2015 UN-Water Annual International Zaragoza Conference
15–17 January 2015
Water and Sustainable Development
From vision to action
UN WATER
WATER FOR LIFE 2005-2015

Business contribution to managing water scarcity: tools and lessons

John H Matthews (Alliance for Global Water Adaptation, AGWA), Paul Reig (World Resources Institute, WRI)

This paper focuses on how the business community can support the implementation of the SDGs where water scarcity is a significant obstacle for achieving those goals. Here we explore how the threats of water scarcity for the business community, practical responses, the implementation challenges for the required actions by the business community, tools developed by businesses, and the lessons learnt from using those tools. This overview is intended to serve as a preliminary statement for how to mobilize and scale up coordinated action.

1. The Threats of Scarcity

For the majority of water users, water scarcity represents the most significant risk imaginable— to businesses, whole economies, and the ecosystems that provide the natural capital for those economies. The key threat inherent in scarcity is that water cannot be replaced, and although many water scarcity events often evolve and develop slowly over weeks, months, or even years, their impacts strain systems and institutions, including the relationships, regulatory frameworks, and supply chains in which those systems and institutions are embedded.

Moreover, scarcity is often a *relative* quality — most often, scarcity is experienced as unmet needs, and those needs vary by individual water user. One institution's crisis may be another's sufficiency, or even overabundance. Water scarcity may indeed really be a water quality issue, with insufficient useable water even when it appears that water supplies should be available. Infrastructure and technology in many cases are intimately connected to scarcity. Can we store, treat, or move enough water during scarce periods? However, allocation and governance — which encourage or discourage effective decision making — are also essential. They become in a sense the virtual infrastructure, channeling water among sectors and between users. Even in developed regions with sophisticated and robust governance and technology systems such as Australia's Murray-Darling basin or North America's Colorado River basin, the difficulty in the resolution of the stressors around water scarcity show that anticipation, coping, and ultimately the negotiation involved in reallocating is a challenge common to emerging and developed economies.

Finally, while water scarcity is far from a new problem, scarcity may be developing new manifestations in this century. While the 20th century saw the rise of megacities, the onset of anthropogenic climate change, localized agriculture leaping forward to hi-tech service and manufacturing economies, and intensive globalization, the 21st century will surely see equally large or larger transformations. Analyses of international trade, for instance, show that massive virtual water exchanges are occurring between continents, while the global availability of freshwater resources may itself be altering. Many of these transitions are relevant at the middle and long term decision making timescale, even as they are difficult to predict. A vision of sustainable development for this century for business must resolve into goals that are both durable and flexible.

2. The Challenges to Practical Responses

How do we harness the creativity and innovation within business, fostering growth and employment, while also achieving sustainable development goals around water allocation and access? Efficiency is often viewed as the most important and first response to scarcity by the private sector. Efficiency reduces systemic stress between institutions, stakeholders, and water users by decreasing competition. In many cases, an analysis of water intensity or the more precise application of technology can increase efficiency. However, efficiency is not a panacea, and efficiency can even produce new risks. For instance, efforts to increase efficiency may be confounded by governance and allocation mechanisms designed during or better suited to non-scarce conditions, producing perverse incentives that place unequal and inequitable burdens among water users. New technological solutions to efficiency may be inappropriate in some socio-economic or operational contexts. In other cases, optimization analyses may be insufficient or not robust to a variety of scenarios, so that shifting circumstances may reveal that more efficient arrangements are brittle and inflexible. Assessments of water use may center on where water is visible (such as in irrigation or in manufacturing processes) rather than through supply chains or critical systems, such as energy or transportation. Worse, non-stationary processes such as demographic change, climate shifts, and economic transformation (such as the transition from an agricultural to a manufacturing economy) can reveal previously unseen or even nonexistent vulnerabilities.

3. Addressing Challenges – Developing and Using Tools

If efficiency is not a panacea for the private sector for water scarcity and sustainable development, then what alternatives exist? Implementing long-term positive changes around water scarcity has proven a significant challenge for the business community, but also one with increasing coherence and progress. Water is not always visible, and some of the most significant risks from scarcity may be embedded in supply chains or hidden in broad networks that may not be in regular dialogue with one another. Who sees themselves as a water manager? How can we ensure that more people view themselves as engaged in allocation and coordination?

Tools to support sustainable development in the face of realized or potential water scarcity can be both tangible and tactical as well as strategic and conceptual, but they should always guide decisions and actions. Here, we will explore how tools can support the private sector across three interconnected levels:

- ✓ Local-scale **facilities management and operations**: How do solve water management problems on a daily or weekly basis? How do we meet production targets during a drought? Can we negotiate with a new local water user? This level focuses on meeting proximal, short term, and relatively local goals.

- ✓ **Process analysis.** How are operations and embedded within processes? In many cases, process analysis ties together distinct facilities into networks, or separate functions and activities within a single facility into stepwise, discrete systems. These processes may be directly relevant to business operations, such as supply chains or manufacturing operations, or they may be connected to external systems and relationships, such as regulatory and legal frameworks for resolving water conflict or energy supply and water treatment systems.

- ✓ Enterprise-level **strategic goals, investments, and relationships**. How do we enable long-term growth and profitability? For large, geographically dispersed, and/or long-lived businesses, high-level strategic thinking should focus on how to best empower decisions at process and facilities levels. Often, these decisions involve complex tradeoffs between local operations and enterprise-wide priorities. Should an existing facility be expanded in one region to improve water security and efficiency, or should investments be developed in another region with more reliable allocation mechanisms?

Facilities Management and Operations

Water scarcity at the facility level is often very tangible and direct: facility managers can *see* the effects of unmet demands, both within the facility itself and in the larger community. This level is perhaps the most appropriate focus for efficiency analyses: how do we make the most productive use of available water resources? Data is often richest at this scale, while direct water expenses are also most directly and keenly felt here. Decision making can be rapid, experimental, and optimizing. At the same time, facilities managers are most often on the frontlines with stakeholders who may perceive — rightly or wrongly — that an enterprise is taking "their" water. However, major changes in infrastructure or external relationships may be difficult to implement at the facilities level, so that these concerns or alternatives may need to be communicated upwards, to higher management levels in order for strategic investments to be approved and implemented. In addition, crisis thinking may dominate at the local scale. Are we fighting the last drought, the drought we are facing now, or the next drought we will be facing? As a result, tools (and solutions) at the local level often emphasize technical (and technological) interventions, optimizing water usage in order to reduce consumption and,

ultimately, the impacts of scarcity. Tools that document and communicate the efficacy and limits of optimization and efficiency are also useful at this scale, as they can help other local water users see the impacts of more sustainable decisions by the business. Tools at this scale are particularly important for resolving crises and extreme events.

Box 1. Desalinization to Meet Drinking Water Needs

Abengoa has developed approaches to membrane desalination (and the finance processes necessary to implement and operate the facilities) to generate alternative resources that provide drinking water in water-scarce at costs that are affordable for emerging economies. Recent facilities have been built in Algeria (three desalination plants), Ghana, Morocco, and India as Public-Private Partnerships (PPP) in water projects, using Project Finance (PF).

Source: Arturo Buenaventura, Abengoa

Process Analysis

At a higher level of abstraction than the single facility or operational function, process analysis explores the relationships between facilities and functions, often through time and space. Ideally, a process analytical level examines risks, opportunities, synergies, and competition between organizations and systems. Have we framed the problem of scarcity correctly for our business? Have we accurately identified our vulnerabilities and pressure points? For instance, the water footprint of electrical consumption may be far larger than the direct operational water consumption, so that water scarcity may be addressed through energy reduction and efficiency investments rather than the reducing water wastage.

The process level is particularly important for examining connections between facilities and envisioning how water may be embedded within supply chains, especially with facilities that may be outside of the direct control of the business itself. How will hydropower-derived energy shortages for "upstream" farmers reduce crop yield? How will drought conditions for dry-season flows reduce navigation capacity for "downstream" transportation by shippers? In countries that have historically limited regulation of water resources, businesses have in some cases taken bold step to begin working with stakeholders at a basin level, moving well beyond their direct purview and footprint to engage in broader allocation discussions in order to ensure sufficiency and sustainability. Tools at the process level, then, are a means for identifying connections and capacity, and then for developing robust solutions that ensure redundancy and continuity.

The development of standards and guides, for instance, can redefine decision-making boundaries so that sustainability becomes a consistent, reinforcing outcome, rather than an accident or dependent on individual understanding. Ideally, tools shift economic and financial incentives to focus on long rather than short term sustainability goals, as well as moving from a crisis orientation to dealing with ongoing and slow-onset shifts in water availability, such as those resulting from demographic shifts, climate change, or urbanization.

Box 2. Defining Investment Standards for Green Performance

Green bonds have emerged in recent years as a promising new financial mechanism that offers investors an opportunity to support climate friendly investments. Projects funded by green bonds have been located across the globe and focused on a variety of goals, from increasing the resiliency of water systems to boosting energy efficiency. The involvement of the multilateral development banks has driven interest in green bonds, with government agencies, municipalities, and more recently utilities and corporations finding ways to use the financial instruments. But maintaining credible market growth will require new tools that will assist issuers in meeting investor demand for climate-themed bonds; assist investors in recognising such bonds; and assist governments in supporting investments in such bonds. Water investments are fast becoming a popular theme for green bonds. The potential for green bonds to drive low-cost capital in search of thematic relevance to clean water projects is undeniable. But while it may be tempting to define every water project as "green," inclusion of environmentally destructive water projects could undermine market credibility and unnecessarily compromise the competitiveness of water projects with a higher environmental and social yield. In these early days of the blossoming green bonds market, the Climate Bonds Initiative in collaboration with the World Resources Institute, Ceres, and CDP are leading the \development of a credible standard for green water bonds to assist capital seeking the highest quality projects that result in measurable impacts. Developing a robust framework for bond issuances in the water sector will help to create awareness about the opportunity within the sector and give investors the confidence that the funds are being used to deliver credible climate change solutions.

Source: Justine Leigh-Bell, Climate Bonds Initiative

Strategic goals, investments, and relationships

At the highest decision making levels within the private sector, water scarcity is a strategic investment issue: Will this program or product continue to be profitable? Should we invest in Ethiopia or Cambodia? Do we shift to new technology or continue with existing approaches? How are governance, climate, and sociological conditions likely to evolve in accordance with our customer needs over the operational lifetime of new infrastructure? Solutions to scarcity at this level are often not clear profit and loss choices. Risks are less certain, and decision making may approach a "satisficing" methodology as complex and difficult to quantify needs are approximated and balanced.

Tools at this level should clarify but not eliminate complexity. Oversimplification and the reduction of a multifaceted challenge to a single parameter will make efforts at the facility and process levels harder and potentially exacerbate problems of scarcity.

Box 3. The Stewardship of Water Across Complex Supply Chains

The Alliance for Water Stewardship (AWS) has been developing the concept of water stewardship in a way that can be used to deal with problems of water scarcity, poor water quality, threats to and loss of important ecosystems and cultural places, and unequal access to water. Water stewardship requires collaboration between business and industry, farmers, communities, governments (and their various agencies), and civil society organisations. In this case study, the system has been applied in the supply chains of major retailers in Africa and Latin America and in the supply chain of food producers in Australia. Each case has involved the larger business (retailers or producers) engaging farmers in examining their water use in the context of the AWS Standard. It adopts a six step process to achieve four outcomes; (1) sustainable water balance, (2) good water quality, (3) healthy important water related areas, and (4) good water governance. The larger businesses were motivated by a need to manage water-related risks in their supply chain, and/or enhance their brand or reputation. A universal outcome evident in all cases was the extent to which the system encouraged collaboration between stakeholders who may not have collaborated previously. Another important outcome was the extent to which implementers were required to look "outside their gate" to the catchment or basin in which they operated and the water challenges in that catchment. This fostered a common understanding of the issues and the role each participant could play in resolving those issues.

Source: Michael Spencer, Alliance for Water Stewardship

4. Enabling Partnerships for Sustainability

Water has become increasingly visible within the business community within the past decade. The language of virtual water has made water visible to more people and in a more sophisticated way, especially from a strategic level. Perhaps the most important relationships that have developed in this regard are from within the business community, as organizations have helped one another to reframe what scarcity looks like and how it can be addressed. Efforts to see sustainability within the larger context of social and environmental sustainability have also made businesses aware of their role as a water user embedded within larger communities and relationships, as well as for the need to make use of other groups, such as civil society, academia, and science.

Box 4: Managing Water Infrastructure over Long Timescales

Most countries have followed economic pathways that involved increasingly intensive water management to minimize risks from droughts and floods and to harness the power of water for supply and sanitation, energy, navigation, and irrigation and aquaculture. Up to 750 billion USD is now spent globally per year to maintain legacy infrastructure, with new investments in the developing world approaching a similar order of magnitude. Unrobust investments made now in regions such as Africa, Asia, and South America are likely to undermine economies and ecosystems and lay the seeds for conflict, inequity, and environmental degradation for future generations. Climate change is a critical driver in this process. Water infrastructure typically

lasts decades, centuries, or even (in a few cases) millennia. And the impacts of that infrastructure can last far longer than the infrastructure itself as the economic system reorganizes itself around the services it provides. However, because of the longevity of water infrastructure and the sensitivity of the water cycle to climate change, there are high risks for divergence between the climate infrastructure has been designed for and the climate it must actually operate in. Current approaches to sustainability over these timescales are inadequate, particularly given the high uncertainties around future projections for water impacts from climate change. The Alliance for Global Water Adaptation (AGWA) is a network focused on creating a Decision Support System (DSS) that integrates the emerging insights from diverse regions, disciplines, and institutions about mainstreaming long-term sustainable water resources management. The DSS is a series of guidance documents in development, which focuses on four major components: "bottom-up" approaches to vulnerability assessment that reflect inherent system limits and serve as an effective means of framing uncertainties about future climate projections rather than top-down methodologies that rely heavily on climate models to frame vulnerability; creating explicitly flexible decision pathways that use economic analytical methodologies to estimate the costs of maintaining multiple options and evaluate tradeoffs between waiting for more-certain information before implementation versus acting in the short-term with less information; integrating approaches to resilience from both engineering (hard infrastructure) and ecological (dynamic social-ecological systems) perspectives; and developing governance systems that reallocate, learn, and anticipate shifting needs and conditions.

Source: John H. Matthews, Alliance for Global Water Adaptation

5. Where (and How) Can We Learn Lessons?

The process of finding appropriate business solutions for scarcity is worth careful consideration. Successful knowledge exchanges can occur through:

- ✓ Peer to peer transfers, such as through like-minded business networks and alliances
- ✓ Ambassadors between business sectors (e.g., energy and agriculture)
- ✓ Translators between social sectors, such as academia, civil society, and government

However, novel challenges — from the possible emergence of new faces for water scarcity, not yet widely experienced as of yet — present more difficulty, as they call businesses to learn in advance of the problem. How can we respond "sustainably" to "superdroughts," a planet with more than 9 billion people, or the ongoing erosion of seasonal snowpack in Andes and Himalayas? Are these even within the purview of challenges that can be addressed by the private sector?

Box 5. Mobilizing the Mining and Metals Industry around Catchment-based Water Management

The International Council on Mining and Metals (ICMM) was founded to improve sustainable development performance. One recent product has been a co-developed guide for members that outlines a comprehensive and systematic approach for identifying, evaluating, and responding to catchment-based water related risks. It is not exhaustive, but rather serves as a structured prompt to guide mining and metals companies in the development of their water strategies and plans in accordance with the local context and hydrology in which their operations take place. The guide also aims to complement existing external initiatives and codes, many of which are referenced throughout the document.

Source: Ross Hamilton, International Council on Mining and Metals

6. Addressing the Challenges: Panel Questions

Panel Suggestions

Can we inspire, find synergies, and still remain practical and grounded?
Are these challenges described above useful and informative? How should they be reframed?
Can we find patterns in our solutions — developed vs developing world? Arid vs wet latitudes? Service vs manufacturing?

Panel Topics

Technology & Arturo Buenaventura: How were stakeholders engaged to find consensus about water supply? Has that consensus remained stable? What differences have emerged across regions, political and climate regimes, and local contexts? How has the use of long-term contracts altered the technological investments into community or social investments? How can finance be used as a mechanism for sustainability?
Governance & Michael Spencer: Have voluntary standards proven to be a way to forge new relationships and practices across the supply chain? What are the advantages and limits of these approaches? What challenges do you see in connections between steps in supply chains, particularly across national borders, catchments, and businesses? Do you see insights from retailing and agriculture for other business sectors?
Financing & Justine Leigh-Bell: Until very recently, climate change in the investment community referred almost exclusively to climate mitigation and energy production and efficiency, while you are developing standards that focus on long-term water security. What enabled this transformation in focus? What resources outside of the business community did you seek? How will the standards alter investment decisions?
Capacity Development & Ross Hamilton: Your guidelines reveal a willingness for extractive industries that have historically viewed each other as competitors to begin to collaborate in a

substantive way on sustainability issues. What prompted this shift, and what long-term shifts in thinking and action does this herald? Was finding consensus on the vision behind the guide difficult to achieve? Why or why not?