

# **Bridging the Gap to Create Innovative Thinking for Global Sustainability**

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## **Introduction**

Water is a resource that is both essential to life and to how it progresses. The earth is made up of approximately 30% land mass and 70% water (Pidwirny, 2006). Water usage has increased by a factor of six in the past 100 years, which is twice the rate of population growth (IBM, 2008). One in five people lack access to safe drinking water worldwide (IBM, 2008). Currently, we have all the water we need on this planet; the issue is not if this resource will run out, but how to effectively management it. Clean water is a universal human right, but methods and the means of how to access and use this resource is an issue drastically divided around the world (Howard, 2009).

Water availability is one example of a local and global issue that crosses boundaries. Finding a solution to problems such as these are not the sole responsibility of a few, but of our global society. I propose that it will take leaders and innovators from many nations, companies, and organizations to solve the water issue as well as other crises of global scale. Many nations and organizations have developed problem identification and technological innovations but only through collaborative measures will global capacities be expanded.

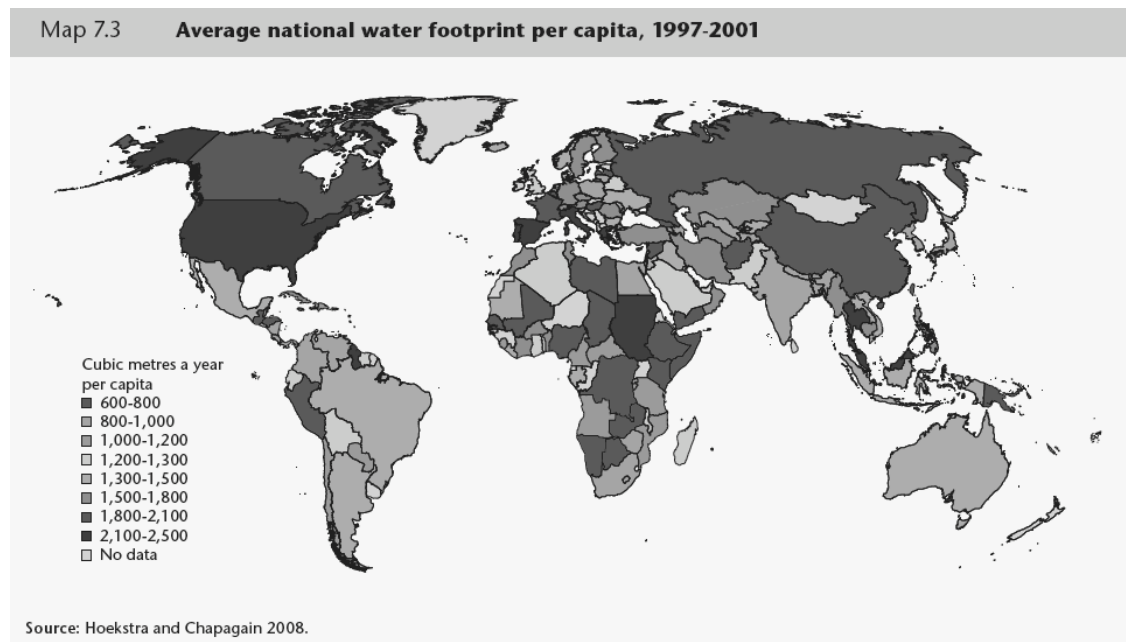
The vision of this paper is to begin new conversations between all kinds of disciplines, skill sets, and worldviews. It is not a conversation that is limited to identifying where and how bad a problem is, but expanding the opportunity for vast knowledge networks from many different realms of experience to apply their ideas and strengths. The point is to first identify where strengths, experience and passions lie, and find a way to apply this toward solving a global issue. The application of knowledge and past solutions can solve current and future problems that might not have clear connections to one field of study or industry. It is common to think solutions to problems lie only within the realm of identification of the problem itself, but what change does this actually produce? Private sectors develop technologies to sell a product or service while research is being done in governments and academia to identify where crises exist. Through the application of business ideas to environmental or social sector areas of research and practice, a new direction is possible to solve large issues in a non-conventional way. Throughout this paper, I will report on a world issue such as potable water availability and give one example of a company that applied a successful business and engineering technique to the management of it. It is an example of finding a solution used in a completely different area applied to an identified problem to not only manage this resource, but lead the way in finding solutions through historical company practices in non-traditional business application areas. Utilizing knowledge capacities of communities, private and social sectors, a new conversation will be opened to how we assess and approach problem solving and apply it in a non-conventional way.

## **Global Water Crisis**

To dive into this paper we must first fully understand the water availability issue and how it could affect so many people.

### *The Situation*

Diseases and contamination carried by water kills between 5 and 12 million people a year (Howard, 2009). Municipal water systems are seen as the stop and fix points to provide clean water for populations in many countries, but what happens if a community cannot afford to pay the high cost of management for these systems? To combat this high cost it has been identified to simply buy safe water from other regions or areas of the world (Howard, 2003). Redistributing water from other areas has been seen as a solution to these types of water scarcity problems, but the water access solution includes technological innovations that foster volume production and sourcing efficiency. However this advancement in technology and use of its ability has stressed water reservoirs around the world by pumping with a disregard for where it is coming from.



The World Resources Institute estimates that 2.3 billion people currently live in “water-stressed areas” which is not limited to underdeveloped countries (Howard, 2003). In America the Ogallala Aquifer is a large source of water that is decreasing in capacity. Starting shortly after WWII the amount of water removed from the basin turned the region into a green fertile area. It also allowed urban areas to be developed and spread out to previously dry areas. Currently the Ogallala Aquifer supports one fifth of total U.S. agricultural harvest, which represents \$20 billion of the world’s food and fiber markets. This area of the U.S. has been developed into a highly productive cropland paired with technologies to exploit this resource on an exponential level. More than 90% of the water pumped is used to irrigate crops, the remaining is being pumped to support a high demand market in both nearby urban areas as well as tanked around the world. Today the basin is being used up at an annual volume equivalent to 18 Colorado Rivers (Little, 2009) The excessive use of this resource has severely stressed the current and predicted levels of water availability. This has produced a struggle between sup-

porters of economic growth and supporters of conservation of the declining resource (Little, 2009). This tug of war exemplifies the complexity of the management of this resource. Water is a resource that humans need, but it is also a resource humans want. Needs and wants drive technological innovation to obtain more of a resource at a more efficient rate (Connor, 2009). The question then becomes, what innovation is the right innovation, how do we employ these solutions, and who does the work?

### **Innovation: Combination of Technology, Methodology, Ideas, and Application**

Humans' wants and needs drive technological innovation which can produce both positive and negative results seen as solutions in some avenues and a catalyst to further problems in others. This advancement of technology should be classified as a tool and not a quick fix. An operator manages this tool, and the tool produces a result based on the application. How does this relate to water usage? Large and complex issues, such as water availability, can be tackled through innovation in technology, however it is important to remember that fast and impressive changes in the way people interact with the world, made possible through technology, adds pressures and solutions on and to the environment (Connor, 2009). In the world of agriculture we learned how to irrigate farms through advancements in pumping technologies. These improvements drastically changed the western region of the U.S. by transforming a once dry and barren land to a highly productive agricultural area. Through technology innovation, efficiencies of how the water is used and even how to determine when and where to use it has provided solutions to key questions in how to sustain the region's vital resource (Howard, 2003). But who should discuss these pathways, and who will do the work?

Dialogues need to transpire between people with multiple backgrounds and perspectives to confer and be in agreement on the allocation of technological innovation and who will push it forward. An article on Watersheds of the World states; "these types of discussions can lead to a range of technical, political, and financial measures to prevent water scarcity in the future and to meet development while maintaining functioning ecosystems" (Watersheds, 2003). During the past few decades' greater environmental regulation and corporate social responsibility combined with pressures from society have prompted cleaner and more environmentally friendly technologies. Government, education, and private industry have taken this to heart, injecting this philosophy into their research and development objectives, and into their marketing campaigns (O'Brien, 2009). There are companies currently leading the way in this effort to solve a global crisis in an effective approach, but in a way that is atypical. I believe by applying business practices to environmental areas of research and practice, the spread of technology, policy, and investment applied intelligently will solve the world's problems.

### **Who's Working Forward? How is this connected?**

IBM is a company that has identified the big problems that exist in this world. They are using the phrase "Building a Smarter Planet" as part of their campaign to apply their expertise in many areas of problem solving to change the world for the better. This is a great example of a company that has retained and injected large investments into re-

search and development (R&D) and has seen tremendous growth. This growth has given them the ability to create new ideas, innovate current systems and processes, and boldly say, “I know how to fix that” (O’Brien, 2009). In the many different areas they are working in, water is one they have not only identified as a crisis, but have developed programs and systems to manage it. Guided by the philosophy, “if you can’t measure it, you can’t manage it” they are rolling out programs to save tremendous amounts of waste through utilization of large amounts of data. Combining technology and methodology of other business practices, IBM developed a program called Green Sigma that applies Lean/Six Sigma to energy and water usage. This is a perfect example of how a non-typical technology and approach to an environmental issue has produced tangible results.

To fully understand this example one must first learn about Lean/Six Sigma. First, Six Sigma is the application of statistical tools to find root causes to problems and produce metrics to develop systems and processes. Developed at Motorola and innovated at companies like General Electric, Six Sigma is identified as an effective and efficient way to reduce waste, eliminate defects in production, compose optimization, and progress toward continuous improvement. This methodology and tool set has its roots in manufacturing and business practices for large organizations, but in recent years it has been expanded into many different arenas (Connor, 2003). The goal of implementing Six Sigma strategies is to use statistical tools to uncover root causes and provide metrics as benchmarks to fix, innovate and build new systems to limit variation all while keeping quality as a solid foundation.

If quality issues are managed through Six Sigma, Lean manufacturing can be identified as a great way to boost productivity, change a culture, and clean up disorganized environments. Established through the Toyota Production System and continuous improvement initiatives Lean has evolved into a methodology to foster action and intuition that efficiently attacks quality and flow issues. In basic terms Lean is described as doing more with less (Connor, 2003). By combining Lean and Six Sigma the capacity to achieve lasting and meaningful results increases, as opposed to utilizing one or the other by itself (Smith, 2003). If correctly implemented and utilized these complement each other, especially in today’s industrial environment. There are few restrictions to Lean/Six Sigma in today’s world of innovation. To many industry leaders Lean/Six Sigma is seen as the necessary toolset to make the most of all job functions large and small.

This approach to business is what separates the ordinary from highly successful organizations. Application of these practices drives performance and commitment. A case study of Landscape Structures Inc. exemplifies the use of Lean techniques and Six Sigma projects by their success in cutting lead time in manufacturing by 92%, improving productivity by more than 20% and dropping scrap from .8 to .2%. Through the combination of Lean and Six Sigma they were able to identify the root cause, applied resources to fix the problems, and produce lasting results. They identified a key point to the purpose of these methodologies, which is problems are more complicated than they seem from the outside looking in. Taking a new approach to problem solving by breaking every element of the system down and putting it through analysis allowed

Landscape Structures to take an outside look into how the process worked on every level. Lean and Six Sigma kept them from dragging out a problem by eliminating complexity (Smith, 2003). Lean/Six Sigma approaches are not a solution, but a means of finding a solution. Likewise IBM's Green Sigma initiative is one example of applying the tools and methodology of Lean/Six Sigma to an environmental issue.

The goal of Green Sigma is to manage and reduce water and energy usage and inefficiencies through advanced analytical techniques and software to make it transparent for their operations. Through Green Sigma, the application of management tools to optimize water consumption is put into practice. Additionally, through the employment of their dashboard software, the visualization of the entire process is displayed to find key performance indicators, and areas to improve on (Cadmus, 2008). IBM's efforts in corporate social responsibility and commitment to finding solutions to big problems while making financial gains have given them the opportunities to make not only a smarter planet, but lead the way for others to follow. A relatively small innovation such as Green Sigma can be huge for one sector of the world, but if the same method of applying non-conventional ideas to problems is replicated real change is possible and more opportunity is made available.

## **Starting a New Conversation**

*How is this all connected?*

The increase in environmental R&D in developed countries paired with encouragement of private sectors investment has already produced great technological innovations. This has not only provided tools and systems, but an awareness and response to public policy toward regulations and standards (Connor, 2009). The application of knowledge and skills in a way not thought of before leads to a solution, and in some cases a process to be replicated or adapted to solve more unseen problems. A new methodology in inviting others to the conversation is needed as well. The best way to start this conversation is first by identifying the strengths and skills of the community one exists in. This is called asset based community development and it will be the method by which citizens will become motivated to find capacities in which they apply what they know to an area of need not thought of before (Block, 2008). The strength of this new conversation is not only in the ability to apply new innovative technologies, but people developing and guiding these technologies to fix big issues. This conversation is not reserved for small communities but expanded in a global scale. Through the utilization of the strengths of multiple industries and disciplines, issues are then combatted through collaborative efforts. It is not just a physical conversation but also the action of using what we already know or what have done before to our advantage. There is no need to duplicate current efforts in different areas, but to use what has been done to build on and produce a working solution. A business process, for example, is something that no one owns, but can be made to work anywhere. The power of Lean/Six Sigma is that it can be utilized by any organization that wants to implement it without paying royalties to the inventor. By researching knowledge in different areas we can solve these problems by applying what we know in a new way. Green Sigma did this by make use of a combination of management, engineering, and environmental research applied to produce a

system that successfully reduces water waste and energy use. This same methodology and use of technology can be employed without the need to redesign.

In an effort to start this conversation the invitation needs to be extended beyond private, education, and government to others with varied assets in many different disciplines to work on global, cross-cutting issues to maximize efforts to solve problems at hand. By inviting the knowledge of management systems in private industry applied to the research performed in the education and government sponsored realms on a global scale, we will have a different conversation rather than trying to do it all one way, in the interest of one party.

## **Conclusion**

With examples of water scarcity and misuse, now is a time to save what we have left and fix current detrimental practices of doing business. In the debate between alternative energies, the means to fund and push new technologies along is still up in the air. Daniel Est, director of Yale University's Center for Environmental Law and Policy believes that governments from around the world should push innovation at a higher level by charging for emissions. Opposite of this, Vinod Khosla co-founder of Sun Microsystems and now a venture capitalist views government directed paths can lead innovators away from what might be the most cost-competitive solution. Khosla agrees that governments around the globe should and have set price signals that spur innovation, but argues that if you create a solution that the average American or the fast growing economies such as China and India will adjust to, it will lead the way for other countries to adapt (Little, 2009). These two leaders have two very different ideas of pathways to take, but they are thinking and speaking out. By simply having the conversation for who to solve these problems starts working towards solutions, but it needs to be expanded to include further dialogues between more people on how and who will come up with inventions and innovations. Instead of choosing one way or the other, the two viewpoints could collaborate and think of areas that real change could actually be made. The goal is to change the mindset, which will not produce the exact solutions, but it will start the process of thinking in a different way. Yes, IBM is producing a system like Green Sigma for profit, but what they are also doing is talking about the large issues on a global scale seeking advice and interest from everyone interested. This will not be accomplished by one company or one government, but by the combination of all avenues at once. It starts by taking an introspective look, and identify what skills or knowledge one uses in daily life, work, or for hobby. Then share that with as many people as possible and begin to ask the question, how could I apply this to help out in some way? Because of our interconnectedness and interdependence, it will take a global effort. Innovation and out of the box thinking can come from the margins, and inject ideas and solutions to problems to not only take a new approach but collectively adapt to a new way of life. It takes leadership and commitment to truly make this objective possible. It is not a vision driven by one opinion or another, but a combination of both. Governments need to set standards and create policy, private industry needs to produce new technologies and services, and other knowledge communities need to step up and realize how much of an impact they can have. This should no longer be a debate on who is doing the most destruction but a shift to who has the capacity to solve the destructive issues.

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