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Is water the new oil?

Strategies for managing the impact of water shortage in industry

Restrictions of water use in California are resulting in increased appreciation of the reality and growing challenges of water scarcity and its potential adverse socio-economic impact on industry and society. Growing water scarcity is now a global challenge that needs local solutions focusing on water stewardship and water management. It also requires wide stakeholder participation and effective ways to conserve water in industry.

Introduction

Although all droughts present direct and indirect risks to ecosystems and residential water supplies, the focus of this paper is on risks to businesses. Many businesses rely on water as a strategic resource, and shortages may lead to significant adverse economic impact for them and for the economy. This impact may range from increased costs to procure water from alternative sources or relocate operations to business interruption or slow-down. It may even threaten business survival. Since water shortage is not a named peril for time element insurance coverage, with the exception of crop insurance, this exposure is largely uninsured. Risk managers and business leaders, who have long relied on a continued supply of water, need to revise their risk management and long-term planning processes to include the reality of water shortage.

Key drivers for water shortage

Water shortage is a very complex issue with a broad global impact. Population growth, urbanization, industrialization, climate change and lifestyle changes are impacting water resources. To understand and effectively manage the challenges associated with water shortage, we need to understand the key drivers and related factors. Water shortage or water stress can be defined as an imbalance between the supply and demand of water over a period of time that results in a disruption of water supply to meet the demand. Water shortage impacts demand for potable water, water for agricultural irrigation and industrial processing.

The key drivers affecting the supply side of water shortage are regional intermittent drought and climatic drought. Regional intermittent drought can be further classified as caused by meteorological drought or hydrological drought by the degree of severity, frequency and duration. The causes of climatic drought are still very controversial for many. The discussion of climate change and associated extreme weather are outside the scope of this paper. Scientific consensus is pointing to a new "normal" of volatile, unpredictable and changing seasonal weather patterns and variations in precipitation globally from climate change. The impact of extreme weather ranges from severe windstorms, extraordinary heat waves, forest fires and floods to more frequent and severe droughts and desertification of areas such as eastern Africa or western North America. Desertification is the process by which fertile land becomes desert, typically as a result of drought and associated prolonged precipitation shortfall, deforestation or inappropriate agriculture. In addition, the warming temperatures may also increase evaporation losses of water from soil and surface water bodies that may further exacerbate droughts and desertification trends.

Most droughts are regional intermittent droughts. Meteorological drought is caused by the deficiency of top soil moisture and a shortfall in precipitation as compared to an average or normal precipitation over a period of time. Hydrological droughts, on the other hand, are associated with long-term shortfalls in precipitation, snowfall and the depletion of surface water supplies. They impact the area's hydrological system of surface and ground water supplies and reservoir levels. Persistent precipitation shortfall associated with climate change and increased water demands drive localized water stresses and droughts.

Since prolonged precipitation deficiencies result in dramatic adverse impact on the hydrologic system of accessible ground water and reservoir levels, hydrologic drought usually lags occurrence of a meteorological drought by several months. Conversely, replenishing depleted reservoirs and ground water aquifers following a hydrological drought takes even longer. Meteorological drought tends to be more localized, whereas hydrological drought tends to be spatially more widespread. Since regions are interconnected by hydrological systems, lack of sustained precipitation to make up for the shortfalls, effective conservation measures and depletion of ground water, the hydrological drought areas are likely to grow spatially and in water stress severity.

Additional factors affecting water shortage

Water is the most precious resource for sustaining life and socio-economic development. The trends for urban migration, population growth and industrialization are key factors affecting water supplies. The rate of growth in global water use has dramatically outpaced global population growth rates, and total water consumption has tripled in the last 50 years. In addition to growth in agricultural and industrial uses of water, modern lifestyle changes — such as running water for long showers, washing and personal consumption; swimming pools; water recreation; and garden landscaping — also have contributed to the increase in water demand. Since the agriculture sector accounts for over two-thirds of global water use, water shortage and droughts tend to have dramatic impact on this sector. Although water shortage for the agriculture sector is impacted by a shortfall in total precipitation, the timing of availability of water in line with the planting cycle is also important. As a result of recent drought, the agriculture sector in California is now facing an unprecedented 25 percent mandatory cut in water consumption.

Water shortage is not a new emerging threat, but it is starting to get serious attention. Apathetic and misguided efforts to cope with today's unchecked growing demand for water and the lack of water stewardship have resulted in over-exploitation and accelerated depletion of reserve supplies of water. Pumping ground water at a rate faster than replenishment through precipitation leads to over-abstraction and sinking of the water table, drying of wetlands and wells, and also higher pumping cost. In coastal areas, over-abstraction leads to intrusion of saltwater degrading the ground water. Additionally, run-offs and pollution from industrial, agricultural and municipal sources have adversely impacted water quality.

Aging, inefficient water infrastructure also contributes to chronic water shortage challenges. Aging water reservoirs, lack of flood control measures, distribution systems and waste treatment facilities impact the availability of water in some areas. Old water treatment plants and distribution systems, including corroded and leaking underground pipes, are of particular concern in many cities globally. Loss of water from leaking pipes and ruptures account for around 14 percent of the distribution of treated water. Inadequate pricing of water, insufficient budgets and the lack of funding sources for infrastructure improvements make this a chronic issue for many urban areas even in developed countries.

Current and Anticipated Water Risks for Businesses

Risk Type	Risk Examples
Physical	• Impact on direct operations, facilities and business interruption • Supply chain and logistics • Electric power supply • Extreme weather, brush fires • Water quality and quantity • Adverse impact on reliability of fire protection • Unpredictable precipitation and floods • Increased subsidence risk
Reputational	• Brand image, public perception and adverse publicity • Competition and conflict with other stakeholders, local communities and non-governmental organizations (NGOs) • Impact on business permits and continuing license to operate • Failure to comply/monitor ethical, social and environmental responsibility
Regulatory	• Restricted water allocations and water use permits • License for continuing operations and policies • Water tariff surcharges, mandatory cuts and conservation orders • Fines for violations of environmental discharge permits, pollution, contamination, etc. • Adverse environmental impact including wetlands, ground water, etc.
Legal/Litigation	• Litigation involving water pollution, discharges, disposal, permit violations, etc. • Waste management practices • Competing for water allocations • Water rights disputes • Failure to disclose financial exposure to material and relevant water risks and water risk management practices

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Competing for dwindling water resources

Since agriculture accounts for over two-thirds of water use globally, industrial and municipal water compete with the agriculture sector. With prolonged drought and dwindling water resources, many regions are faced with higher costs, changing priorities and restricted allocations in the form of water usage caps and water rationing. This situation often leads to conflicts between growing communities and large users of water, such as agricultural and industrial users. Some farming irrigation practices and crops are particularly water intensive and need to be reviewed in light of chronic water shortages. Businesses such as food and beverage manufacturers and chemical companies that need a reliable water supply for production will have to consider water conservation measures.

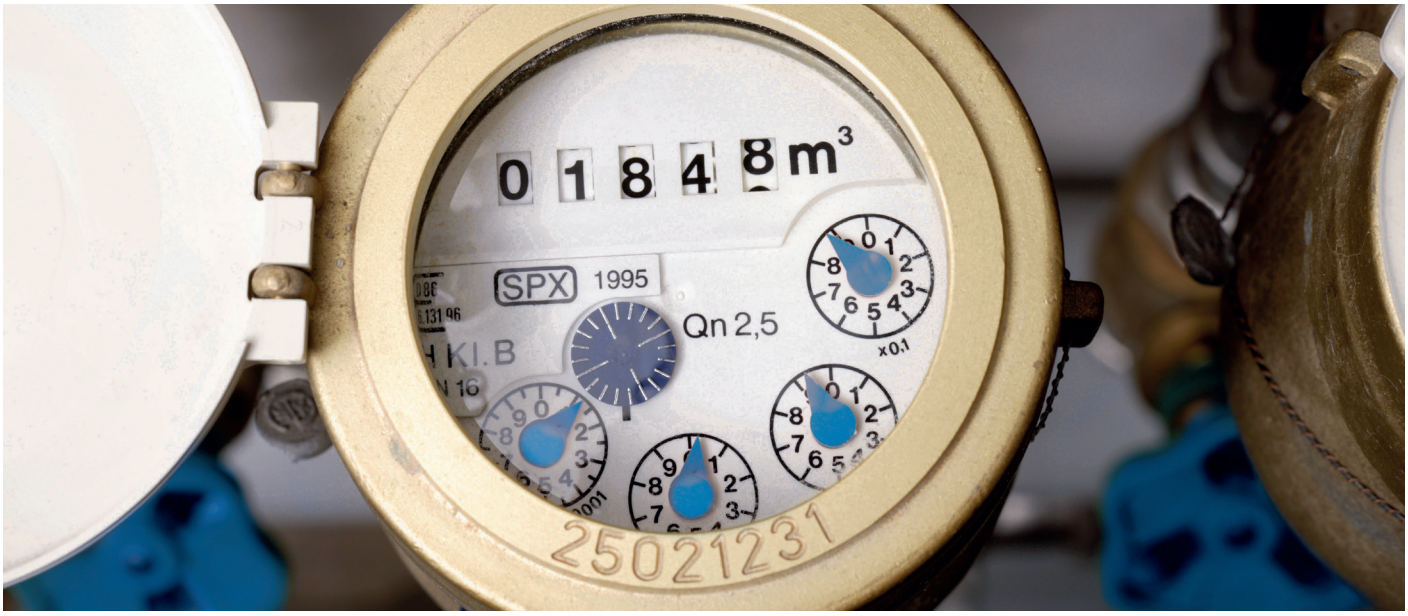
Assessing business risks

For businesses, the risks associated with water shortage can be direct or indirect and will vary by type of business. All businesses, however, will be adversely impacted to some extent by physical, regulatory, reputational or litigation risks, emphasizing the importance of undertaking a robust assessment of current and anticipated water risks.

As an example, businesses may face increasing risk from regulations for the protection of scarce water resources, ecosystems, wetlands and the environment. The regulations may also extend to water use licensing and allocations and include mandatory requirements for water conservation and stewardship. Litigation involving water rights is also possible.

As water shortages become more severe and frequent, the higher costs of infrastructure development, as well as pumping and distribution systems, will be borne by businesses along with the possibility of use restrictions. Since government entities are constrained by budgets and funding sources, businesses may wish to take advantage of opportunities for public-private partnerships for infrastructure development projects as a long-term solution to water shortage and as a means to ensure access to needed water. In addition to an increased tax burden for infrastructure improvement, unmet demands for water needs can also impact municipal approval of future expansion, growth and strategic business plans. In extreme cases, regional intermittent droughts can also force a business to curtail operations, incur higher extra expenses (due to importing of water from alternate sources) or even consider relocation.

Clearly, businesses should assess their dependence on water supply for production and process needs to understand business interruption risk. In addition to agriculture and food and beverage companies, many businesses such as petrochemical, refineries, paper and pulp, electronics, mining and even nuclear power plants rely on continuous uninterrupted and reliable water supply for processing and cooling. Reductions in this supply can result in curtailed operations or even plant closures. Large businesses competing directly with the local community for dwindling water supplies should not underestimate the significant risk to their reputations.



Fluctuating water levels in reservoirs, lakes, wells and aquifers can adversely impact the mineral contents of water, resulting in unanticipated corrosive damage to pipes in the distribution system, water treatment plant equipment, industrial processing and cooling water systems. Additionally, fluctuating water levels can also affect the current locations and depth of water intake points for adequate pumping, which can affect access to available water. Additionally, over-abstraction from deep wells and underground water sources may increase the subsidence risk.

Since potable water is a life sustaining resource, extreme water shortages can also lead to political conflicts and unrest. In many parts of the world, farming and agriculture rely heavily on precipitation. Unpredictable and unseasonal precipitation patterns have dire consequences for crop production. Crop failures lead to devastating impact on farmer welfare and significant food cost inflation. In addition to the direct impact of water shortage, failures, there is also a concern for the indirect and cascading effects on the downstream supply chain. An example includes the impact of cotton crop failure on the apparel industry. Shortage of potable water will have adverse impact on food processors and the beverage sector, both of which rely on a water intensive agriculture supply chain. Allocation disagreement on shared water resources between countries can be a source of conflict. Lack of normal precipitation and snowfall can have an adverse impact on resorts and the tourism sector. The indirect cascading impact of water shortage is an often overlooked supply chain interruption and global political risk.

For drought-prone regions with access to seawater, water scarcity and increasing water price could make the construction of a desalination plant an attractive option. The desalination process consumes a significant amount of energy. Newer technologies and co-locating desalination plants and solar energy plants, helps bring the cost down, making even small scale desalination plants feasible. In addition to desalination, water scarcity is also giving a boost to technologies for water reclamation, reuse and recycling.

In addition, many businesses are now starting to disclose the financial impact of exposure to water risks in their financial disclosure statements to meet the growing expectation of the investor community.

Strategies for water management

It is important to recognize that while water shortages may be a global challenge, the most effective solutions will be local. Continuing to drill deeper wells and drain the water reservoirs and ground water supplies to cope with today's growing needs is not a prudent short-term strategy without a long-term commitment to a strong water management and conservation strategy. In order to manage competing water demand and dwindling water supplies, regulators may use the higher price of water and mandatory conservation to reduce the demand for water. Although conservation strategies for dealing with water shortage will be different for each industrial, commercial and institutional business, experts recommend to any business the following collection of best practices for water management:

1. Make a commitment to water stewardship and appoint a champion from senior management, both on-site and company-wide.
2. Build alliances with all regional stakeholders to coordinate, collaborate and share good water governance practices and sustainable water balance plans for the region.
3. Identify your critical water-intensive processes and assess your on-site water utilization. Consider a water accounting program, including installation of water meters.
4. Implement a water management and conservation plan:
   - Set and measure base-line levels for water conservation benchmark goals.
   - Raise awareness and involve your employees.
   - Identify and prioritize opportunities for water conservation.
   - Regularly inspect your systems for leaks, and promptly repair them.
   - Install water-efficient devices, such as auto shut-off valves and low-flow devices.
   - Measure and monitor your progress using appropriate tools (e.g., Ceres Aqua Gauge, World Wildlife Fund and others).
   - Communicate and publicize your successes and results.

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In addition to these overarching best practices, each type of business may have more specific opportunities to recycle, reclaim, reuse and reduce water consumption. Here are some examples to consider:

1. Explore and prioritize opportunities for reuse, recycling and reclaiming of water.
2. Consider recirculation of cooling water for your heat generating processes. Replace it with air cooling if and where possible.
3. Instead of dismantling for cleaning, deploy clean-in-place (CIP) systems for processes and equipment that require a thorough cleaning between production batches, as in the case of food and pharmaceutical facilities.
4. If you have a boiler or a steam system on your premises, inspect steam traps, condensate return lines and automatic blow down controls regularly.

To conserve water during periods of water shortage, municipal authorities may curtail the frequency of flushing and inspection of fire hydrants. This testing is necessary to ensure adequate flow, water supply and pressure for the reliability of fire protection systems. Reductions in this recommended testing can compromise the reliability of fire protection systems. Impairment of fire protection can seriously impact life safety and the safety of critical operations in manufacturing, commercial and retail establishments. To ensure reliability of sprinkler systems under these circumstances, drain testing of sprinkler systems should be conducted in accordance with National Fire Protection Association recommendations (NFPA 25 Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems) and records of each test maintained. By comparing the results of successive tests for any anomalies, detection of any obstruction or significant reduction in water flow to the sprinkler systems is possible. Appropriate recognition and mitigation actions will ensure the reliability of fire protection from sprinkler systems.

Conclusion

The imbalance in regional water supplies caused by changing weather patterns and ever-increasing water demand are likely to be an ongoing challenge for many parts of the globe. Improvement of water infrastructure, including consideration of desalination technologies and water distribution networks, are capital intensive measures that will require finding adequate financial resources. These are forward-looking collaborative opportunities for public-private partnerships. Responsible water management and sustained water conservation strategies may help restrain the growth in water consumption. Although water conservation is not a silver bullet to solving the water crisis, it gives some catch-up time for precipitation to recharge reservoirs and ground water levels.

It bears repeating that the water shortage is a global challenge, but the effective solutions must be local. Collaboration and coordination of water management and stewardship efforts by all stakeholders will be essential to meet this global challenge with local on-the-ground solutions.

Analyzing current and anticipated water risks and conserving water are not one-time efforts, but ongoing initiatives that will pay rich rewards. Continue to research and learn about water efficiency practices, equipment and best practices for your business sector to identify ongoing opportunities.

Resources

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

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