



The CEO Water Mandate

Driving Harmonization of Water Stress, Scarcity, and Risk Terminology Discussion Paper

January 2014

Background

As corporate water assessment tools and stewardship initiatives continue to emerge and their underlying approaches and methodologies evolve, there has been a proliferation of sometimes conflicting interpretations and uses of key terms, such as water “scarcity”, “stress”, and “risk”, often used to indicate geographic locations where water-related challenges are more pronounced. In advance of its March 2013 multi-stakeholder working conference in Mumbai, the CEO Water Mandate developed a briefing paper that describes how definitions and interpretations of these terms have evolved over time and how they are currently being used differently by various corporate water tools and initiatives.

In May 2013, the Mandate Secretariat initiated a dialogue among organizations developing corporate water tools and other initiatives, including the Alliance for Water Stewardship, Carbon Disclosure Project (CDP), Ceres, Global Reporting Initiative (GRI), The Nature Conservancy, Water Footprint Network (WFN), World Resources Institute, and WWF to see if a shared understanding could be reached on a number of key definitional issues. While acknowledging that each group uses these terms to varying extents and orients their tools and other products around different objectives, participating organizations agreed that when making use of these terms, doing so in a harmonized and consistent way supports understanding of their products and limits confusion among their audiences. In this spirit, they sought to work toward a mutual understanding on key questions such as:

- Do “scarcity”, “stress”, and risk” refer to three distinct, useful concepts in the context of corporate water stewardship?
- What specifically is meant by each term? How do organizations conceive of them differently?
- How do these terms relate to one another?
- How can these terms be used in practice? For what purposes may these terms not be appropriate or useful?

This initial dialogue has led to a several-month-long, iterative endeavor by which the aforementioned organizations have attempted to reach shared understanding of these terms, while also identifying areas where there is divergence in understanding. These discussions have focused on developing a conceptual overview of these terms and their relationship to one another, as opposed to harmonizing quantitative approaches to calculating and measuring them. The latter goal was deemed quite difficult due to data and science limitations (and perhaps even undesirable).

This paper summarizes key outcomes from this process to date. Looking forward, the Mandate Secretariat and partnering organizations seek to solicit feedback on this work within the corporate water stewardship community, as well as more broadly amongst others in the scientific, water resources management, and risk assessment communities and others helping to shape the development of water-related indicators and metrics, in order to further refine our thinking.

Critical factors in assessing the nature of and relative severity of water challenges

Discussion among participating organizations has suggested there are a number of approaches and considerations that are important to incorporate when assessing the nature and severity of water-related challenges, including:

- The terms “water stress”, “water scarcity”, and “water risk” refer to three distinct concepts and should not be used interchangeably.
- Water consumption, in addition to water withdrawals¹, is a helpful, often necessary, aspect of understanding an area’s water challenges, and demand for water specifically.
- High spatial resolution of data is preferable wherever possible.
- Calculations of water abundance should account for upstream consumptive uses that deplete available supplies.
- Accounting for monthly variation in water supply and demand is preferable where data allow.
- Environmental flow requirements should be explicitly considered when assessing the extent of an area’s water challenges.

Conceptual definitions of key terms

Water scarcity

“Water scarcity” refers to the volumetric abundance, or lack thereof, of water supply. This is typically calculated as a ratio of human water consumption to available water supply in a given area. Water scarcity is a physical, objective reality that can be measured consistently across regions and over time. Water scarcity reflects the physical abundance of fresh water, rather than its availability for specific needs. For instance, a region may have abundant water supplies (and thus not be considered water scarce), but have such severe pollution that those supplies are unfit for human or ecological uses.

Tool developers and organizations differ on whether environmental flow requirements should be included when assessing water scarcity. WFN, for example, takes environmental flows “off the top” when calculating water availability, whereas other organizations do not and rather opt to address environmental flows in their respective approaches to characterizing water stress.

Water stress

“Water stress” refers to the ability, or lack thereof, to meet human and ecological demand for water. Compared to scarcity, “water stress” is a more inclusive and broader concept. It considers several physical aspects related to water resources, including water scarcity, but also water quality, environmental flows, and the accessibility of water (i.e., whether people are able to make use of physically-available water supplies), which is often a function of the sufficiency of infrastructure and the affordability of water, among other things. Both water consumption and water withdrawals¹ provide useful information that offers insight into relative water stress. There are a variety of physical pressures related to water, such as flooding and aquatic habitat degradation, that are not included in the notion of water stress. Water stress has subjective elements and is assessed differently depending on societal values. For example, societies may have different thresholds for what constitutes sufficiently clean drinking water or the appropriate level of environmental flows to be afforded to freshwater ecosystems, and thus assess stress differently.

In contrast to available water risk assessment tools, WFN’s Water Footprint Assessment Tool does not use the term “water stress”, but instead identifies water-challenged regions (sometimes referred to as “hotspots”) based on water scarcity, water pollution levels, benchmarks, (i.e., where the water consumption can be reduced or avoided for reasonable cost) and indicators of social equity. It can be understood that these hotspots are areas experiencing water stress.

Water risk

“Water risk” refers to the probability of an entity experiencing a deleterious water-related event. Water risk is felt differently by every sector of society and the organizations within them and thus is defined and interpreted differently (even when they experience the same degree of water scarcity or water stress). That notwithstanding, many water-related conditions, such as water scarcity, pollution, poor governance, inadequate infrastructure, climate change, and others, create risk for many different sectors and organizations simultaneously. This reality underpins the notion of “shared water risk” or “basin risk” that

¹ For a more in-depth description and explanation of the terms “consumption” and “withdrawals”, see Appendix A.

suggests that different sectors of society have a common interest in understanding and addressing shared water-related challenges. However, some contest the appropriateness of such terms on the basis that risk is felt uniquely and separately by individual entities and is typically not shared, per se.

“Water risk for businesses” refers to the ways in which water-related issues potentially undermine business viability. It is commonly categorized into three inter-related types:

- *Physical* – Having too little water, too much water, water that is unfit for use, or inaccessible water
- *Regulatory* – Changing, ineffective, or poorly-implemented public water policy and/or regulations
- *Reputational* – Stakeholder perceptions that a company does not conduct business in a sustainable or responsible fashion with respect to water

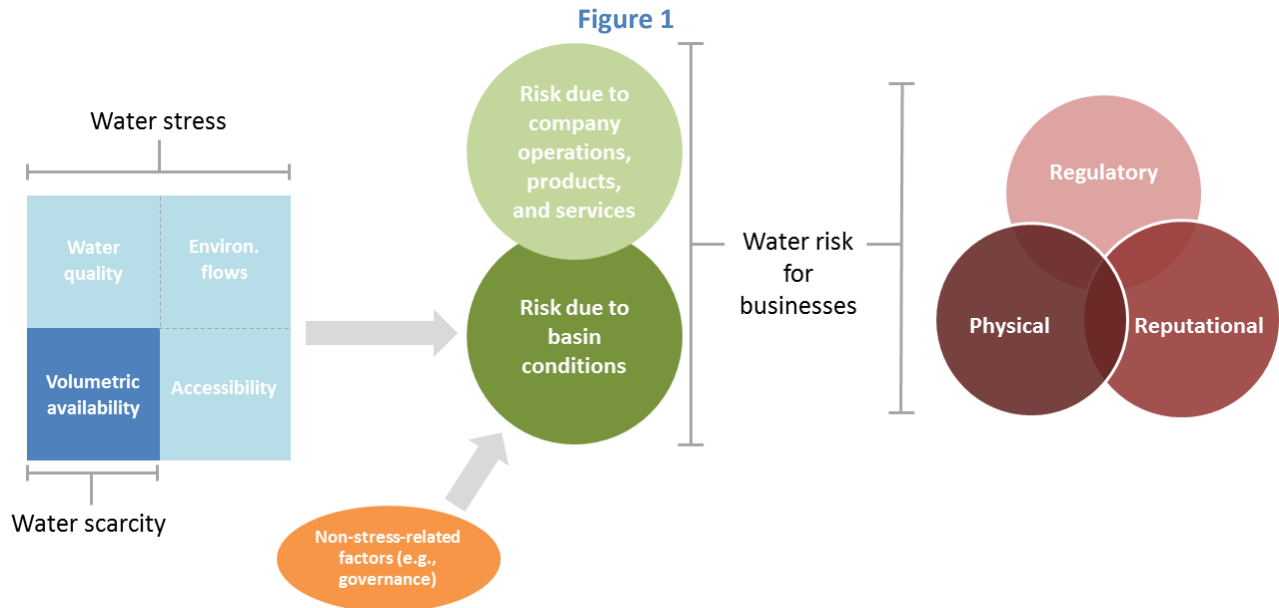
“Water risk for businesses” is also sometimes divided into two categories that shed light on the source of that risk and therefore what types of risk mitigation responses will be most appropriate:

- *Risk due to company operations, products, and services* – A measure of the severity and likelihood of water challenges derived from the way in which a company or organization, and the suppliers from which it sources goods, operate and how its products and services affect communities and ecosystems.
- *Risk due to basin conditions* – A measure of the severity and likelihood of water challenges derived from the watershed/basin context in which a company or organization operates, which cannot be addressed through changes in its operations and requires engagement outside the fence.

If a company experiences a high degree of “risk due to company operations” then it likely will seek to implement water efficiency, wastewater treatment, and other improvements in its own facilities or through its suppliers in response. However, if a company primarily experiences “risk due to basin conditions” then such operational measures would likely not sufficiently address this basin-level risk. Because of this, the company might instead seek to collaborate with other interests in the basin to advance an aspect of sustainable water management (e.g., by facilitating water use efficiency in other water users or supporting infrastructure improvement efforts) in the regions in which it operates.

Relationship between terms

“Water scarcity” is one aspect of many that contributes to and informs “water stress”. An area could conceivably be highly water stressed, but not water scarce, if, for example, it had egregious water pollution, but plentiful supplies of contaminated water. “Scarcity” and “stress” both directly inform one’s understanding of “risks due to basin conditions”. Companies and organizations cannot gain robust insight into water risk unless they have a firm understanding of the various components of water stress (i.e., water scarcity, accessibility, environmental flows, and water quality), as well as additional factors, such as water governance. This concept is explored further in the “Applications and functionality” section on pg. 4-5. These relationships are illustrated in Figure 1.



Note: WFN calculates environmental flow requirements as part of its volumetric availability.

Applications and functionality

These terms are useful insofar as they help society and organizations understand the degree and nature of water challenges for a geographic region and make informed decisions on how to manage them. Below we describe some of the specific applications of each term and identify applications for which they are not typically well-suited.

Applications of “water scarcity”

“Water scarcity” (illustrated by the dark blue box in Figure 1), at its core, serves as one way to assess and compare the health of river systems. Indeed, WFN’s Water Footprint Assessment Tool, which aims to understand how water use by companies and others may affect the sustainability of a river system (as opposed to assessing business risk), uses basins’ relative “water scarcity” (and specifically “blue water scarcity”) as a way of understanding where equivalent water footprints will have more severe impacts. Since scarcity is a relatively simple measure that reflects an objective reality, it is also useful as the basis of quantitative measurements and comparisons. However, this measurement alone is not an effective approximation for “water risk”, but rather is only one of many factors that contribute to and inform water risk for businesses.

Applications of “water stress”

“Water stress” (illustrated by the four blue boxes in Figure 1) serves as a way of understanding where it is challenging to meet human and ecological demands for water. Since it addresses a wider range of factors, “water stress” is considered more useful than “scarcity” when evaluating “water risk”. As such, “water stress” is sometimes used as an approximation of areas that are likely to lead to “water risk”, especially when a more comprehensive assessment of qualitative risk factors is not available. The WRI Aqueduct tool, for example, uses “water stress” as a key factor in understanding where companies might face “water risk”. Similarly, WWF Water Risk Filter accounts for water scarcity, pollution, and impacts on ecosystems when assessing “physical water risk”. The Water Footprint Assessment Tool combines blue water scarcity and water pollution levels, in addition to water use efficiency benchmarks to identify “hotspots” or basins with water stress, which can also indicate where companies might face “water risk”.

However, since stress is a somewhat subjective concept and our ability to measure it scientifically and consistently is quite limited, using water stress as the basis of sound quantitative comparison is not possible at present. That said, it may be possible to develop simplified proxy measures that indicate areas that would generally be thought of as “water stressed”, based on more easily-quantifiable metrics. This would greatly improve its utility in disclosure and communications settings.

Application of “water risk”

“Water risk” (illustrated by the green circles in Figure 1) serves as a comprehensive compilation of the ways water issues may affect specific businesses, governments, communities, and others. Because of this, by definition, it is the most useful term to use as the basis of decision-making and strategy planning geared toward supporting business viability, if effectively assessed and understood. However, various dimensions that inform “water risk” are elusive to measure with scientific certainty due to their complexity and inherent subjectivity. Thus, “water risk”, at the moment, is mostly an anecdotal approach, as opposed to a scientific approach, and is not well-suited for robust, sound quantitative comparison. It may also be too complex for typical communications and awareness raising efforts. “Risk” encapsulates some factors that affect business viability, but that do not necessarily affect the degree to which a basin is managed sustainably. For example, if infrastructure delivering water to a company facility is insufficient or damaged, the company may not be able to operate optimally (and thus face risk), but the basin will likely be unaffected. As such, “risk” is not necessarily the most helpful concept for driving water sustainability in specific basins.

Areas of further inquiry

Despite numerous areas of emerging alignment, this discussion to date has also revealed a number of areas where participating organizations interpret and conceptualize water terminology differently. Understanding these areas of divergence is important in understanding related tools appropriately and communicating water-related information in a more meaningful manner. It also shines a light on priority areas for future discussion before shared understanding of key terms can be achieved in the corporate water stewardship space. Questions for which there is no consensus as of yet include:

- Should a naturally-arid region with no water demand be considered water scarce? Stressed?
- In the absence of location-specific environmental flow requirements, is it helpful to use a generalized approach to understanding sufficient environmental flows? If so, what might this approach look like?
- What are the various components needed to understand water “accessibility”?
- Does understanding of these terms among the corporate water stewardship community align and agree with that of the broader water research and risk assessment communities? (Are there opportunities to drive further alignment with these communities?)

Appendix A: Explaining water “consumption” and “withdrawal” and the relationship between them

In this document, we assert that, depending on whether one is assessing “scarcity” or “stress”, different approaches to understanding water demand might be more or less appropriate. Specifically, we state that water “consumption” is most appropriate when trying to understand water “scarcity” and that both “consumption” and “withdrawal” can provide meaningful information on the relative extent of water “stress”. This appendix explains and further unpacks these terms for those unfamiliar with them.

- **Water withdrawals:** The volume of freshwater extracted from a surface or groundwater source, without accounting for how much is returned to the freshwater source after use.
- **Water consumption (also known as consumptive use of water):** The volume of water that is extracted (withdrawn) from a freshwater source and *not returned* to that source after use. Water is consumed due to evaporation or being incorporated into a product. For example, water that is used as an ingredient in a beverage and therefore does not return to the basin is considered to be consumed. Water is also considered to be consumed if it is returned to a different catchment or the sea.

Comparing the volume of “consumption” relative to available water supply allows one to understand how much water is remaining in the freshwater source, and is thus directly related to the concept of “scarcity”. Additionally, understanding whether the volume of “withdrawals” exceeds available supply in a given area, sheds light on whether this is enough water to meet human and ecological demand, thus the usefulness of both “consumption” and “withdrawals” in understanding “stress”.

Figures 2 and 3, reprinted with permission from the book *Chasing Water* by Brian Richter (Island Press 2014), illustrate this difference.

Figures 2² and 3



² Figure 2 is meant to illustrate the differences between water withdrawals and water consumption in the most basic sense. As such, it does not include some ways which water can be consumed (e.g., being included in a product or sent to another basin).