueBriefDetail.cfm?DocumentID=49620>

^{xiv} More information on the Facility Reporting Project can be found at: <http://www.facilityreporting.org/>

^{xv} More information on Sustainable Silicon Valley can be found at: <http://www.calepa.ca.gov/EMS/SiliconEMS/>

^{xvi} ISO 14001:1996(E) *Environmental Management Systems – Specification with Guidance for Use*. Geneva, Switzerland.