



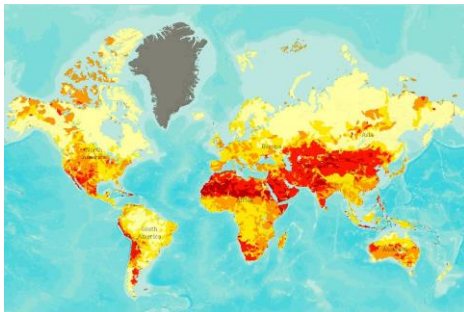
Overview

Multi-national corporations and investors are increasingly interested in understanding their organization's water-related risk exposure not only within their direct operations, but also across their global supply chain. Working with Eli Lilly and Company (Lilly) and Kaiser Permanente (KP), a Water Risk Analysis Framework for Suppliers (WRAFS) was developed and applied to Lilly's first tier supply chain for the manufacturing and packaging of insulin for the U.S. market.



The application of WRAFS to a select part Lilly's supply chain for insulin has given the company knowledge and insight into their indirect water-related risk exposure, which can potentially be used to inform future decision-making and corporate water disclosure. WRAFS can also be applied not only to other health care products provided by Lilly, but to other organizations seeking to better understand the water-related risk exposure in their supply chain.

Significance



Source: World Resources Institute

Climate change, population growth, and increasing living standards are contributing to the rising pressure on scarce water resources¹. Water is a crucial resource that is essential for sustaining manufacturing business practices, and changes to water supply can disrupt and/or limit a company's business operations². While most companies are prepared to manage water-related risk in their direct operations, few have tried to understand and quantify their indirect water risk exposure in the supply chain³. Evaluating water-related risk within a global supply chain is a difficult task due to a large number of suppliers across a wide range of industrial sectors, and limited access to each supplier's facility water use data.

Objectives

1. Develop a framework for assessing the water-related risks within a supply chain.
2. Apply this framework to Lilly's first tier supply chain for the manufacturing and packing of insulin (specifically Humalog and Humulin) for the U.S. market.

Methods

Currently, there is no single prevailing tool or methodology to assess water-related risk. In order to satisfy the objectives with limited financial resources and available data, the following criteria was used to select the most appropriate water risk tool:

Water Risk Tool Selection Criteria	
Accessibility	Is the tool free and publicly available?
Source Data	Is the source data granular to the watershed level?
Water Use Data Inputs	Does the tool not require specific facility water use data?
Output	Does the output quantify water-related risk?

After evaluating 10 water risk tools, it was decided that the World Resource Institute's Aqueduct Water Risk Mapping Tool (Aqueduct) was the most appropriate tool for this supply chain water risk assessment. Aqueduct is a publically available tool whose underlying data is at the watershed level. In addition, Aqueduct does not require facility water use data and provides a water risk map and water risk score as its output.

The Water Risk Analysis Framework for Suppliers (WRAFS)

The Water Risk Analysis Framework (WRAFS) was developed utilizing WRI's Aqueduct tool. WRAFS overcomes financial and data limitations by providing a methodology which utilizes a publically available tool that assesses water-related risk based on geographical location using a novel weighting scheme, identifies suppliers located in relatively higher water risk areas, provides a market concentration profile for commodities produced in relatively high water-related risk areas without requiring water use data. WRAFS also includes a materiality assessment approach should water data be acquired or estimated.

WRAFS Weighting Scheme

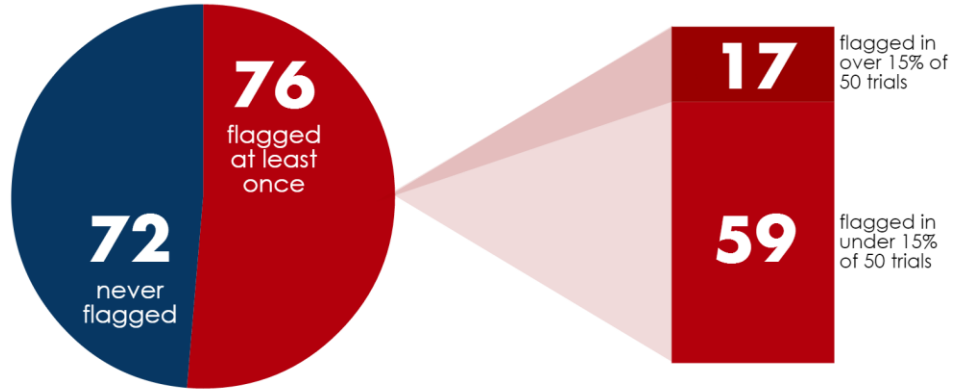
Aqueduct requires applying weights to 12 water risk indicators based on a user's risk profile. Due to the range of industries that the suppliers in a supply chain can come from, it becomes difficult to create one, all-encompassing, weighting scheme. Instead, WRAFS utilizes a weighting scheme that is based on the creation of 50 randomized risk profiles. This weighting scheme allows for identification of suppliers with relatively higher water-related risks using an innovative prioritization system that ranks suppliers based on the frequency a supplier's location is exposed to high or extremely high water-related risk. This identifies suppliers whose associated location risk is chronically high, regardless of weighting scheme.



The Application of WRAFS to Assess Water-Related Risks in Lilly's Insulin Supply Chain

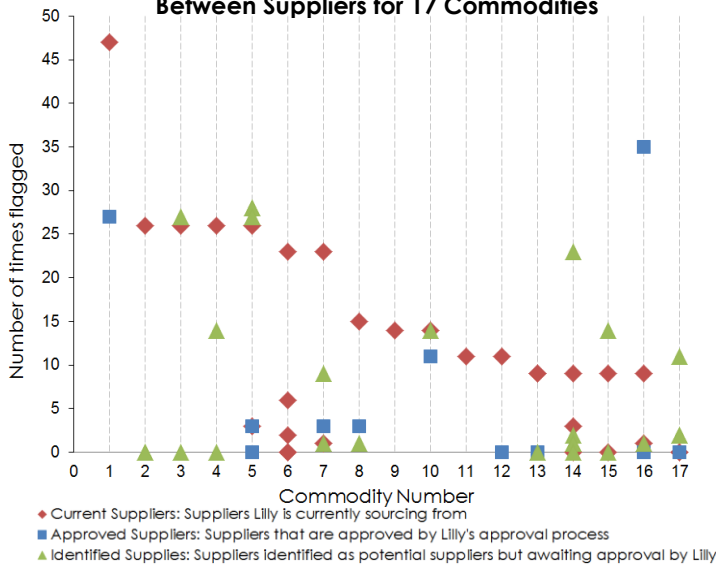
Step 1: First tier supply chain analysis

A supplier was “flagged” if its overall water risk score, based on its location, was greater than three. A score greater than three indicates that the supplier’s location is exposed to high or extremely high water-related risk given a particular weighting profile. Seventy-six (51%) of Lilly’s 148 1st tier suppliers were flagged at least once out of the 50 trials. A single trial represents one weighting profile. Seventeen of these 76 suppliers were flagged in over 15% of the 50 trials.



Flagged: Supplier’s locational water risk score was greater than 3

Comparison of Water-Related Risk Between Suppliers for 17 Commodities



Step 2: Market Concentration Analysis

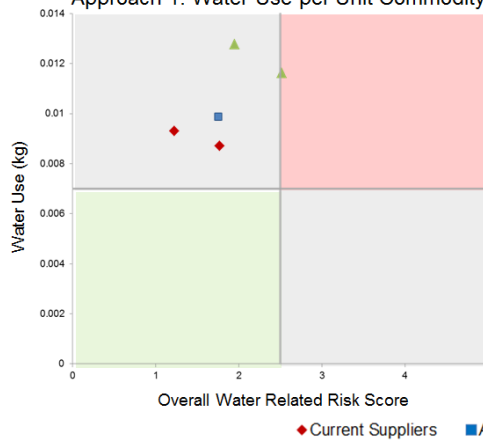
This analysis was performed on current and alternative (approved and identified) suppliers for the commodities provided by the 17 suppliers identified in Step 1, in addition to 1 commodity of interest provided by Lilly. Except for commodities 6, 9 and 11, every commodity had at least one approved or identified supplier located in areas of lower water risk than the current supplier with the highest water related risk.

This analysis can be used to help inform sourcing decisions. For example, for commodity 6, Lilly has 4 current suppliers, with one supplier with no location water related risk. Lilly can mitigate risk from this commodity by sourcing more from this low water risk supplier.

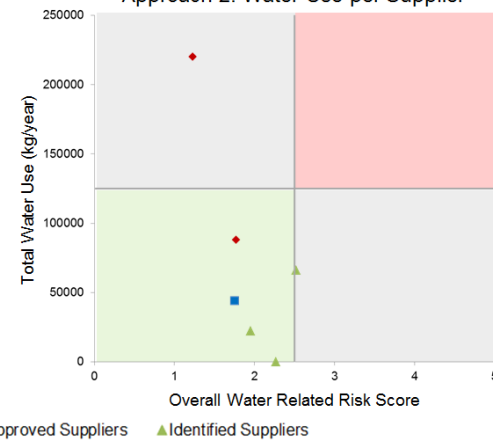
Step 3: Materiality Assessment of a Commodity

This matrix can help Lilly focus their water risk mitigation efforts on suppliers located in the upper right quadrant, which have a combination of high water risk score and high water use. Perception of risk for suppliers with comparable water use per unit commodity may change depending on the proportion of commodity sourced from them, as illustrated by the current suppliers in the graphs.

Approach 1: Water Use per Unit Commodity



Approach 2: Water Use per Supplier



Water use was estimated using two approaches and hypothetical sourcing proportions for suppliers of a commodity. These values may not be reflective of true water use.

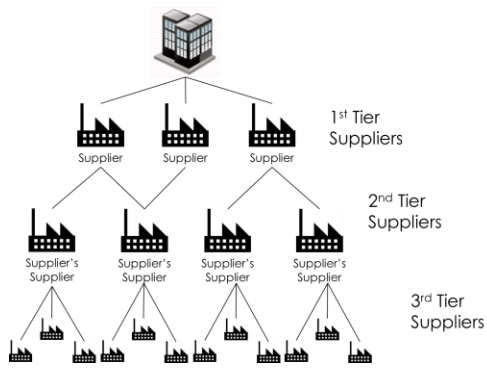
Approach 1 Water Use Calculation

$$\frac{y \text{ kg water}}{\text{kg commodity}} \times \frac{x \text{ kg commodity}}{\text{ml insulin}} \times \text{ml insulin} = \text{kg water}$$

Approach 2 Water Use Calculation

$$\frac{y \text{ kg water}}{\text{kg commodity}} \times \frac{\text{total commodity (kg)}}{\text{year}} \times \% \text{ sourced} = \frac{\text{kg water}}{\text{year}}$$

Discussion



The WRAFS results, when applied to the first tier supply chain of Humalog and Humulin, could inform global procurement of suppliers located in higher water risk locations and provide insight into their alternative suppliers for that commodity. However, this analysis only extended to suppliers from which Lilly has direct business relationships (1st tier) and does not offer a true picture of the water-related risks for the supply chain beyond these suppliers (2nd tier and beyond).

Although the World Resource Institute's Aqueduct Tool utilizes the most detailed and current water data, there are certain indicators and geographical locations where the tool is data poor. Additionally, WRAFS relies only on historical data and does not incorporate future climate change impacts into the projections and overall water risk score output. Ultimately, WRAFS depends upon the underlying source data of this tool and is hindered by the limitations mentioned above.

Few businesses and organizations have attempted to understand the water-related risks in their supply chain due to the unavailability of supplier water use data and the sheer volume of suppliers across different industrial sectors. This makes analyzing the supply chain seem like a daunting task. WRAFS can be applied in-house by any entity with a desire to begin understanding their supply chain water impact, with relatively little time and financial resources.

The last step of WRAFS requires an estimation of water use, and this data can either be standardized across suppliers if it is unavailable, or estimated using open source life cycle assessment inventory databases such as the U.S. Department of Energy's LCI Database Project. Otherwise, an organization could reach out to key suppliers identified through WRAFS to begin collecting water use data to be used for the materiality assessment.



Source: Diabetes Source

Takeaways

- Supplier facility-specific information such as water use is often not disclosed. However, despite these data limitations, WRAFS can be performed in-house by any entity with a desire to better understand water-related risks in their supply chain.
- By applying this framework to Lilly's insulin supply chain, the company gains knowledge and insight into their indirect water-related risk exposure and has the potential to inform future decision-making and corporate water disclosure.

References and Acknowledgement



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Pictured (left to right): Grace Kao, Kathy Tejano, Casey Garrett, Aarushi Jha, Lyan Dias

References

[1] Barton, Brooke, Berkley Adrio, David Hampton, and Will Lynn. 2011. The Ceres Aqua Gauge: A Framework For 21st Century Water Risk Management. <http://www.ceres.org/resources/reports/aqua-gauge>. [2] Barton, Brooke, Berkley Adrio, David Hampton, and Will Lynn. 2011. The Ceres Aqua Gauge: A Framework For 21st Century Water Risk Management. <http://www.ceres.org/resources/reports/aqua-gauge>. [3] Barton, Brooke. 2010. Murky Waters? Corporate Reporting on Water Risk. A Benchmarking Study of 100 Companies. Ceres. <http://www.ceres.org/resources/reports/corporate-reporting-on-water-risk-2010>.