Business for Social Responsibility

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At the Crest of a Wave:
A Proactive Approach to Corporate Water Strategy

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About this Report
Business for Social Responsibility (BSR) and the Pacific Institute have partnered to produce this Trends Report for companies which details a proactive approach to corporate water strategy. The report was written by Linda Hwang, Sissel Waage, Ph.D., and Emma Stewart, Ph.D., of BSR's Research & Development team and Jason Morrison, Peter H. Gleick, Ph.D., and Mari Morikawa of the Pacific Institute. Please direct comments or questions to Linda Hwang at lhwang@bsr.org or Jason Morrison at jmorrison@pacinst.org.

About the Pacific Institute
The Pacific Institute (www.pacinst.org) is dedicated to protecting our natural world, encouraging sustainable development, and improving global security. Founded in 1987 and based in Oakland, California, the Institute provides independent research and policy analysis on issues at the intersection of development, environment, and security and aims to find real-world solutions to problems like water shortages, habitat destruction, global warming, and environmental injustice. The Institute conducts research, publishes reports, recommends solutions, and works with decision makers, advocacy groups, and the public to change policy.

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Since 1992, BSR (www.bsr.org) has been a leading provider of innovative business solutions to many of the world's leading companies. Headquartered in San Francisco and with offices in Paris and Guangzhou, China, BSR is a nonprofit business association that serves its 250 member companies and other Global 1000 enterprises. Through advisory services, conferences and research, BSR works with companies and concerned stakeholders of all types to create a more just and sustainable global economy.

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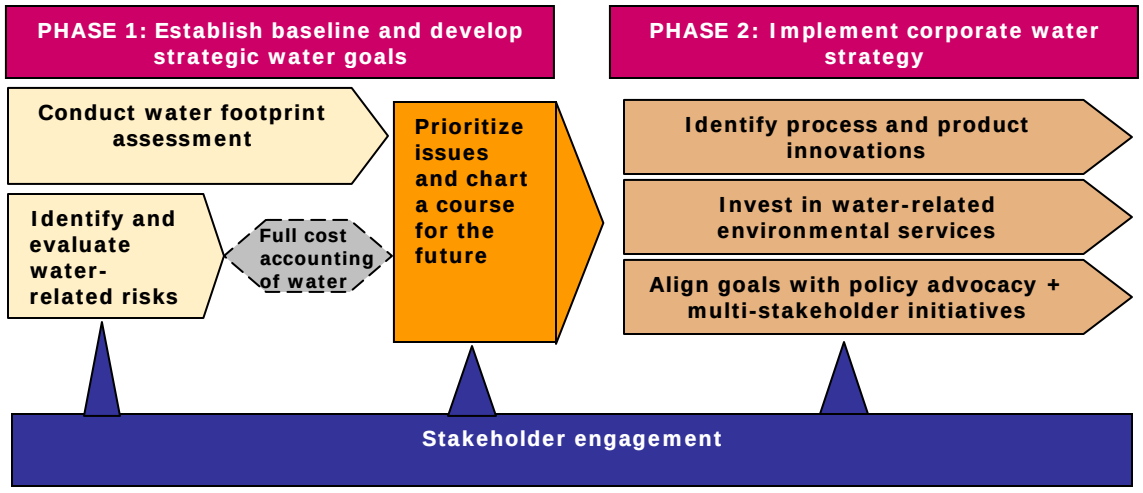
1. Executive Summary

As freshwater resources become ever more scarce or polluted, a global crisis in access to clean water is emerging. While this is most acutely felt in Africa and West Asia, a lack of freshwater is already an economic constraint in major growth markets like China, India, and Indonesia, as well as commercial centers in Australia and the western United States. 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.[i] Meanwhile, too much water has recently led to severe flooding in low-lying areas of Great Britain, southern Europe, East Asia, and the eastern United States. Further compounding -- and politicizing -- these challenges is the reality that fully one third of the world's population lacks access to enough water to meet their most basic needs.[ii]

In the next two to five years, companies will need to adapt to availability concerns such as water stress and flooding; quality concerns, including increasingly contaminated surface and groundwater; and access concerns, specifically competition (real or perceived) with other water users. As a result, a thoughtful water strategy will prove an essential mechanism for managing medium-term business risks and opportunities. In being proactive, corporate leaders will not only anticipate the future, but will shape it while gaining advantage in some of the key--and most water constrained--markets worldwide.

Proactive corporate action that dramatically overhauls how companies use, innovate around, and invest in water supplies will be crucial for gaining regulatory and community goodwill, improving reputation, and mitigating risks. Such ***anticipatory corporate water strategies will include not only 1) innovating to significantly increase value chain and product eco-efficiency; but also 2) investing in the restoration of ecological systems that affect water flows; and 3) engaging in collaborative strategies for maintaining water resources over time.***

Together, these three components—innovation, investment, and collaboration—construct a 21st century corporate water strategy *that goes far beyond tracking inputs and outputs.* ***This report steers the reader through 1) developing, and 2) implementing such a strategy, as depicted below.***



1. The Context: 21st Century Water Trends

For the past few decades, corporate decision-makers have generally assumed that water trends do not pose a threat to business continuity, reputation, product margins or growth markets. Circumstances, however, are changing.

Businesses will increasingly find themselves grappling with water constraints in various sourcing, production, and retail sites around the world. Indeed, for some sectors, an availability of reliable, high-quality water may determine the nature and location of billions of dollars of investment. Sustainable access to safe water is likely to affect corporate behavior, goodwill, and profits. Water trends that are re-shaping the business context include:

A. Increasing and inequitable demands
B. Ongoing over-appropriation
C. Intensifying environmental impacts
D. Declining water quality
E. Climate change and its effect on water
F. Emerging role of the public in water policy
G. Growing debate over the role of markets in delivering water

A. Increasing and Inequitable Demands

The world's freshwater resources are under pressure. Both growing populations and significant increases in agricultural and industrial demand are seeking to tap into what is essentially a 'fixed resource.' Yet demand is increasing competition for this fixed resource, raising new concerns about water quality and contaminants, and fostering greater levels of public participation and concern about local control and management. Layered into this increasingly complex context is the highly variable access to freshwater from region to region. Even in wealthier regions, access to water is increasingly contentious.

Box 1: Growing Demand in Agricultural and Industrial Water

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. And demand for water is on the rise—from both agricultural and industrial sources. For example, the Stockholm International Water Institute predicts that agricultural water use will double by 2050, particularly as agriculture becomes an energy supplier through biofuels feedstocks. And of the 93 developing countries surveyed by the FAO, 10 are already using more than 40 percent of their renewable water resources for irrigation – a threshold used to signal the level at which difficult choices must be made between countries' agricultural and urban water sectors. Likewise, industrial water demands are expected to grow at rates that parallel, or even exceed, population growth.

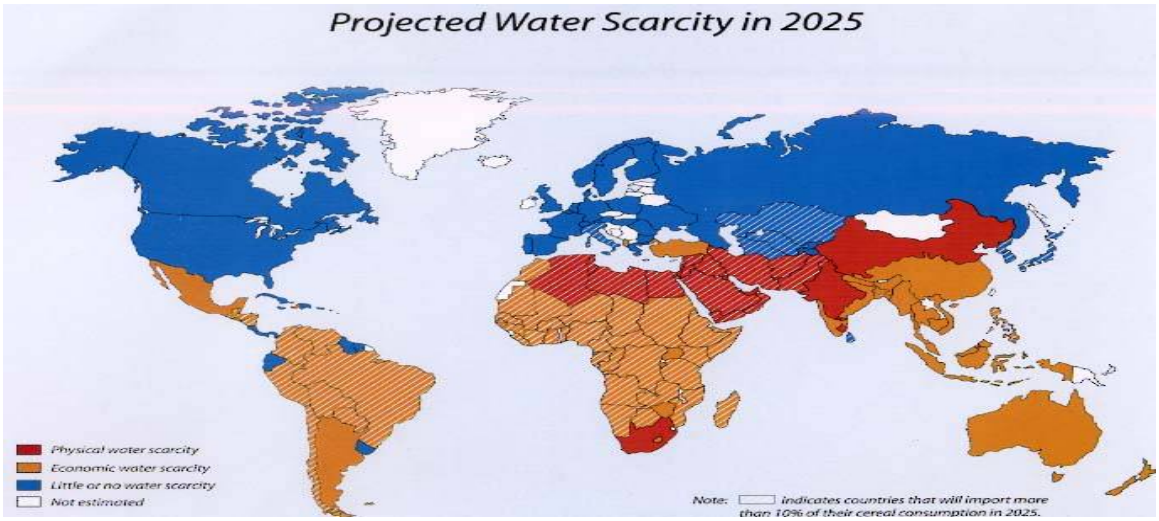
Sources: Stockholm International Water Institute. 2005. "Challenges of Water Scarcity"; UNESCO. 2003. "World Water Development Report"; UN Food & Agriculture Organization. 2003. "Unlocking the Water Potential of Agriculture."

All of these complexities are amplified in regions where basic water needs are not met and public health concerns are prevalent, which is the case in a number of key emerging markets. Globally, more than one billion people lack reliable access to clean drinking water and 2.5 billion lack adequate sanitation.[iii] While the problems are most acute in Africa and West Asia, insufficient water is

already a major constraint to industrial and socio-economic growth in many other areas, including China, India, and Indonesia.[iv]

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.[v] Companies will be competing for an increasingly scarce resource in a contentious political context. 'Economic water shortages' will drive greater competition over water, with a particularly strong impact on some of the foremost emerging markets (see Figure 1).

Figure 1



Source: International Water Management Institute (IWMI), Sri Lanka. 2005. http://www.iwmi.cgiar.org/. Note: countries that are shown as having little or no water scarcity, on average, may still experience very significant regional scarcity or shortages at some periods. The United States, for example, has significantly less water in the western region than in the east.

Early signals of what is to come can already be seen, particularly in parts of the world where inadequate water infrastructure and water-management capacity already constrain companies' growth, disrupt operations, and necessitate costly investments in equipment and technology. Countries with poorly developed infrastructure are also less able to decouple their economy from climatic variability, which puts not only agricultural and food sectors at risk, but other industries as well. The reality is that in times of water crisis, governments typically prioritize water allocations for domestic uses over industrial uses.[vi] This phenomenon exacerbates the risk shouldered by companies operating in regions with inadequate water infrastructure.

As water quantity and quality issues grow in the coming years, tensions are likely to increase between businesses and local communities, particularly in developing countries. Community opposition to water withdrawals and perceived or real inequities can quickly emerge and affect business profoundly (see Box 2 on the business implications of over-appropriations of water).

Overall, demand is on the rise, inequitable access to water and changes in pricing are rife, resulting in an increasingly complex political terrain. The challenge for business will be ensuring access to needed water within more competitive contexts while coordinating with, rather than being in conflict with, local community water priorities.

B. Ongoing Over-Appropriation

As demand grows, current water use in many areas often exceeds sustainable supplies. Water is often already over-appropriated. Water allocation and appropriation varies from region to region due to a wide variety of legal and institutional conditions reflecting the complex public and private values of water. The causes of over-appropriation are many and include:

- Inadequate attention to, or understanding of, ecological and hydrological systems and limits to appropriation;
- Inappropriate economic and market structures.

Over-appropriation can already be witnessed, as many large rivers, such as China's Yellow River and the Colorado River shared by the U.S. and Mexico, no longer reliably reach the sea due to withdrawals and upstream use.

Groundwater overdraft is also occurring in many parts of the world. For example, in northern China, parts of India, and the Ogallala basin in the Great Plains of the United States, groundwater levels are dropping faster than they can be replenished. The result is short-term rising energy costs to users, and long-term uncertainty over supply.

Box 2: Business Implications of Water Over-Appropriation

The over-appropriation of water has already affected specific companies and industrial sectors in the developing world. In Kerala, India, both Pepsi and Coca-Cola lost their licenses to use local groundwater at bottling plants after drought raised competition for local aquifers. The city of Bangalore, India is losing information-technology firms because of worries about water scarcity and reliability.

Beijing authorities have announced plans to severely limit development of new water-intensive businesses in the region because of water scarcity. Authorities are constraining the location of new textile, leather, metal smelting and chemical industries according to reports in the *China Daily*. Makers of beverages, plastics and pharmaceuticals in the region may have to meet water conservation restrictions to gain approval.

Sources: "Why are IT firms fleeing Bangalore?" The Economic Times, 29 July 2004; Environmental News Network, 11 March 2004.

The challenge is that over-appropriation is occurring in a context of growing demand. So, even as many regions are experiencing greater demand than supply, the demand curve continues to move upward. Moreover, climate change is beginning to introduce new uncertainties ranging from unanticipated alterations in water supply and availability to new extremes in both flooding and drought. The end result is that over-appropriation of water in today's complex context is likely to become more challenging, not less so.

C. Intensifying Environmental Impacts

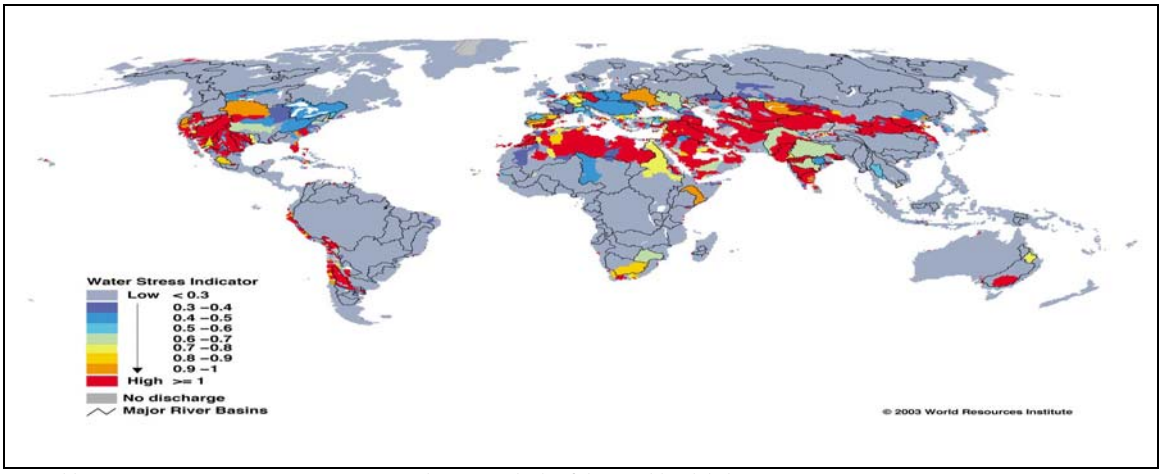
Ecological systems need water to sustain resilient, robust natural communities and functions. Aquatic species—including fish, amphibians, gastropods, and freshwater mussels—need not only water, but water at certain times in their lifecycles, within a particular temperature range, and of a particular quality in order to maintain healthy populations. These timing, quantity, and quality issues mean that over-appropriation and growing demand for water have routinely led to unintended consequences for ecological systems.

Aquatic species are experiencing a higher extinction risk than other species.[vii] Taking water out of natural systems not only aggravates extinction rates, but can also lead to fundamental changes in the ecological characteristics of a system. Changes in one part of an ecosystem often have wide-ranging impacts throughout the system.

These landscape-level changes to natural systems have been underway for years. Massive dam construction and water withdrawals on some river systems mean that virtually the entire flow of some rivers is now captured and used before reaching the rivers' mouths. This, in turn, desiccates delta estuaries, shrinks wetlands, cuts off nutrients to the sea, reduces critical habitats for marine fisheries, and brings adverse economic, social, and cultural impacts to downstream and coastal human populations. The effects over the past century have included the loss of more than half of all wetlands on the planet, which has in turn diminished the ability of natural systems to filter water and create buffers from flooding. Many scientists noted that the devastation of Hurricane Katrina in 2005 could be partially attributed to the decimation of wetlands along the greater Louisiana coast. This was a gradual ecological change that seemed insignificant for years—until it suddenly had an enormous and costly consequence for both human and economic systems.

In many parts of the world, the water needed to sustain healthy ecosystems and their dependent species is being used by humans (see Figure 2).

Figure 2: Environmental Water Scarcity Index by Basin



Source: World Resources Institute, Water Resources EAtlas: Watersheds of the World, Global Map 16.

As awareness of the environmental consequences of human water use grows, so do efforts to restore some water explicitly for ecosystem use. Policymakers are increasingly considering reallocations, environmental water policies, and the development of water markets that cap usage or inputs. While current policy actions in this domain are modest, ecosystems will become a more important component of intentional water management and planning in the future. The result will be further pressure on the human uses of water.

D. Declining Water Quality

Poor and declining water quality is an acute problem in many regions around the world. It is a very real issue that can affect national strategies for economic development. Already, for example, growing

concerns about water quality in China have spurred government action toward more stringent environmental protections (see Box 3). The policy response will require both changes in infrastructure and in 'business as usual' practices.

For companies, water-quality concerns may mean more national restrictions on the type, size, or location of specific industrial investments, as well as new and costly constraints on a company's wastewater outflow. With an estimated 90 percent of wastewater in developing countries discharged directly into rivers and streams without any waste processing or treatment, the legal and financial implications could be significant.[viii] As economic development continues, companies will likely have to absorb new costs associated with meeting increasingly stringent water-treatment requirements. Industrial expansion may also be affected in regions where the water supply is already contaminated, particularly for industries that require clean water in production.

Box 3: Poor Water Quality & Constrained Economic Development – The Case of China

In 2005, these key water-related issues were documented in China:

- 278 Chinese cities reportedly had *no* sewage treatment plants;
- Only 52 percent of sewage produced by China's largest cities is treated;
- Over 38 billion tons of wastewater flowed into the Yangtze, Yellow, and Huaihe rivers;
- The Yangtze alone has 9,000 chemical plants along its banks;
- A chemical spill in November 2006 forced Harbin to suspend running water to 3.8 million people for five days. The contamination also affected Russia downstream – an example of the international nature of water;
- Five of the seven major river systems in China are considered to be severely polluted, with the Haihe River near the Beijing and Tianjin industrial centers in the worst condition. These conditions are already affecting local industrial development plans.

China's recent 5-Year Plan, announced in October 2005, calls for a departure from the "old, growth-at-any-cost model that has led to many rivers being polluted." This shift will require massive investment in water-quality treatment systems. Northern China, for example, plans to spend over $100 billion to address the issues in its ongoing five year plan.

Sources: "38b tons of waste water flows into major rivers." Xinhua News Agency, December 20, 2006; "Plight of Yangtze River worsened by critical water shortage." Xinhua News Agency, January 19, 2007;
G. Wong. 2006. "China to spend US$125 billion to improve water facilities, combat pollution." Associated Press, August 23, 2006.

E. Climate Change and Its Effect on Water

Further complicating the water picture is the likelihood that climate change will alter the world's hydrological cycles. Some climate change now appears both inevitable and unavoidable. As these changes occur, scientists expect to see, among other things:

- Changes in traditional precipitation and runoff patterns;
- Increases in the frequency and severity of both drought and floods;
- Degradation of water quality by changing water temperatures, flows, runoff rates and timing; and
- Threats to coastal aquifers from rising sea levels, with potential implications for coastal populations reliant on groundwater resources.[ix]

Climate change-related impacts on water systems will vary regionally. Problems could be especially severe for parts of Asia, due to accelerated rates of glacial melt, highly vulnerable populations in flood-prone and coastal regions, and existing constraints on supplies. According to estimates by the Chinese Academy of Sciences, China's highland glaciers are shrinking each year by an amount equivalent to all the water in the Yellow River.[x] These glacial melt rates are worrisome, as Himalayan glaciers account for a significant fraction of runoff in the Yangtze and Yellow Rivers in China, the River Ganges in India, the Indus in Pakistan, the Brahmaputra in Bangladesh, and Burma's Irrawaddy. At present about 67 percent of the nearly 12,000 square miles of Himalayan glaciers are receding and, as the ice diminishes, glacial runoff and river flows in summer will also go down, leading to severe water shortages.[xi]

Overall, climate change is expected to add more complexity and unpredictability to water management. Organizations as diverse as the Intergovernmental Panel on Climate Change, the U.S. National Academy of Sciences, the American Water Works Association, and the California Department of Water Resources have all urged water managers to re-examine water management policies and tools in the context of climate change. Corporate managers may wish to investigate whether regionally-based climate impact models exist for key areas of operation, and what those models say about water-system vulnerabilities in the future.

F. 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. By the end of the century, many countries had witnessed a movement toward more public participation in decision-making.

Box 4. Public Campaigns against Corporate Water Use

Companies such as Intel have begun to run into local concerns about the magnitude of water needed for new facilities, or about quality concerns associated with wastewater discharges. In the late 1990s, the South West Organizing Project (SWOP) received mainstream media coverage for their campaign against Intel's expanded water use in New Mexico. SWOP challenged Intel's tax incentives and filed shareholder resolutions. Operating in water-scarce regions like the southwest U.S. and Israel, Intel has since become known as an industry leader in water efficiency.

Source: ""Project XL" translates to "extra lenient" de-regulation." Silicon Valley Toxics Coalition, October 15, 2001, available at http://svtc.igc.org/hightech_prod/liaisons/xl/xlaction.htm.

Partially contributing to this shift have been some highly publicized water controversies where decisions were made that affected large numbers of people, including the public opposition to the Narmada dam in India and Three Gorges Dam in China. Not surprisingly, as the public's interest has grown, so too has the attention of the mainstream media (see Box 4). Today, it is not uncommon to see headlines on disputes among users in water-scarce regions, such as the U.S. Pacific Northwest's Klamath Basin where ecosystem and agricultural water demands have clashed, or in India where communities have challenged corporate water use in high-profile cases.

Increased public and media attention has direct consequences for businesses, and the stakes, in terms of brand image and reputational capital (typically in the form of "good will"), are growing. This phenomenon will likely have increased relevance in terms of companies' long-term strategic plans,

markets, and public affairs, as water-use decisions could lead to public and emotionally-charged disputes over access to a resource considered by many to be a basic human right.

G. Growing Debate over the Role of Markets in Delivering Water

An international debate is growing over whether (and how) water should be considered an "economic good," subject to the rules and power of markets and international trade regimes.[xii] In places with increasing water scarcity, prices have been imposed on water that was previously provided for free. In many instances, artificially low water prices are rising as subsidies are phased out or pricing schemes are implemented to promote water-use efficiency (see Box 5).

Box 5. Using Price Hikes to Address Water Scarcity – The Case of Australia

In 2007, the government of Victoria Province in Australia announced a 15 percent price hike in water to help pay for water security infrastructure. Other provinces have considered doubling or even tripling the current prices, which range from US$0.70 to US$1.20 per liter. Economists agree that water prices do not reflect the current and future scarcity of water, nor its social and environmental value, but many view price hikes as weak incentives to eliminate wastage. Says Australian water economist, Dr John Marsden, "Prices may go up but that is small compared to our household energy budget. The available information we have is that people are not responsive to [water] price."

Price hikes are also viewed as inappropriate tools in developing rural areas, where the poor often pay more per unit of water than in industrialized societies.

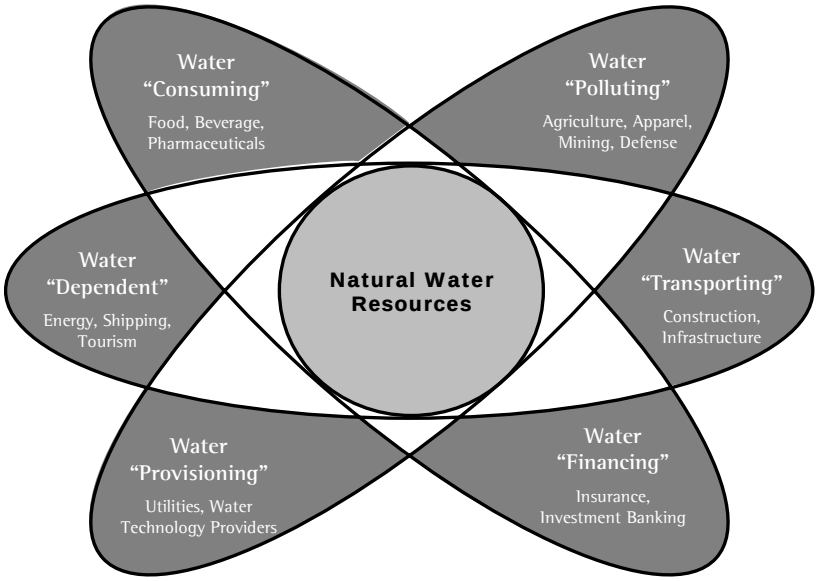
Source: "Water Prices Set to Rise." ABC News Australia, August 15, 2007.

At the same time that water is beginning to be 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.[xiii] 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 for water research have not yet been made available by governments or the world community. Discussion of how the private sector may contribute is likely to increase as the deadline draws nearer.

The Implications for Business

While the drivers outlined above are dynamic and often lie outside of the direct sphere of corporate control, they highlight a critical point in the way stakeholders view water worldwide. This will affect companies in different ways, depending upon how essential water is to a particular business (see Figure 3).

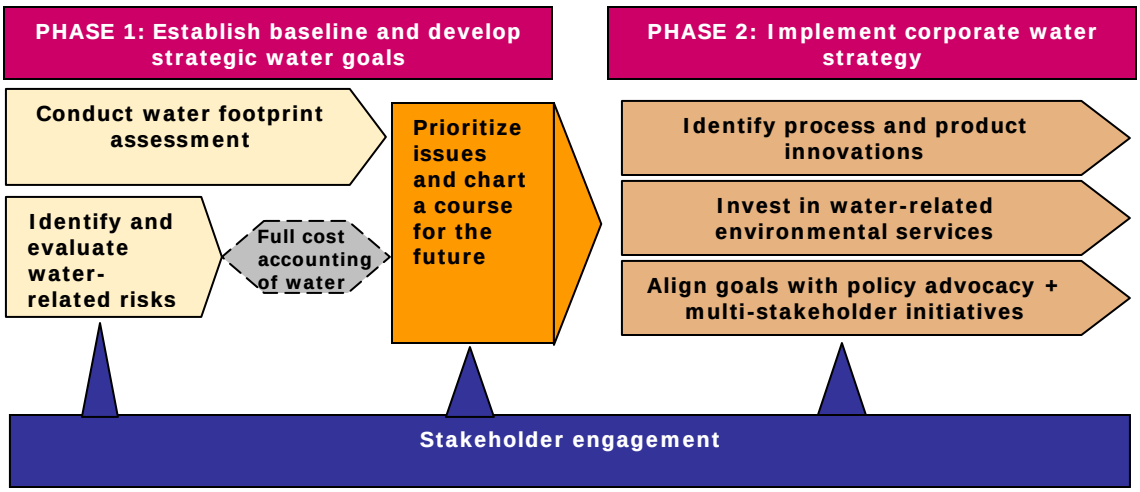
Figure 3. Mapping the Role of Water across Industries



A small but growing minority of businesses is taking steps to address water-related risks in ways that protect medium- to long-term value. Most companies, however, are not addressing water issues strategically or are only doing so in an *ad hoc*, piecemeal fashion.

In the next two sections, we describe the steps involved in designing and implementing a robust and comprehensive approach to water risks and opportunities, as depicted in Figure 4.

Figure 4: Developing and Implementing a Corporate Water Strategy



II. Phase I -- Establishing a Corporate Water Strategy

Phase I involves a strategic assessment of current water-related business risks that also considers risk mitigation and adaptive management options. We recommend a series of three steps that can establish a baseline for developing water management plans:

Step 1: Conduct a Comprehensive "Water Footprint" Assessment
Step 2: Identify and Evaluate Water-Related Risks
Step 3: Prioritize Issues and Chart a Course for the Future

Conduct water footprint assessment

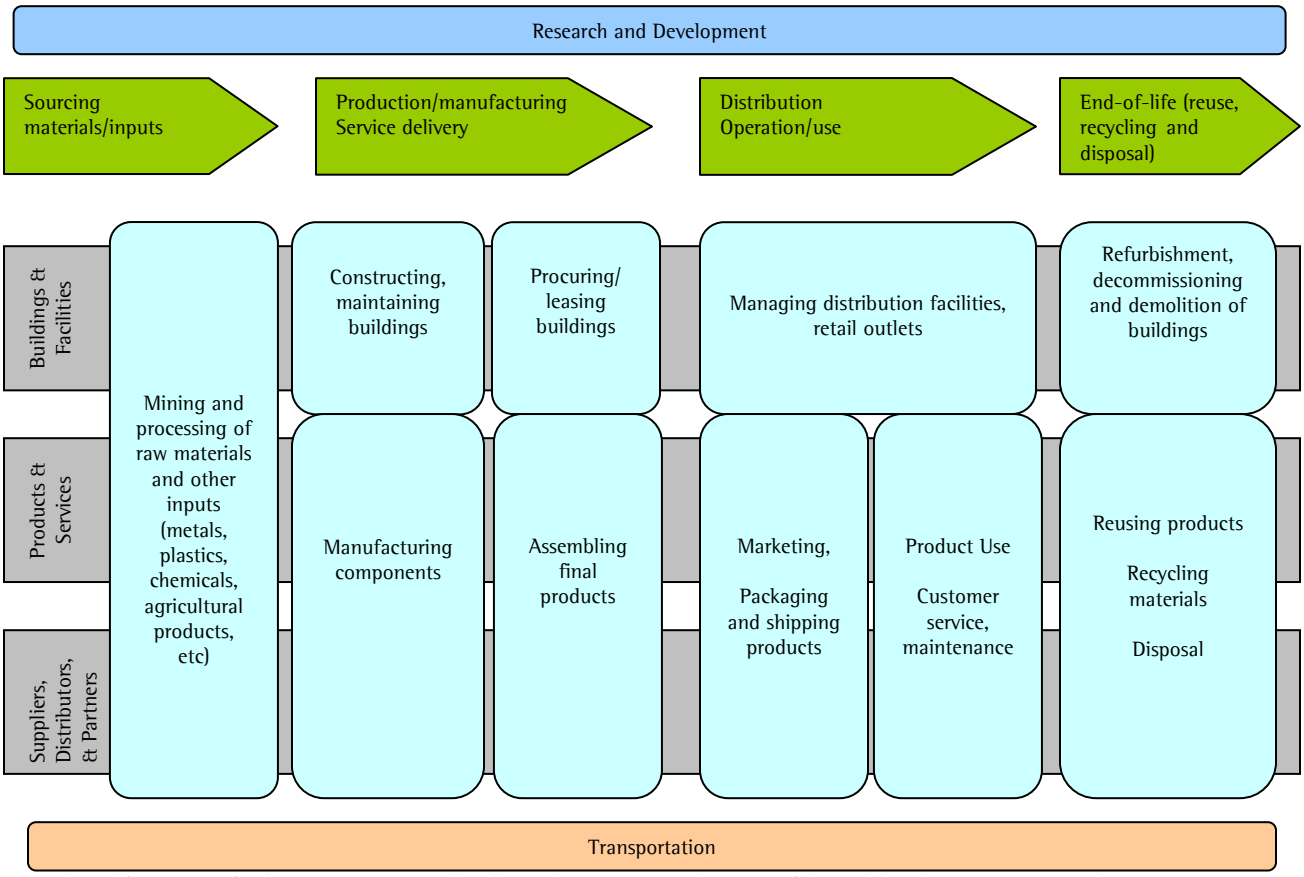
Step 1: Conduct a Comprehensive "Water Footprint"

In order for companies to accurately assess risks and opportunities associated with their water issues, a logical first step is to conduct a "water footprint" investigation to fully understand current water use and wastewater discharges throughout the business.[xiv] A thorough assessment of a company's global water footprint will provide the basis for:

- Assessing relative risks
- Prioritizing management efforts
- Setting strategic goals
- Evaluating progress

Ideally, this footprint should include not only direct operations, but also downstream supply chains as well as upstream product use and disposal stages. Understanding water use "beyond the fence line" can be highly material to industries with significant "product embedded water" or disposal concerns. Therefore, a full water footprint would include water impacts associated with each of the following categories below (see Figure 5).

Figure 5: Value Chain Categories for a Generic Industry Sector



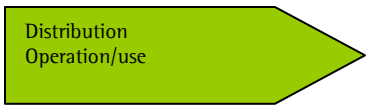
Adapted from Forum for the Future. 2006. "Earth Calling: The Environmental Impacts of the Mobile Telecommunications Industry."

Sourcing materials/inputs

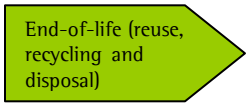
- What are the primary inputs to a company's goods and services?
- Does the production, transportation, or storage of these primary inputs either require, or affect, water in any significant way?
- Are there input substitutes that reduce these water-related impacts?

Production/manufacturing Service delivery

- Does water used in production (or production of component parts) come from sustainable/renewable sources?
- Are there other local users that rely on these same sources?
- Are legal issues associated with water access clear and resolved?
- Do water discharges generated during production activities result in water-quality impacts through deposition?
- Are there national or regional water discharge standards that must be met? If not, does the company have a standardized policy on its discharges?



- What are water-related impacts associated with various packaging materials?
- Does the potential for spills exist during product transportation or distribution (e.g., product or other spills from tankers, truck, and rail)?
- Is a significant amount of water needed to use the product/service? What approaches are available to reduce the amount of water required to produce the same product or service?
- Does customer use, misuse, or storage of the product/service affect water quality?



- Is a significant amount of water required to dispose of or recycle the company's products?
- Do its products (or product components or residuals) end up in surface or ground water following use?
- Does disposal of the business' products have the potential to contaminate surface or ground water via leaching or run-off when disposed in landfills?

When quantifying its footprint, a company may want to consider the following key water measurements and performance indicators:

Water Use and Discharge

Global Reporting Initiative indicators:

- ✓ Total volume of water withdrawn by source
- ✓ Volume and rate of water reuse and recycling
- ✓ Total water effluent discharges by quality and disposal method

Also recommended:

- ✓ Breakdown of water use by purpose (e.g., ingredient, cooling, heating, washing, etc.), life-cycle stages, business functions (e.g., R&D, Management/Sales, Production etc.), business units, and geographic region or country

Impacts on Community and Environment

Global Reporting Initiative indicators:

- ✓ Water bodies and related habitats significantly affected by discharges of water and runoff
- ✓ Water sources significantly affected by withdrawal of water

Also recommended:

- ✓ Annual withdrawal of ground and surface water as a percentage of available water from local water sources

Step 2: Assess Water-Related Risks

Understanding the water-related risks for a particular industry and company is most useful when it is done simultaneously with the water footprint exercise described above.

Risks associated with the following should be identified:
1) Local hydrological conditions
2) Socio-economic conditions in production regions or key consumer markets
3) Business impacts on defined water resources

One of the most significant characteristics of water-related risks is that the impacts of companies' water use vary depending on local hydrological, social, economic and political factors. In other words, one unit of water is not equal to another unit. The same amount of water withdrawn in an arid urban area versus a rural wet region has completely different impacts and associated risks.

Box 6: Water Risks in the Supply Chain – The Case of Anheuser-Busch

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 U.S. 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 highly dependent on water for power generation, created intense short-term competition for limited freshwater resources. The reduced allocation of water for irrigation in Idaho resulted in lower barley yields, 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.

Source: Global Environmental Management Initiative (GEMI). 2002. "Connecting the Drops Toward Creative Water Strategies."

Therefore, on a regionally-specific basis, and at a minimum for key areas of operation and sourcing, companies will need to consider:

- ✓ Potential shortage risks
- ✓ Potential flooding risks
- ✓ Trends in regional demand
- ✓ Deficiencies in institutional or political "water governance" capacity
- ✓ Disparities or inequities in local and regional water access and pricing
- ✓ Impacts of the company's water use and waste runoff on the local community and surrounding ecosystems

Box 7: Assessing Water Risk – The Case of Nestlé

Nestlé reports that it conducts hydro-geological assessments of their bottled water sites, and monitors source water quality and other environmental conditions and parameters including water levels, spring flow, and rainfall data.

Source: Nestlé. 2003. "Nestlé and Water: Sustainability, Protection, Stewardship."

Such an analysis of relative water conditions around a company's facilities and throughout its value chain can offer advanced warning of where problems may arise, and consequently, where priority actions can be taken.

Finally, although companies' water risks will vary significantly depending on their business sector and regions of operation, the water resource trends and issues described in Section I are likely to become increasingly widespread in coming years. In addition, during a company's "water footprint" and relevant risk assessment, the use of appropriate benchmarks and external data can provide background and allow for comparisons among facilities, companies and industries. Appendix A provides a few sources of environmental--specifically water-related--data and methods for developing benchmarks, indicators, or indices.

Box 8: Useful Water Risk Assessment Tools

While some large corporations have developed company-specific water risk assessment tools and management systems, there are also several publicly available tools to help companies conduct water risk assessments and develop sustainable water management strategies. These include:

Water Sustainability Tools by the Global Environmental Management Initiative (GEMI)

- *Connecting the Drops Toward Creative Water Strategies* is designed to help companies create a corporate-level water management strategy by laying out five management stages businesses can follow to develop and implement water strategy, which include:
  - Assessment of water use and its impact to water sources
  - Identification and assessment of business risks linked to the water use and impact, respectively.
- *Connecting the Drops: A Water Sustainability Planner* provides detailed guidance for assessing water-use-related business risks at the facility level. It does so with step-by-step instructions on how to assess water use inventories, including:
  - Water quality and quantity used for various purposes and processes
  - Losses of water to land and air
  - Water effluent discharges.

Global Water Tool by the World Business Council on Sustainable Development

- Web-based software tool for companies with global operations and extended supply-chains to assess their water use and risks associated with water availability by:
  - Directly comparing the water use of their facilities and suppliers (including staff, industrial and supply chain use) with water and sanitation availability databases at both the country and watershed levels, and thus
  - Helping companies identify the number and location of sites and suppliers that face greater water availability risks.
- It also contains the UN's water availability prediction for 2025, enabling users to assess both current and future risks. The tool focuses on water availability-related risks, and does not provide assessments for risks associated with the quality of water supply or wastewater discharges.

Prioritize issues and chart a course for the future

Step 3: Prioritize Issues and Chart a Course for the Future

Establishing Corporate Water Policy, Strategic Goals, and Management Plans

A corporate water policy is an essential instrument for guiding decisions throughout a business, and for communicating practices and expectations to suppliers, partners, and other stakeholders. The water policy can include a statement of the business' high-level commitments related to water management, including:

- Why water is important for the business, and to what degree
- How water is used
- How the business' activities impact water resources
- What challenges the business faces in water management

Closely tracking local water conditions, including hydrological, social, economic, and political factors, can give companies room to plan for a wide range of scenarios. Quantifiable goals and targets for water-use efficiency and conservation should be set to minimize water impacts and other associated water-related risks. For water-scarce or high-risk regions and key areas of operation and sourcing, contingency plans can be developed to respond to risks such as decreasing water quality, higher water prices, extreme hydrologic events, and local economic development.

The following guidelines for the development of a water management plan can help identify and prioritize specific measures, and establish implementation schedules:

a. Affirm top management commitment by emphasizing the positive potential for the bottom line.

b. Finalize a set of initial priorities and goals for the program.

c. Consult water suppliers, industry associations, and regulatory agencies for guidance, examples of best management practices, technical assistance or financial incentives, and information about applicable regulations.

d. Form a water team staffed by representatives of every business function that uses water or that has the potential to pollute water.

e. Create a water management program and develop tasks and measures based on the water footprint and impact assessments.

f. Communicate water management objectives to employees and external stakeholders and invite feedback.

Companies may also wish to consider applying full-cost accounting[xv] to evaluate and compare potential water strategies and management measures. Full-cost accounting is based on a life-cycle approach, and aims to identify and quantify all internal and external environmental and social costs associated with certain business decisions or activities. Companies can use full-cost accounting to measure the "true cost" of their water use and discharges, in order to incorporate water factors into their overall business strategy and decision making. Although there is no standardized method for full-cost accounting for water, some water-related issues companies could consider quantifying include:

Direct costs

- Water use and wastewater discharge fees
- Pretreatment technology
- Energy cost associated with water use (heating, pumping, water treatment etc.)
- Regulatory cost (permits, compliance assessment, etc.)
- Cost for water management measures (staff time and resources, technology, equipment and materials)

Indirect costs

- Disruption of service
- Site location limitations
- License to operate or grow (marginal cost for capacity expansion)
- Relationships with stakeholders (suppliers, financial institutions, employees, regulators, customers, shareholders, neighbors and local communities)
- Health of employees and neighbors
- Loss or damage of ecosystem/species

Box 9: Water Conservation Calculated Savings – Corporate Examples

- BMW conducted a Sustainable Value project, which calculated the savings from water conservation measured by profit per cubic meter use and compared it against 16 other automobile manufacturers.
- PepsiCo uses a Capital Expenditure Filter that ensures that sustainability issues, including water, are formally considered in all major capital expenditure proposals.
- Kirin uses an environmental accounting program to measure the impact of water use in business and the financial benefits derived from water-conservation projects.
- Merck is developing a methodology to assign a cost structure to water that reflects its true value.
- Merck and several others also mention the connection between water use and energy, and plan to factor water information in energy use management.

Sources: BMW Group Sustainable Value Report 2005/2006; PepsiCo Annual Report 2005; The Kirin Group CSR Report 2006; Merck & Co. Inc Corporate Responsibility 2004-2005 Report.

Using Stakeholder Input in Strategic Planning

During the strategic planning process, corporate decision-makers can benefit from communicating what was learned in the water footprint and risk assessment in order to gain valuable feedback from investors, customers, local communities, and other key stakeholders. Through an early and proactive involvement with concerned stakeholders, companies can better anticipate and respond to emerging issues and expectations, such as competing water demands by local communities or industry, or local concerns over wastewater discharge. Open discussions with water providers and local communities can be an important factor in preventing or reducing the risk of future water-related disputes or disruptions. Such discussions can also identify pivotal inputs to help guide priority areas for action. In addition, these consultations are a useful tool for engaging employees across the enterprise in supporting water programs.

Communities often feel very strongly about the use of local water resources. As a result, transparent discussions with local communities are vital to good business planning. Although public participation in local water policy has been limited in the past, civil society representatives and non-governmental organizations now play increasingly important roles in defining water policy along with the affected communities. In instances where a company plays a large role in a community or is a substantial water user, developing early and ongoing ties with local groups can prevent or reduce the risks of future water-related disputes. 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 the loss of a company's license to operate. Should a business pursue proactive efforts to improve water quality or water availability, those efforts may help build positive relations with regional stakeholders through direct participation in developing local water systems, the provision of funds or appropriate technology, education, or water resource planning.

IV. Phase II -- Implementation and Innovation

Once companies have designed water policies and goals based on their water footprint and associated risks, an action plan can be initiated to implement efficiency, reuse, innovations, partnerships, and investments around water. Key areas for implementation and innovation include:

Step 1. Identify process and product innovations
Step 2. Invest in water-related environmental services
Step 3. Integrate corporate goals with policy advocacy and multi-stakeholder initiatives

Step 1. Identify Process and Product Innovations

Process and product innovations can be grouped into the following categories:

a. Decrease water use and impacts
b. Increase water recycling and reuse
c. Manage priority supply chain issues
d. Design of "water-savvy" products

Step 1a) Decrease Water Use and Impacts

For many companies, a logical first step to implementing a corporate water strategy involves minimizing the range of impacts in their water footprint by conserving and recycling water, as well as managing water quality by reducing wastewater discharges and pre-treating discharged water. Typically, a water strategy starts with management programs focused on internal operations, which can eventually be broadened across a company's value chain. Companies also have an opportunity to identify supply inputs that may be water-intensive or detrimental to water quality.

Cost-effective water conservation and efficiency measures can pay for themselves in the form of reduced utility and energy bills. These financial savings are often the most obvious reason to justify the many changes required to conserve water, but there are additional intangible benefits to making water-wise changes:

- ***High visibility*** – Such measures demonstrate an organization's commitment to using water responsibly, which can boost an organization's public image.
- ***Ease of implementation*** – Water efficiency measures can be quickly enacted, and are a good way to demonstrate that a company is serious about conserving a scarce environmental resource.
- ***Employee and public goodwill*** – Implementing water efficiency measures suggested by employees and local interests generates goodwill and positive relations with the communities where organizations do business.

There are various ways to "slice" a company's approach to increasing water efficiency and reuse. One useful categorization is the following:

- Hardware Solutions: Monitor all water use; replace high-flow fixtures with water efficient versions; replace water-intensive processes.
- Operational Solutions: Implement regular water "audit" programs; find alternatives to using water for operational tasks; institute a regular leak inspection and repair program; find ways to re-circulate and use water multiple times; set and report on targets.
- Employee Solutions: Educate and encourage employees to conserve water and report leaks.

Using this categorization, a number of relatively simple, low-cost actions can be combined to create significant water conservation results, as laid out in the table of examples below.

Table 1: Selected Examples of Low-Cost Water Efficiency Measures

Value Chain Category	Hardware	Operational	Employee
Manufacturing	Install water meters where water is being used	Automatically shut off water flow at end of production cycle	Survey the water pressure at specific places throughout a site
	Install "sub-meters for sub-processes and specific pieces of equipment	Automatically shut off water flow at end of employee shift	Work with local water utility to measure water pressure at key delivery and usage points
	Install separate water meters for large operations	Install flow restrictions to ensure specified flow throughout a range of water pressures	Review historical water usage for your facility. Analyzing several years of consumption data will often identify leaks or other process inefficiencies
	Install temperature control valves		
	Identify water-efficient alternatives for production		
	Explore and implement more efficient cooling systems that use less, or recycled, water		
Packaging, Distribution, Marketing/Sales	Install water efficient fixtures such as toilets, faucet and showerheads	Implement leak detection and repair program in the following areas:	Communicate leaks to maintenance team
		Restroom and shower facilities	Alternatives to water-powered cleaning (e.g., Use broom rather than water to clean sidewalk)
		Kitchens and food prep areas	Implement employee conservation suggestions (e.g., Hold water conservation meetings, place water-related
		Wash-down areas	

		Water fountains	notices on bulletin boards)
		Water delivery devices	
		Landscape irrigation systems	
		Convert restroom sinks to cold water only	
Consumer Operation / Use		Use water efficiency labeling where possible	Encourage consumers to wash fabrics in cold water
Product end-of-life		Perform water-leach test on products to determine leaching potential	

Source: Adapted from North Carolina Department of Natural Resources, 1998, and New Mexico Office of the State Engineer, 1999. Actual savings opportunity will depend on the goods and services being produced, the processes being used to produce them, the cost of water and energy, and other factors.

Production and manufacturing processes often provide opportunities for improvements in areas that use the most "expensive" water (water that requires pre-use treatment, heating or cooling, and predisposal treatment). Such investments may include replacing outdated equipment, making modifications to existing equipment, establishing more efficient operational procedures, and exploring new processes and procedures that use significantly less water without negatively affecting production and/or service quality.

Box 10: Water Conservation and Energy Efficiency --The Case of Unilever

Water conservation and efficiency measures can also reduce a facility's energy consumption. At Unilever's margarine and vegetable-oil products plant in Rexdale, Ontario, energy expenditures represent 15 percent of all production costs. Unilever's Energy Team focused on the total cost of purchasing and treating municipal water used to produce 218 million pounds of steam used by the plant each year. A reverse osmosis system was put in place to replace the water softeners used to treat municipal water. The system not only softens and purifies the municipal water, but also recycles process water captured throughout the plant. This significantly reduces the consumption of municipal water, which in turn affects the facility's energy consumption. Unilever calculated that the reverse osmosis system resulted in 1.6 million fewer kilograms of CO2 production.

Source: McDermott, Kerry. 2006. "RO System Helps Unilever Reduce Water Usage." *Water & Wastewater International*, August 10, 2006.

Water efficiency measures within production processes also frequently result in *energy savings*. With rising water and sewer rates, as well as increasing prices for the energy required to heat water for many industrial processes, facility managers can reduce both operating costs and environmental impacts through an energy-efficiency program that includes a focus on water management (see Box 10 on Unilever).

An often overlooked area is buildings. In the U.S., buildings account for 12 percent of potable water consumption.[xvi] According to the American Institute for Architecture, incorporating water efficiency methods in commercial buildings can cost-effectively reduce water usage by 30 percent or more, a conclusion supported by a comprehensive assessment of urban water efficiency potential in California[xvii] (see Box 11).

Box 11: Water Efficiency in Facilities

A federal facility in Maryland developed and implemented a water conservation program that reduced annual water consumption by more than 1.6 million gallons, an 18.6 percent decrease from the previous year through actions that included: reduction in lawn watering schedule, installation of water efficiency devices in restrooms, upgrading of valves on heat exchangers, regularly scheduled leak inspections, and installation of submeters in cooling towers.

Source: US General Services Administration. 1992. "Water Management Guide."

Water use may also be high in outdoor areas, including water used for landscaping. Because this water use is often ornamental, or not critical for production, the potential for savings is significant. Advancements in landscape design and maintenance technologies have made the upkeep of healthy, efficient landscapes both simple and cost-effective, so today's facility managers have many choices as to how to meet both landscaping needs and water reduction goals (see Table 2).

Table 2: Water Efficiency Measures for Landscaping

Category	Hardware	Operational	Employee
Efficient landscape watering	Install rain/moisture sensors to turn irrigation system off during rainfall.	Reduce or eliminate area of turf grass; increase area of native low-water using plants. Adjust sprinkler heads to ensure only plants are watered, not pavement.	Avoid landscape fertilizing and pruning that stimulates excessive growth.
	Use hose nozzles that automatically shut off when not in use.	Water during early morning hours to reduce evaporation.	Inspect nozzles regularly for clogging.
	Use a rain gauge or soil moisture monitor to determine when to water.	Collect rainwater for irrigation.	Establish a monthly budget based on plant water needs.
		Water in several short sessions rather than one long one.	
		Consider drip irrigation for plant beds.	

Source: Adapted from www.irrigation.org, available at http://www.irrigation.org/Rsrcs/default.aspx?pg=consumer_info.htm&id=140.

Step 1b) Increase Water Recycling / Reuse

Businesses can also engage in proactive measures for managing water quality through providing adequate wastewater collection, treatment, and disposal, and by monitoring activities that might create water quality problems. The reuse of wastewater has an important role to play in managing water resources, particularly in reducing the potential impacts of the discharge of pollutants into water sources, and reducing the demand on supplies of potable water. Operations that are adjacent to, and/or drain to natural waterways--marine environments, wetlands, rivers, creeks and fish habitats--can reuse water in order to reduce impacts on the surrounding environment.

Recycling water involves using water previously employed for one purpose in another application, before it reaches a natural waterway or aquifer. By using water several times, industries can increase the productivity of each gallon of water consumed (see Box 12 on NUMMI) and minimize the pollution of stormwater.

Box 12: Water Recycling at NUMMI

"New United Motors (NUMMI), a joint venture of General Motors and Toyota Motor Company, initiated two water recycling projects at its Fremont, CA plant. For one project, the company installed re-circulating pumps in the evaporative air conditioning systems which reused 170,000 gallons of water daily. For the second project, NUMMI set up a system for recycling water used in the wet sanding process, conserving 100,000 gallons of water daily. From a financial point of view, the company realized a return on the $400,000 investment in a little over one year."

Source: Alameda County Waste Management Authority. 2007. Available at http://www.stopwaste.org/home/index.asp?page=263.

Table 3: Examples of Water Reuse and Recycling

Category	Hardware	Operational	Employee
Manufacturing	Install chiller systems consisting of compressor, condenser, evaporator pump, and temperature controller to re-circulate temperature-controlled fluid	Install flow restrictions to ensure specified flow throughout a range of water pressures	
		Water used for heat transfer can be pumped into holding tanks and used in other processes	
	Work with water agency to provide access to recycled water for appropriate purposes.	Waste water from one process can be reused for another with less exacting water requirements	
		Identify places where water can be used sequentially	
		Use dry processes to replace wet processes	

		"High value" water, such as deionized water, can be treated and reused	
Packaging, distribution, marketing/sales	Install gray water systems to reuse water for landscapes or flushing toilets		

In general, process optimization means more than just investing in new equipment and technology. A facility manager's task is to develop a comprehensive, cost-effective design and operating program that optimizes water usage, recycling, and discharge during production processes. Such programs generally focus on process water reuse and recycling in conjunction with improving the efficiency of production processes. These programs will differ among industries, as opportunities for water savings and pollution reduction are highly industry-specific. Appendix B highlights areas of water reuse in cooling towers, equipment cooling and rinsing, and alternative water sources.

Step 1c) Manage Priority Supply Chain Issues

Many companies' direct water use typically pales in comparison with the water impacts embedded within their supply chains. 'Embedded water', also referred to as 'virtual water' or 'embodied water', refers to the amount of water required to produce a good from start to finish. Though the term is most commonly used in reference to agricultural products, it can be applied to non-agricultural products as well. For example, a single bed sheet has on average 9,750 liters of water embedded, while a 1.1ton passenger car has about 400,000 liters embedded in its process.[xviii]

A company's strategic water plan should also address managing water quality and increasing water efficiency in the processing and sourcing of raw materials and other inputs. Supply chains have evolved into complex networks of various stakeholders; this fragmentation and increased outsourcing creates an intricate set of challenges for managing water resources. Comprehensive water stewardship can begin with supply managers evolving internal water initiatives into programs that include suppliers, business partners, and customers.

Box 13: Supply Chain Prioritization

Honeywell's Albuquerque, NM plant assembles thermostats, building controls, and commercial burner and boiler controls. In 1994 water consumption at the plant was 8 million gallons a year. Due in large part to Honeywell requiring its circuit board manufacturer to supply cleaner boards, the company eliminated the need for process water completely. One year later the company's water consumption dropped to 3 million gallons a year, a 63 percent reduction.

Source: New Mexico Office of the State Engineer. 1999. "A Water Conservation Guide for Commercial, Institutional and Industrial Users." Available at http://www.ose.state.nm.us/water-info/conservation/pdf-manuals/cii-users-guide.pdf.

Understanding the extent and structure of a supply chain is the first step in understanding how to leverage it. Whether organizations are seeking energy, water, or process efficiencies, training and support along the supply chain is an important factor in successful supply chain management. Suppliers need time and encouragement to align their practices with the company's sustainable water management goals.

Table 4: Selected Examples of Water Management in the Supply Chain

Extracting raw materials	Hardware	Operational	Employee
Water Conservation Measures	Install meters to monitor water withdrawals, use, and discharge.	Develop alternatives for recycling water	Monitor wastewater discharges
	Evaluate technological options for reducing water associated with materials extraction or production.	Limit surges in water pressure	Monitor unaccounted water
	Install leak noise detector		
Water Reuse and Recycling	Install water meters on process loops	Review operations to identify options for changes in process.	Monitor potable and waste water meters regularly and discuss results at production meetings

Step 1d) Design of "Water-Savvy" Products

Sustainable design, and in this case the design of "water-savvy" products, is an emerging area of opportunity in a world facing water constraints. A design team can either start by assessing the primary water impacts of a given product life cycle, or design a product from scratch with an eye towards optimizing water-related sustainability metrics.

The first approach generally involves life cycle analysis (LCA) to identify where in the cycle--from raw material and manufacture to use and disposal--water plays the biggest role. For example, detergent manufacturers identified the consumer-use stage as the part of the cycle with the highest level of water consumption. In response, starting in September 2007, Proctor & Gamble will switch all of its liquid detergents to a compact formula, which will be better for the retailer, the consumer, and a better overall choice for the environment. Similarly, Unilever's All Small & Mighty brand detergent uses 74 percent less water than regular detergents. The new concentrated formulas use up to 44 percent less water, as well as less packaging.[xix]

The second approach can be useful for replacing out-dated water-intensive products or to corner the emerging market in water filtration, purification and conservation products (see Box 14 on PAX Scientific). These advanced water treatment technologies are aimed at reducing stress placed on current water supplies, as well as overall consumption, energy use, and costs associated with creating and recycling water.

Box 14: Emerging Markets in Water Technologies

Municipal drinking water is often stored in large holding tanks while the water is in transit for distribution. The temperature of water held in these tanks, which can often hold one million gallons or more, stratifies according to weather conditions, lowering water quality. PAX Scientific has developed a self-contained, floating mixing unit that works inside a one-million gallon holding tank that reduces stratification in a short period of time using a minimal amount of energy.

Source: PAX Water Technologies. 2006. "A Case for Potable Water Mixing Using the PAX Water Mixer."

Experts in the field of venture capitalism and entrepreneurship are suggesting that water will see an increase in technology breakthroughs and investments in the next 3 to 5 years. From an investor perspective, increasing water scarcity and the challenges of a sustainable water future present a high potential for growth as well as business opportunities in sectors related to water. According to data from the Cleantech Network, from 2004 to the first quarter of 2007, 71 deals in water and wastewater treatment have been made, totaling almost $303 million.[xx] Specifically, Atlantium, a developer of water disinfection solutions in Israel, received two rounds of funding worth $27 million, while MIOX Corp., a manufacturer of on-site generators for water disinfection in Albuquerque, NM, received venture capital funding worth $30 million.[xxi]

Third, there is a growing number of entirely new processes being developed to use less water. For example, "waterless car wash products" are one example of an innovative product that responds to the needs of urban populations who demand time-saving, space-saving and less resource-intensive products. Similarly, pervious concrete for pavement can address communities' and developers' needs for storm-water runoff while minimizing "heat island effects" in metropolitan areas. Additional benefits include better soil infiltration, increased groundwater recharge, reduction in runoff volume and storm-water treatment for pollutants.[xxii]

Multinationals are also innovating for water conservation. For example, in 2006, GE established a global research and development center in Singapore for its Water & Process Technologies group, which will build on earlier successes in reverse osmosis membrane and other technologies for water purification and filtration.

The ideas captured here represent some examples of water efficiency and management of water quality. In addition to mitigating risks and adding value through investments for better water management, proactive companies should determine how best to restore and replenish the natural systems that provide water for their operations.

Step 2. Invest in Water-Related Environmental Services

Healthy, well-functioning environmental systems are now a key component of both overall water policy and corporate water risks. Yet few companies have made any significant progress in either understanding local ecosystem water needs or functions, or in formally committing to protect and guarantee those needs.

Until recently, most enterprises have taken these services for granted as fixtures of the operating environment. Business people have largely assumed that there will be sufficient clean water for operations; that raw materials will continue to flow in predictable patterns; that transport will not be unduly interrupted by extreme weather; and that workers will have healthy air to breathe and clean water to drink. However, the most far-reaching ecological study ever undertaken by over 1,300 scientists around the world—the Millennium Ecosystem Assessment—found that 60 to 70 percent of these resources are being degraded faster than they can recover.[xxiii] Given these findings, the question arises of how companies can assure the continuity of such functions for sustained business operations, particularly regarding ecological systems linked to water availability, quantity, and quality.

We recommend considering the following three steps:

a. Assess the market potential
b. Operationalize ecological restoration
c. Identify investment opportunities in watershed services

Step 2a) Assess the Market Potential

For years, there was no easy way to invest in the maintenance and restoration of environmental services, nor much incentive for businesses to do so. Over the past decade, however, numerous options have emerged, ranging from purely regulatory constraints on water withdrawals, to more sophisticated multi-million dollar markets in environmental services, including those related to wetlands and water pollution. Some background on water-related markets is presented in Table 5.

Table 5: Illustrative Examples of Water-Related Markets (or "Payments for Watershed Services")

Regulated / Compliance Markets	• ***U.S. EPA Water Quality Trading*** (http://www.epa.gov/owow/watershed/trading.htm) • ***U.S. Clean Water Act Wetlands Mitigation Banking*** (http://www.epa.gov/owow/wetlands/facts/fact16.html) • ***U.S.' State Nutrient Trading Programs (Pennsylvania, Oregon, etc.)*** (http://www.envtn.org/wqt/stateprograms_page.html) • ***Mexico's Payments for Hydrological Services (PSA-H, 2003)*** (http://www.ine.gob.mx/dgipea/download/draft_ecological_economics.pdf) • ***Australian State Forests of New South Wales' reduction of water salinity program***, where water transpiration credits earned by State Forests for reforestation are sold to irrigators for $40/ha per year for 10 years and revenues are used to reforest private and public lands[xxiv] (http://www.napswq.gov.au/publications/bilaterals/nsw/pubs/nsw-bilateral.pdf)

Voluntary / Self-Organized Payments for Watershed Services	• ***Perrier Vittel*** pays upland farmers for specific practices to maintain water quality • ***New York City*** paying upland farmers to maintain water quality and quantity • ***A Beer Company, Municipal Water Company, and Electric Power Company*** pay $1.7 million for upstream conservation in Quito, Ecuador

Market mechanisms addressing water issues are growing in the same way that any market does, in response to a generally recognized need. For example, in the case of 'payments for watershed services,' companies in need of reliable flows of clean water have entered into private deals to pay upstream landowners to change their land management practices — both agricultural and forestry — around rivers to ensure less sediment, establish more plant cover on river banks, and thus enable more reliable flows. The case of New York City entering into an agreement with upstream farmers rather than building another water treatment plant is a well-known example of a municipality investing in ecosystem protection to maintain a high-quality product.

Some bottled water companies are also recognizing the economic role that watersheds play in protecting their commercial product. Nestlé Waters has made arrangements in some regions with neighboring landowners to protect watersheds and sensitive areas crucial to keeping its product quality high (see case below). In China, some corporations are calling for upstream water quality and ecosystem protections in order to improve the quality of downstream supplies. In all of these cases it can make more sense to invest in ecological restoration rather than technological solutions to address either shortages or quality problems.[xxv] Sometimes, formal markets may emerge, such as those related to wetlands mitigation banking in the U.S., which offer another kind of market in water quality.[xxvi]

Opportunities exist for companies to become 'sellers' of environmental services and in the process turn liabilities into assets while deriving new revenues. They can also become 'buyers' of environmental services, using cost-effective approaches to water-related challenges. Emerging environmental markets are bringing these elements together in ways that hold promise for companies to become restorers of ecological systems—and to provide the operational infrastructure that functioning ecosystems represent for businesses and communities alike.

This convergence means that ecological protection and restoration of aquatic systems is becoming central to corporate strategy, particularly for companies with large land holdings and/or reliance on direct access to clean, substantial water resources.

Step 2b) Operationalize Ecological Restoration

Because these opportunities are emergent, markets are fragmented and vary from region to region. It can be arduous to identify the best opportunities, assemble the parties, draft the contractual language, broker the trade, and cash in on credits and incentives.

To begin the process, companies are well advised to first 'audit' their own properties to understand exactly what ecological services are being produced on those lands or in those aquatic systems. While this task is not technically complex—given remote sensing technologies that can be effectively coupled with field data sampling—it is detail oriented and can be resource intensive. Many companies are already aware of whether or not their properties include 'ecological hotspots' and key conservation areas, but this information should be confirmed to identify potential 'high [conservation] value' properties that may be more desirable within the context of environmental markets. Once a company's ecological holdings are clear, then consultations with environmental

markets experts or key regulatory agencies will assist in identifying potential funding sources for restored areas as well as the most promising sites. Finally, long-term plans for management are often required within these markets and are, therefore, worth careful advance thought and planning.

Despite the many steps and challenges, some adventurous corporate leaders are already in the game. For example, from Goldman Sachs to DuPont to Yahoo!, global companies are stepping into carbon markets, and in the process are dipping their toes in the environmental markets more generally. Chevron and Perrier Vittel (now Nestlé Waters) have engaged in biodiversity and land use-based environmental markets and payments, as discussed below.

Box 15: Business-to-Business Financed Restoration

Perrier Vittel (now Nestlé Waters) began work in 1989 to reduce nitrate contamination caused by agricultural intensification in the watershed. The company financed upstream farmers to change their farming practices and technology, following four years of research by the French National Agronomic Institute on the relationship between farming practices and the nitrate levels in the aquifer, as well as new practices that lead to desired reductions in nitrate levels. In 1992, Vittel created Agrivair, an intermediary responsible for negotiating and implementing the program. By 2004, the program was deemed a success with all 26 farms in the key areas adopting new farming systems designed to protect 92 percent of the sub-basin in the watershed.

Source: Daniele Perrot-Maitre. 2006. "The Vittel payments for environmental services: a "perfect" PES case?" International Institute for Environment and Development, September 2006.

Companies engaging in these environmental markets are supported by brokers, aggregators, and technical experts from a variety of financial and scientific disciplines who are keen to facilitate engagement of the private sector in these environmental markets. This increased institutional capacity and market infrastructure is evolving rapidly, due in large part to the dynamic international policy and business discussions around climate change.

Box 16: Regulation-based Restoration Incentives

Chevron turned a tapped out 7,100 acre property in Paradis, Louisiana into $150 million in wetland mitigation credits. In facing the property, the company considered a variety of options, from building homes to selling the land—all limited by the fact that the property's elevation averaged six feet below sea level and was too weak to support structures. The land could, however, function as a wetland mitigation bank. Turning the land into a mitigation bank has required planting trees and digging culverts, representing relatively low financial outlays. Ecological dividends include ongoing carbon sequestration within trees, mitigation of flooding risks, and filtration of pollutants through wetlands. And the restored, enhanced and created wetlands are expected to retain two-to-three weeks worth of rainwater, taking pressure off the local drainage board's pumping stations.

Source: Kenney, Alice. 2006. "Chevron Opens Mitigation Bank in Paradis(e)," Ecosystem Marketplace, March 30, 2006.

Step 2c) Identify Investment Opportunities in Watershed Services

The most active areas of regulation-based restoration are mitigation banks in the U.S. The mitigation bank concept was codified by the federal Clean Water Act, which requires that builders replace as many wetlands as they destroy through such a 'banking' process. Developers building on wetlands can buy credits, or shares, in mitigation banks located in the same watershed to offset the ecological damage they cause. Wetland mitigation banking began in the early 1990s and there are now more than 450 approved banks throughout the U.S. and an additional 198 in the proposal stage. Between 20 and 30 percent of them are backed by large corporations, such as Chevron,

Tenneco and Florida Power and Light. The lesson from Chevron (see Box 16) is clear: banking on functioning ecological systems can pay dividends and avoid dead end real estate investments, or worse, liabilities.

Align corporate goals with policy advocacy + multi-stakeholder initiatives

Step 3. Align Corporate Goals with Policy Advocacy and Multi-Stakeholder Initiatives

Because water is a shared resource, water management practices can be a sensitive social, cultural and environmental issue, particularly in times of drought and water restrictions. Companies can rarely achieve the best water management outcomes on their own. Most solutions to water supply, quality and sanitation issues require an adaptive co-management approach.

Yet while there is increasing momentum around managing water quality and water conservation activities, there is little discussion on how companies can gain competitive advantage through organizational alignment of their corporate water strategies with public policy goals and multi-stakeholder initiatives.

This section will highlight ways that companies can integrate their corporate water goals with public policy and stakeholder initiatives, through:

a. Collaborations with other businesses
b. Collaborations with communities and NGOs
c. Collaborations with government agencies

There is no single approach to integrating corporate water policies with public policy goals and stakeholder concerns, but the following strategies can help guide an organization through prioritizing water policy actions.

Step 3a) Collaborations with Other Businesses

Partnerships within and outside a company's given industry offer tremendous opportunity to develop interdisciplinary, cost-effective solutions to the complex water challenges facing the world today. Industry collaboration promotes good conduct and water stewardship, sound management practices, and provides shared resources to assist members in dealing with a wide range of issues, from managing priority supply chain issues to engaging with local communities (see Box 17).

Box 17: Industry Collaboration –The CEO Water Mandate

On July 5, 2007 the CEOs of six global corporations (The Coca-Cola Company, Levi Strauss, Laeckerby Water Group, Nestle, SAB Miller and SUEZ) launched The CEO Water Mandate at the Global Compact Leaders Summit in Geneva.

The Mandate is both a call to action and a strategic framework for companies seeking to address the issue of water sustainability in their operations and supply chains. It is designed to assist companies in developing a comprehensive approach to water management in six key areas:

- Direct Operations
- Supply Chain and Watershed Management
- Collective Action
- Public Policy
- Community Engagement
- Transparency

This new water initiative is one of the two environmental programs at the Global Compact along with climate change. It is open to all participating companies of the Global Compact, and aims to assist the endorsing companies through policy dialogues, facilitation with respect to partnerships, and the dissemination of existing and new tools as well as other resources.

Source: UN Global Compact, 2007.

Step 3b) Collaborations with Communities and NGOs

Community-based organizations and NGOs can provide a forum to ensure that local perspectives and knowledge are incorporated into water policies and programs. Local actors are often best positioned to note changes in the ecosystems around them. NGOs frequently represent the needs of marginalized and vulnerable populations, and can both complement and supplement the efforts of companies to establish an integrated and comprehensive response to water issues (see Box 18).

Box 18: Ethos Water and CARE

Ethos Water is working in partnership with CARE in the Democratic Republic of Congo, financing the construction of a safe water and sanitation infrastructure for the war-ravaged village of Kampene. This alliance ensures that families in the village have access to clean water after years of civil war destroyed water infrastructure in the region.

Source: "Ethos Water Company joins with CARE for water project in Congo." CARE press release, February 9, 2005.

Step 3c) Collaborations with Government Agencies

There are multiple benefits to be gained from aligning corporate water strategies with local, regional, and national water agencies. Participation in government programs that encourage partnerships in water quality management can mean fewer regulations and stronger relationships with water quality governing bodies.

For example, Philip Morris hosted a USA Water Strategy Forum to focus on water use in its activities at its manufacturing centers and at its Richmond, Virginia headquarters, where it owns and operates a wastewater treatment plant. This third-party facilitator-led forum included representatives

from state and federal agencies, regional and national NGOs, and suppliers. The goal of the forum was to look for ways the company could reduce water consumption and discharges, from the sourcing of raw materials to the disposal of its products. Philip Morris learned that its stakeholders were interested in the water practices of U.S. tobacco farmers, and in response initiated the formation of the Good Agricultural Practices program to educate tobacco farmers on how to manage their land and water use.[xxvii]

In addition, partnerships with state and local water utilities can be beneficial for both industry and local government, offering opportunities to minimize demands on local water supplies, save on costs of building effluent treatment plants and to provide communities access to clean water.

Box 19: Business and Local Government Collaboration

Rio Tinto's HIsmelt® project in Western Australia, uses treated wastewater from a nearby effluent plant that would otherwise be discharged to the ocean. HIsmelt®'s partnership with the Western Australian Water Corporation provided the critical base-load demand needed by the Corporation to enable the effluent treatment project to be built. The treated water is of sufficiently high quality to reduce water treatment requirement on the HIsmelt® site. As well as lowering the amount of effluent discharged to the local marine environment, the arrangement will also improve security of water availability for the HIsmelt® project.

Source: "Saving water by running on recycled waste," available at http://www.riotinto.com/ourapproach/217_features_5898.asp.

At the intergovernmental level, avenues for public participation in managing transboundary water resources are essential to ensuring better governance and less conflict among nations. Unfortunately, in many countries the responsibility for managing water is frequently fragmented and overlapping. Numerous international conferences, initiatives, and policy processes are underway that focus on promoting a more sustainable and integrated use and management of water across multiple jurisdictions. These efforts, including some of the business-focused activities mentioned earlier, will make it possible to learn about a wide range of issues relating to water.

Additionally, various UN programs provide data on resources, institutions, and regional public initiatives on water issues, as well as information on regional water agreements and action programs. UNDP's Human Development Report in 2006, for example, offered a wide range of data and background on global freshwater resources, while FAO's Aquastat offers searchable data on water use, water availability, and some industrial and agricultural water challenges (see Appendix A for more information).

Effective management of water offers an occasion to collaborate and establish partnerships that diminish business risks and maximize social and economic returns. An open and transparent approach to such partnerships further enhances trust among stakeholders, and can provide businesses with a platform for dialogue on other issues. As it becomes clear to governments, NGOs and individuals how urgent the world water situation is, local, national and international policy processes and networks focused on water will become much more commonplace. This will provide organizations a greater opportunity to influence and shape a framework for new water technologies and innovations.

V. Conclusions

A strategic water plan will position a company over the longer term to more readily forecast change and respond to challenges.

If executed fully and communicated appropriately,
it will help companies avoid being viewed as competitors with community water users.

If inclusive of employee ideas and new technologies,
it will save money and help inspire neighboring communities to also steward water resources.

If enhanced over time,
it will challenge existing processes and practices and replace them with better alternatives, thereby increasing productivity and reducing pressure on water supplies.

If built into organizational incentives,
it will enable the company to manage water as a key material resource while protecting its social, cultural, environmental and economic values.

If built into conversations with key stakeholders,
it will help to avoid surprise critiques or media exposés.

And if included in public policy advocacy strategies,
it can help to predict future costs, entitlements, and access rights.

There are no simple solutions to our water uncertainties, but there is tremendous potential for a multi-faceted approach that combines efficiency and conservation measures, innovation at the process and product level, and investments in natural systems that replenish and purify water long into the future.

Appendix A: Third Party Data Sets

World Resources Institute's Earthtrends (http://earthtrends.wri.org) is a comprehensive online database, including the following water-related data:

a. Actual Renewable Water Resources: Per capita
b. Actual Renewable Water Resources: Total
c. Agricultural Inputs: Water use intensity
d. Desalination: Desalinated water production
e. Ecosystem Area: Water bodies
f. Freshwater Indices: Water Poverty Index
g. Groundwater Withdrawals: Annual per capita and total
h. Groundwater Withdrawals: By End Use
i. Groundwater Withdrawals: Withdrawals as a percent of annual recharge
j. Industrial Water Pollution: Organic water pollutant (BOD) emissions
k. Internal Renewable Water Resources (IRWR): Per capita and total
l. Internal Renewable Water Resources (IRWR): Surface water produced internally
m. River Flows: Annual river flows to and from other countries
n. Species: Fish species, number threatened
o. Water and Sanitation: Access to an improved water source
p. Water and Sanitation: Access to improved sanitation
q. Water Withdrawals: Annual per capita and total
r. Water Withdrawals: By End Use

Pacific Institute's "The World's Water: The Biennial Report on Freshwater Resources" (www.worldwater.org) includes extensive data sets, including:

a. Total Renewable Freshwater Supply, by Country (2006 Update)
b. Freshwater Withdrawal, by Country and Sector (2006 Update)
c. Access to Safe Drinking Water, by Country, 1970 to 2002 (2006 Update)
d. Access to Sanitation by Country, 1970 to 2002
e. Access to Water Supply and Sanitation by Region, 1990 and 2002
f. Annual Average ODA for Water, by Country, 1990 to 2004 (Total and Per Capita)
g. Twenty Largest Recipients of ODA for Water, 1990 to 2004
h. Twenty Largest Per Capita Recipients of ODA for Water, 1990 to 2004
i. Investment in Water and Sewerage Projects with Private Participation, by Region, in Middle- and Low- Income Countries, 1990-2004
j. Bottled Water Consumption by Country, 1997 to 2004
k. Global Bottled Water Consumption, by Region, 1997 to 2004
l. Per Capita Bottled Water Consumption by Region, 1997 to 2004
m. Per Capita Bottled Water Consumption, by Country, 1999 to 2004
n. Global Cholera Cases and Deaths Reported to the World Health Organization, 1970 to 2004
o. Reported Cases of Dracunculiasis by Country, 1972 to 2005
p. Irrigated Area, by Region, 1961 to 2003
q. Irrigated Area, Developed and Developing Countries, 1961 – 2003
r. The U.S. Water Industry Revenue (2003) and Growth (2004–2006)
s. Pesticide Occurrence in Streams, Groundwater, Fish, and Sediment in the United States
t. Global Desalination Capacity and Plants—January 1, 2005
u. 100 Largest Desalination Plants Planned, in Construction, or in Operation—January 1, 2005

Ecological Footprint (http://www.footprintnetwork.org/gfn_sub.php?content=datamethods) is a resource management tool for measuring how much land and water area a human population requires to produce the resources it consumes and to absorb its wastes under prevailing technology. Among the data available are measures of cropland, grazing land, carbon production, forest use, and more. While water is not adequately integrated into this approach, corporations may find the methodology useful for the evaluation of their own water-related footprints.

Yale Environmental Performance Index (EPI) (http://www.yale.edu/epi/) identifies targets for environmental performance and measures how close countries come to these established goals. The issue-by-issue and aggregate rankings permit cross-country comparisons and might offer a tool for improving policymaking and environmental decision making, particularly related to:

- Reducing environmental stresses on human health
- Protecting ecosystem vitality

United Nations Human Development Report (HDR) (http://hdr.undp.org/hdr2006/statistics/) reviews the state of human well-being, which in 2006 focused on water resources and provided a set of data on water-related development measures by country, similar to the ones shown above for WRI and the Pacific Institute.

Appendix B: Water Reuse and Recycling

This appendix provides detailed information on the four major areas of water reuse:

Cooling Towers – For many facilities, cooling towers represent the single largest opportunity for greater water efficiency. Cooling towers should be investigated to determine how many times water circulates before it is bled off and discharged. Increasing the recycle rate of the tower results in multiple savings, from water and sewer costs to savings on the purchase of chemicals used to treat both incoming and discharged water.

Equipment Cooling – Replace single-pass cooling systems, where water is circulated once through a piece of equipment and then discharged to a sewer, with a process or cooling loop. This loop provides water at a pre-set temperature to cool equipment. When a process loop is not possible, reusing single loop discharge water for irrigation or other non-potable water requirements is another way to increase water efficiency.

Equipment Rinsing and Cleaning – There are many efficient rinsing options for facilities. Counter-current rinsing is typically the most water efficient method for rinsing equipment. In this process, the cleanest water is used only for the final or last stages of a rinse operation; water for early rinsing tasks, when the quality of the water is not as important, can be obtained later in the process. Other efficiency rinsing includes batch processing, when several pieces of equipment are cleaned at the same time, and using rinses from one process in another. Cleaning process equipment can be a significant part of many food, beverage and pharmaceutical companies' manufacturing costs and in some cases can account for as much as 50 to 70 percent of a facility's total water use. As such this presents a tremendous opportunity for water savings.

Alternative Water Sources – Large facilities are good candidates for alternative water sources because they typically use large amounts of non-potable water. Companies may be able to update processes to allow the use of saline and wastewater instead of fresh water. The approach reduces the impact on freshwater resources with subsequent benefits to the local community and the ecosystem. The two most useful 'alternative' water sources for facilities are air-conditioning condensate recovery and rainwater harvesting.

- Condensate recovery: The condensate from air conditioners, dehumidifiers, and refrigeration units can provide facilities with a steady supply of relatively pure water for many processes. Because condensate water is relatively free of minerals and other solids, it could be used for cooling tower or boiler make-up and reverse osmosis feed water, or for drip-irrigation.

- Rainwater harvesting: Rainwater is another excellent source of non-potable water and can be used in many of the applications in which condensate recovery is used. Facilities in the U.S. considering the use of rainwater should check with local or state governments about possible restrictions. Some states allow facilities to detain water for irrigation and other uses that return water back to the system, but do not allow water to be retained permanently on a site.

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