The Water, The Region, The Industry

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Abstract

The world has a limited supply of water, and with increasing population and withdrawals, availability continues to decrease. Worldwide, agriculture draws the greatest volume, though industry exceeds agriculture in many highly industrialized countries. Industry is making strides in increasing efficiency of water use; the issue is, it is often not enough. The food processing industry, for example, is one that has a great draw on water supply by nature. This paper analyzes various decisions an industry would need to look into considering water sustainability and international expansion. The United States is a nation the must be looked at by region—some with sufficient water supply, some with very limited supply. Australia, being the driest continent on earth, would be a poor choice for an industry with a large draw on water to expand into. India has its own unique issues—a fair amount of natural sources from monsoons and the Ganges, but using the available water effectively has been a struggle. Regulations on water use are another issue a business must consider when expanding internationally.

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What is Sustainability

The balance of the world is in jeopardy due to unsustainable practices. Water has always been a force to have great impact on the world, though often historically both due to its presence, and its absence. Water shortage is becoming the prevailing issue of today. Not only is there a greater population to use the water, but on average each person individually is also using more (Clarke 1993, 32). The situation has escalated to such an extent that this year’s World Economic Forum had declared the global water crisis as “the biggest threat facing the planet over the next decade” (Brabeck-Letmatre and Ganter 2015).

This paper will take a look at water sustainability itself. These ideas will then be applied to water’s use in industry, and then compared throughout three countries. Water use in industry will then be applied to a specific industry as an example. Throughout this exploration, the impact of the strain on water will be analyzed.

When many hear the word “sustainability”, they think of a choice to be “nice” to the earth. Sustainability has become a more common word in the businesses of today as well, but many of these think of it as an ethics problem, a choice to worry about their image or not. The truth is, the water crisis has reached a point that focusing on its sustainability is now about strategic, long-term success for most businesses. They just need to see it as a way to ensure the success.

Water, of course, can naturally come from many sources—lakes, rivers, oceans, aquifers, groundwater, etc. The important issue with sustainability is whether these sources are renewable. “Renewable” itself takes on a new meaning here. Some sources, such as some groundwater sources, may be able to renew themselves eventually, but it will take many generations. One could almost consider these sources as unrenewable, at least in a lifetime. These sources that take generations to replenish themselves should be used with the care of a limited but crucial resource.

Within the span of history, civilizations have risen due to water availability and fallen due to lack thereof. Human use has been a main factor to influence these situations. In many areas of the world, water availability is a bigger issue than ever before. The population of the human race has been growing exponentially, and with it an increase in the use of water for food production, sanitary use, business and industry use, and other human consumptions. Humans have literally moved rivers and drained lakes, and it’s beginning to look like the long-term effects of this are greater than were ever estimated. This creates a great constraint on business globally, as expanding business must take a deep look into not
only the situation of current water availability, but if the environment will allow a business to sustain itself into the future.

**Industry and International Business**

When describing water use, there are three basic divisions generally used: agriculture, industry, and domestic. If one were to list them by highest to lowest use globally, they would go in the same order. Agriculture, on a global scale, uses much more water than industry, though industry uses twice as much as domestic. By nation and region, what uses the greatest amounts can vary.

Sustainability is gaining attention worldwide as a critical consideration. Yet industry and domestic uses are still withdrawing many times more water than they actually consume (Anisfeld 2010, 51). Even more unfortunate is that this use of water by industry is still many times more financially efficient than the use by agriculture. As (Clarke and King 2004, 38) states, a ton of water used by industry creates output that is 70 times more valuable than that of agriculture. With agriculture being the largest user of water worldwide, one can truly begin to see the seriousness of the situation that humans face.

Fortunately, there is some progress in the area of water sustainability. Innovative new ways to be more efficient and effective with use have become more prevalent. Unfortunately, progress is slower in agriculture than industry. However, every bit does count in the end, even in the domestic sphere. The advancement of technology will hopefully contribute to ever more efficient methods. Governments and others in power will also hopefully begin to see the urgency of the situation.

It only makes sense that, as the world is expected to further industrialize, the use of water by industry is expected to increase (Clarke and King 2004, 38). The amount of water globally projected to be withdrawn by industry is expected to jump from 16% today to 22% in 2030 (Charting 2009, 12). This withdrawal generally is from three main areas: the manufacturing process, cooling systems used in industry, and feedwater used to generate boiler steam (Dave and Nako 2004, 67). Of course, the use of water by region of the world varies greatly, mostly based on factors such as the type of industry prevalent, the available supply of useable water, the technology available to the industries, and even the climate of the region (Shiklomanov and Rodda 2003, 32). “Pressure is mounting to be more efficient with the world’s most precious liquid” (Milmo 2008, 1). Industries are feeling this pressure, and moving to make changes.
Industry is moving towards more sustainable practices in the use of water, especially in more developed countries (Shiklomanov and Rodda 2003, 32). Mainly on a per-company basis, efforts to create more sustainable systems of water use are underway. Businesses have found that this is almost necessary, not only to have water available for use into the future, but even on the mere level of saving money. Some are even replacing water completely in their processes. It is not only the smart choice; in many areas, it is becoming the necessary choice.

Despite this promising progress in individual businesses, overall industry water use seems to still be increasing. The world in general is industrializing. A greater total number of individual businesses are drawing on the supply of water. The issue is that not all industrializing nations have access to advanced technology that would allow them to be smarter with their resource use.

Industry is often found near the hubs of civilization, the large cities, and these large cities have often sprung up near large water sources. Yet years and decades of use have put a strain on this water. “Many of the world’s largest cities are located in water-stressed areas, and they are struggling to meet the water needs of their growing populations” (Clarke and King 2004, 66). The best location for industries is often near the greatest congregation of consumers. Increasingly, this is also where the greatest water strain is.

Industries in need of water to operate may increasingly need to locate further from where greater populations are putting a strain on resources. Yet this may only increase the cost of doing business, through transportation and infrastructure building. It may come down to whether these costs outweigh the cost of bringing water to the original location, or changing operations to use less water. Businesses may have difficult decisions ahead of them, which will have significant bearing one way or another on their future.

Competitive advantage can be ever elusive for companies today. Another way companies work towards “sustainability” is a sustainable competitive advantage. The best way to achieve this is a strategy that is difficult for others to copy. Water resources and systems can be just the factor, in certain industries. It can not only be difficult to copy because of the location of more permanent sources, but water resources are also regulated by governments and others can simply run out. If a business has access to ample water supply in a way that others cannot, they can sustain their business. “Water is so important that though it seems far removed from the final product...it could actually be a
competitive advantage" (Fishman 2011, 1). Underestimation of water's importance today could harm the business tomorrow.

The businesses of today must look at the triple bottom line of business more than ever before: financial, social, and environmental factors. Today's market has a focus on much more than just the money. To keep a positive image, a company must consider their impact on society. As stated above, the environment can affect a business, and how a business handles the environment can impact their success. All three of these factors must come together successfully for a business, corporation, entity, et cetera to hold on to a sustainable competitive advantage in today's marketplace.

"It is, in reality, a problem of incentives, social controls, ability to handle complexity, as well as social pressure and conflicts" (Clarke 1993, 75). Water sustainability is good for business, and, by extension, good for international relations. "Water is a unique natural resource...because it moves...the way rivers are used in one country can therefore have far-reaching effects on all other downstream countries" (Clarke 1993, 90). The effect that water sustainability in business goes much beyond a company itself, even beyond the water source itself the company draws from. The relations between countries themselves can be at stake. While the focus of this paper does not lie in this topic, it remains a significant factor to bear in mind.

"Pressure is mounting on industry to be more efficient with the world's most precious liquid" (Milmo 2008, 1). Industries have had to reevaluate the systems used in the past to create more efficient and sustainable methods for continued success in the future. For example, many industries in recent years have switched to a process that recycles water within their operations. Some have been reusing water from surrounding areas mostly unused by others, such as municipal sewage plants. "The concept of reusing municipal waste water and other waste streams is particularly useful for large-scale industries like petrochemicals" (Milmo 2008, 3). Other industries have found ways to cut out water use altogether. These industries making changes realize it is the necessary process, and others are continuing to follow. The hope is that continued and more innovative system changes will continue into the future.

Country Profiles

Where a company is located geographically can have as much, or not more, of an impact as what industry it is a part of. Location is a more immediate concern for a company or industry when making future decisions, whether on how they will continue successfully where they are, or where to
move to next. As examples of rather different situations one may face, the water situation in the United States, India, and Australia are examined here.

The United States

Being such a large country, the water situation in the United States stands out. One could say that, as a whole, the United States has access to a fair amount of water, but that may be ignoring the struggle some have to get by, while others may not even know water can be an issue. "We cannot continue to assume that unlimited quantities of affordable water will be available to us," (Subcommittee Hearing 2014, 1). It may be difficult in a nation such as the U.S. to make country-wide changes concerning better water practices, because it is not a priority to the many citizens that have the advantage of having a large enough supply to not worry about water. It must be conveyed how serious the situation is in other regions.

The truth is, several areas of the United States in particular are facing more and more serious water scarcity problems. Population, agriculture, and industry growth in areas that have naturally low access to water have begun or continued to cause a strain that is unsustainable. The situation is getting to a point that it has escalated to a grim reality. The drain on the very limited water supply in certain regions has left few options for future development, and the current trend appears to be ever growing agriculture and industry demand.

"As water scarcity becomes more prevalent in the US, water availability is becoming more and more of a constraint in siting new power plants" (Anisfeld 2010, 224). The issue of water has reached such a level in some places that prevents industries and businesses from success, even if they have the monetary resources in order to set up operations. This could prevent expansion into water-stressed regions and nations. If a business or industry wishes to expand into a nation such as the United States, they must be sure the natural environment is conducive.

"In Europe and NA, industry predominates [water withdrawal]...by comparison, [domestic withdrawal] is relatively insignificant" (Clarke and King 2004, 24). America is one of the greatest industrialized countries, and the industry takes the most from the water sources America has at its disposal. Industry has a very large influence on economic success in the country, and therefore is a priority to the nation. If water is recognized as having a big enough impact in industry, then it may achieve a higher priority.
Yet the environment historically has not always been a priority in America and its regulations. Some areas are beginning to realize the importance of water regulations, though often out of necessity rather than environmentally-conscious initiative. This can cause the options for the future to be more limited and drastic. While basic resources necessary for mere survival as well as industry would benefit from being a high priority, misleading assumptions are often made. Take California, for example. The state of water strain there has reached such a point that tough regulations and rules are being put into place. Yet had water sustainability been a priority from the start, the situation may not be nearly as dire as it is now.

India

India is a different country than the others viewed in this paper for more than its water situation. India is, of course, much less industrialized and developed than both the United States and more highly populated than Australia. The GDP per capita is also low, compared to these other two nations. "The region, however, has considerable development potential, especially if its natural resources could be harnessed sustainably, efficiently, and rationally" (Biswas and Uitto 2001, xi). Many of the industries prevalent in nations such as the United States would find India to be a much less saturated market, with a large population of citizens, many who could live well on lower wages.

The natural flow of water in India is unique in several ways. "Some regions (e.g. northeastern US) experience uniform precipitation throughout the year, while other regions (e.g. India) experience seasonal cycle in precipitation" (Anisfeld 2010, 45). "Most of the water is received in a period of 30-40 days, but it has to last for the entire year" (Biswas and Uitto 2001, 20). "The main problem is the water scarcity during the lean season" (Biswas and Uitto 2001, xii). India needs to be efficient with the use of the water they do receive. However, the strategies and infrastructure to achieve this can be too much for the nation, based on its level of development and economic power. This is one of the issues that set India apart from other countries, especially countries such as the United States and Australia. India must adapt to succeed, yet they face many issues to achieve this.

The Ganges is a major source of water and all its various possible uses. It's one of the world's major rivers, and this river is vital to the livelihood and society of much of India. In this area, there is even a spiritual element to the river. During the monsoon season, much of the river flows unused into the sea (Biswas and Uitto 2001, 22). Yet during the rest of the year, the "upstream diversions and other water demands" can cause none of the river to make it to the ocean (Biswas and Uitto 2001, xii).
central part to India's water system has its issues, that careful management and effective use of resources could improve. India, however, may not have the incentive nor the amount of resources to solve their water issues.

The groundwater is being used at an unsustainable rate as well. "For future development, groundwater will no longer be a major source" (Biswas and Uiotto 2001, 23). "In some states, adverse effects of overexploitation of groundwater...are already being experienced" (Biswas and Uitto 2001, 23). Even India, with one of the world's greatest rivers and an ocean bordering much of the nation, is running into water stress and scarcity, and must be willing to consider viable solutions if they hope to remain sustainable and successful as a nation. India must consider their citizens needs on an individual level, as well as the needs of the economy and environment as a whole. Changes must be made to India's systems, and it will likely not be a simple change.

**Australia**

Australia represents a particularly unique and critical situation. Australia is, in fact, the driest continent on the planet, and faces a more extreme water situation than countries such as India and the United States because of it. Australia is so dry due to natural causes, with a very sparse network of rivers and lakes (Shiklomanov and Rodda 2003, 324). Most of the water sources are located, and the vast majority of precipitation occurs, on the coasts of Australia, particularly the northeast, as well as the southwest edge (Shiao and Maddocks 2015, 1). Australia's largest cities can be found in these relatively water-rich locations.

It's expected that by 2025, the availability of water in Australia and surrounding Oceania will decrease by 30% (Shiklomanov and Rodda 2003, 346). All of the surface water available is currently under use by agriculture, even in areas with the most sources, leaving other uses such as industry and domestic to find alternative sources such as artesian wells, which are much slower to renew and therefore much less sustainable (Shiklomanov and Rodda 2003, 328). This goes back to the concept presented earlier that water sources are really only sustainable if they can be replenished in a relatively short amount of time. A big issue is the fact that what water there is, is not distributed evenly in the country, both geographically and over the course of a year, and so the people, plants, industries, of Australia experience a variability of water supply not experienced by most of the rest of the world (Shiklomanov and Rodda 2003, 348). This variability differs from even countries like India in several ways. In Australia, there is very little rainfall, and this rain falls in a very limited geographical area. The
situation of Australia is one that is naturally hard to overcome, and would continue to be so even if withdrawal were to decrease.

Australia's government and others making decisions are very aware of the dire situation their nation faces. The use of what water there is to its highest potential has become a high priority in government and national development. Many of the rivers throughout are under regulation, and "it can be expected that a large portion of the Australian GNP will be devoted to environmentally sustainable water resources management" (Shiklomanov and Rodda 2003, 342). Australia is well aware that water availability can be a large hindering factor to their nation. The question is whether there is enough that can be done about it. "In Australia, after a devastating drought in the 2000s, cities there have cut water consumption by as much as 40% (Brabeck-Letmatre and Ganter 2015, 1). Progress is being made from necessity, but the future is looking drier.

Industry Example

Populations, nations, and business are beginning to turn their focus to this issue which can impact survival of all. Business success is often dependent on water availability, as societal success itself. Besides where a company, business, or industry is located, they make decisions on the situation of the industry itself they are a part of. Common practices and future process innovations in an industry can greatly impact internal decisions for the use of water.

The food processing industry will be reviewed here as an example of an industry that is rather water sensitive due to the high use in its processes. All levels of the food industry, from agriculture to processing to transportation, have a large dependency on water, and regions of the world where scarcity and sustainability is becoming more of an issue will also find themselves having more of an issue with food, in one way or another. Food processing will be examined here as an illustration.

Food processing essentially is the process of taking raw food products, changing and combining them in an industrial setting, and generally packaging them in such a way to make them easily consumable by the market. "Making foods and beverages easier to consume has been a driving force in 21st Century product development" (2014 Food 2014, 1). Activities in the food processing system often include boiling, pickling, canning, preservation, liquefaction, and the like. This industry is increasing in both size and global scope (2014 Food 2014, 1).
Water use in the food processing industry in particular is more inherent and essential than many other industries. Water is often put into the product being processed, in addition to the process of running and cooling the mechanisms and machines. This is an industry that virtually cannot run without water, and so is more subject to the issues that arise from water strain. The water situation in a country may be the determining factor for a food processing company to expand. While “American companies step gingerly around the sustainability issue” (2012 Food 2014, 1), this is an industry where is will become necessary to face the facts. In an industry that draws so much water for its processes, sustainability is an issue that will rise sooner or later, sooner if companies feel pressure from outside the firm to conform to sustainable practices.

Corporate Social Responsibility is an issue that has been affecting the food processing industry as many others of late. “Virtually all the U.S. multinationals have responded with CSR reports that extol their efforts to reduce waste and the consumption of energy and water in production” (19). The impact of the significance of Corporate Social Responsibility has been positive for the sustainability efforts. CSR has almost become a trend among businesses and corporations, and consumers look into this aspect of an organization more than ever. Implementing CSR can help a business both appeal to their consumers and the public, and work towards being more sustainable as a business. The important factor moving forward will be whether companies just put up an image of CSR, or if they take measures to have a real impact towards a sustainable future.

To Enter a Country

This example of an industry shows how a more specific business considers resource decisions. However, moving forward with a business often includes expanding geographically, especially in today’s more globalized world. The next step of decisions after analyzing where they are, is analyzing where they can go.

Essentially, when choosing to enter or not enter a country, a business would do well to look at the nation by regions, especially with countries of larger area, as the ones reviewed here. Across a nation the size of the United States, the situation of water scarcity and sustainability can greatly differ. Taking a look at a nation as a whole would be beneficial to analyze the political, economic, and regulatory environment that is being considered. However, dividing the nation into regions and categorizing the situation in each would likely be the most beneficial way for a company to go about analyzing whether the nation is environmentally sustainable, with sustainable resource.
The United States is one of the more industrialized nations. There seems to be a relationship between greater industrialization and greater regulation on use of resources. The greater the regulations, the greater the restrictions on business and their options on how to operate. The regulations on water use particularly could have several effects on businesses attempting to enter the United States. In one view, these regulations are put into place with the hope that this will increase the sustainability of the water supply in the long term. If this is the case, then businesses could look on the regulations favorably as assistance to sustained business success, assuming the business has access to water in the first place. However, greater restrictions can also be perceived as negative by a business. Depending on what is stated, the regulations could increase costs and reduce freedom for operating a business. A business could find this cost to be too great, and move somewhere else.

Regulations in the United States are headed in the direction of better controlling the use of available water. Priorities have been changing, and awareness of resource availability issues has been gaining. Regions with greater stress have generally made more advancement, due to growing concerns. The problem is whether or not water is a priority to those creating the regulations, and possibly by extension the people these regulation-makers serve. The negative impact on business and lifestyle may also inhibit regulation creation.

"As companies look to expand in the east, and more arid countries, water is much more of a pressing concern" (Milmo 2008, 1). This pressing concern is just how the world is today, and companies must decide to face it. Labor costs, tariffs, transportation, and the like are no longer the only concerns to be considered in the financial future of an expanding company.

A business that uses any significant amount of water at all should think twice before expanding into Australia. The lack of natural sources and the strain already present create an environment that would be rather hostile to a new draw on this limited resource. Trends seem to show that regulations by the Australian government on water use will continue to increase, while useable water will continue to decrease. The cost to a company to operate in Australia with high water needs, especially if they are expanding there rather than continuing current operations, would really be too high.

As a country to expand a business into, India has its advantages and disadvantages. India is less regulated than a country like Australia, as far as water use goes. The priority placed on these regulations by lawmakers, as well as governmental resources available, are much higher in Australia. India is realizing the importance that needs to be placed on water in its policies, but as of yet, these
policies are often in regard to sanitary use rather than amount (Johnston and Hiwasaki 2012, 35). India has had many issues with unsanitary water conditions, and citizens washing and being in the rivers is a part of the national culture. The danger to citizens posed by unsanitary waterways has caused the lawmakers to make sanitation a focus. Less regulation in India currently exists with regards to withdrawal. While, due to this, a business would face lower costs from regulations, the lower level of industrialization may be an issue as well. While sanitation issues in the water supply of India continue, certain industries may have added costs to make water useable before it enters the rest of their processes.

India, as the United States, must be considered on a regional basis. “In India, the Ganges and Brahmaputra basins are subject to recurring floods of varying intensities” (Biswas and Uitto 2001, 30). Some areas of the country receive greater rainfall. However, this rainfall may not be useable. Flooding around the main rivers could cause more issues than advantages. The rivers of India must be approached carefully as well, as they have significant cultural and religious significance to the populace. The rivers are tricky, but “out of the total surface water resources in India, about 63 percent are in these river basins” (Biswas and Uitto 2001, 21). The advantages of a company entering India could outweigh the costs of its unique situation. However, if a company does not review and consider the challenges beforehand, they could pay for it in the end.

Summation

“It goes without saying that water and development, and by that I mean water and the advancement of the human species, are two sides of the same coin” (Johnston and Hiwasaki 2012, vi). Life itself cannot continue without access to useable water. It’s a necessity for the advancement of a society, an economy, a nation. Many nations today are held back to a large extent from developing like their peers because of a limited supply of the resource of useable water. It seems unfortunate, as it is often due to unchangeable factors that a nation has limited access, but that does not mean there is no hope.

As with a nation as a whole, a business should also understand the strain on water in different nations and regions. If a business hopes to grow and expand, it needs to know exactly what resources will be required, and whether their location has access to these. Considerations could hold a company
back from expanding, decide where they will expand into, or even cause them to be more innovative with their processes to use less of this resource.

"Although economic values may represent the interests of many, solutions should be in accordance with the values and beliefs of all participants in order to be effective" (Johnston and Hiwasaki 2012, 51). In order to promote long-term success, all parties that water sources can affect must be considered. It goes back, in a way, to the triple bottom line, then deeper. Each country and each region has its own situation with its own set of people and groups that can be affected.

Water strain, availability, and sustainability are important because these factors determine the course of life and society itself. But on a slightly smaller and more immediate scale, these factors affect the expansion of business and sustainable success of these expanding or current businesses. Some industries may have greater need for greater access, but all can be affected, be it through transportation, location of the market, sustainability of the market itself, and more. It is an issue that the world will continue to see grow in importance and prominence.
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