Responsible Care

Laundering uses a large volume of water...from **31.07** gallons per load in a conventional machine down to **14.38** gallons per load in an Energy Star washing machine (EnergyStar 2010). There is great opportunity for consumers to alleviate environmental impacts associated with water consumption.

Wash full loads of laundry. By washing full loads once every two weeks instead of once a week, you can decrease your overall impact on water resources.

Wash in cold water. You can reduce the impact of your clothes on the environment by taking a simple step: wash them in cold water instead of warm or hot.

Use water efficient machines. By using a front loader washing machine you can reduce your water use by up to 45% .

The Future of Water Footprinting

As water footprinting gains traction and acceptance in the business world, we expected current methodologies to become more refined. While calculating a volume of water to be associated with the production of a garment is relatively straightforward, a major challenge lies in characterizing the environmental impact of the water consumed. Our water footprinting framework takes a first step towards linking a product water footprint with a regional water stress indicator, in an attempt to quantify the impact of water consumption in a given watershed.

Robust discussions surrounding water use and disclosure are occurring in businesses and academic institutions worldwide. Advocacy for water footprints will continue, and more people will be made aware of the complex and significant role of water in our lives and economies. Climate change will exacerbate many of the challenges associated with our reliance on freshwater, and companies must be prepared to venture beyond their comfort zone to sustain viability of this critical resource. Coordination of tested and agreed methods creates an opportunity to characterize meaningful strategies to address water footprinting, impacts assessments, and associated business risks, thus contributing to the well known business notion of 'measure to manage.' (SABMiller 2009).

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PROJECTBRIEF

Spring 2010

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Developing a Product Water Footprinting Methodology for Patagonia®

A Collaborative project between Patagonia® and the Bren School

Water scarcity has become a critical issue for many businesses, compelling them to measure, report and reduce their water use. Patagonia, a mid-sized outdoor apparel company, is concerned not only with the business risks that accompany water scarcity, but also with the environmental impacts associated with the water they use. As a textile company, they use large amounts of water in a few parts of their supply chain, namely the dyeing and raw materials stages. However, with suppliers distributed globally, Patagonia may not have knowledge of the local water conditions in these regions. Water footprinting is an emerging practice of quantifying water used in the manufacturing of the good taking into account the source of water, as well as associated water pollution. Patagonia has chosen to take on water footprinting at a product level to better understand the impacts of each garment they produce, and to communicate this information in a meaningful manner to their customers.

Patagonia's main objective is to measure the water use requirement for any garment, and to assess its environmental impact. This project developed a method of calculating a water footprint that is both environmentally meaningful and relatively easily replicable. Patagonia can determine—to a first order approximation—their water use without extensive research or complex calculations. This project also developed a method to assess the regional impact of water, based on a global water stress indicator. This will allow Patagonia to evaluate business risks and compare water impacts across suppliers and garments. Since the methodology was developed to be applied to any garment, it may also be of use to other businesses, textile or otherwise.

Project Objectives

1. **Develop a simple, replicable methodology to measure the water use for any garment.**
2. **Assess the environmental impact of that water use.**

A Closer Look at the Problem: Increasing Water Scarcity

Demand for water is increasing worldwide due to population growth, urbanization, and the globalization of the world economy. According to the United Nations, roughly two-thirds of the world's population will be living in water-stressed conditions by the year 2025 (Alter 2009, Rosegrant et al. 2002). Compounding the problem of increased demand for water is a growing uncertainty regarding the supply of freshwater. Climate change is projected to lead to major spatial and temporal changes in precipitation, affecting the availability of freshwater (IPCC 2007 as cited in Gerbens-Leenes & Hoekstra 2008). As humans place increased demand on water resources, the pattern of supply is expected to shift, which is expected to create additional and significant stress for certain areas of the world (Alter 2009, Rosegrant et al. 2002).

The Business Case for Water Footprinting

As business leaders plan for the future, they look for opportunities and risks that may have an impact on their company, industry, and even the world. Water is now among these considerations. Every industry has a unique relationship with water, and water footprinting may be applied to their operations or on their products depending on the objectives.(GEMI 2002). Water footprinting provides the information required to assess the risk associated with water use along a company's supply chain. Water risk is correlated with water stress, and demonstrated in this by mapping supply chain locations over a worldwide map of water stress. It is important to look at a water footprint in relation to the local environment, and this method may be used as a first approximation of risk across global supply chains.

A Simple, Replicable Methodology

Patagonia requires a simple yet comprehensive methodology for quantifying the water used in the production of a garment. This methodology must be easily replicable, so that it may be applied to Patagonia's full line of apparel. Therefore, we have defined our footprint boundaries to best meet Patagonia's needs, considering only direct water uses. Patagonia is most concerned about the water resource impacts that may be attributable to water intensive production processes.

Furthermore, Patagonia would like to incorporate water resource issues into its strategic planning for business decisions. By borrowing from existing water footprinting concepts and tactics, and conducting supply chain research, we created an original framework for determining a product's water footprint, as well as interpreting its regional impact on water resources.

We have chosen to create two separate footprints that deliver different messages to different audiences. Our first footprint is directed towards Patagonia's consumers. This footprint reports a product's gross life-cycle water use throughout its supply chain and consumer use stages. Additionally, we created a strategic planning tool designed to communicate a product's impact on regional water resources. This impact assessment can be used by Patagonia as a means to evaluate supply chain actors from a water resource perspective.

Data Collection and Calculation

In order to calculate the components that comprise a product's water footprint, we designed Excel-based surveys specific to each segment of the production supply chain: raw material production, fiber spinning, fabric weaving, dyeing/finishing, cutting/sewing, and printing. The Excel-based surveys allow Patagonia to identify processes that require significant direct water use in production. The footprint calculator tool draws information from those specific surveys to determine the garment's product water footprint. It is important to note that this tool differs according to garment and raw material.

BLUE	*Surface Water or shallow groundwater*
GREEN	*Rainwater stored in soil*
GREY	*Dilution volume of polluted water*

Product Water Footprint

The product water footprint communicates the total gross water, including both green and blue, used throughout the product's life. This also includes an analysis of the consumer use phase and its associated contribution of water. While this water is not something that Patagonia has direct control over, there are opportunities for them to communicate with customers regarding how responsible care can reduce environmental impacts associated with water consumption. Grey water is not included in this representation as it is not a volume of water that is actually used in production.

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Regionalizing the Impact Assessment

While a product's water footprint provides a useful number for analyzing the total water requirement for a product, it does not provide any indication of the regional impact on water resources that a supply chain may have. Determining the precise impact of a water footprint presents a unique challenge, as water resources, policies, and politics vary significantly geographically and temporally. We have created a second footprint, focused on consumed blue water and grey water, to communicate impact on regional water resources. By focusing on blue, we're directing Patagonia's focus toward the aspects of the footprint they can influence and because consumed water becomes permanently unavailable to others within the source watershed, the impacts are much greater, compared to unconsumed water.

In order to link a volume of blue water to a region of the world, we relied on a Water Stress Index (WSI) developed by Pfister et al. (2009) to scale the impact of the blue water component of our footprint. The WSI is a ratio between water use and water availability, ranging from 0.01 to 1, with 1 representing the most water stressed areas and 0.1 representing the least. To relate the impact of blue water consumption to its region, we multiplied the consumed blue water by the WSI of its location, and then divided by the global average WSI. By dividing by the global average we produce a regional impact of the water use relative to the global average watershed. If consumptive use occurs in a more water stressed region, the impact value of the blue water increases; likewise, if consumptive use occurs in a non-water stressed region, the impact value of the blue water decreases. Regionalizing the blue water component of the footprint changes the units from liters to "liters of potential impact." This regionalized blue water can then be added to the grey water component to determine the full supply chain's overall potential impact on local water resources.

Methodology Boundaries and Scope

Only include direct water uses in the manufacturing processes, such as irrigation and dyeing.

- Exclude indirect water uses, such as facility water use and transportation.
- Exclude water used in the production of peripheral goods, such as capital equipment and packaging.
- Exclude industrial discharge that is treated at a wastewater treatment facility.

Women's Simply Organic Cotton T-Shirt Case Study

Supply Chain Segments

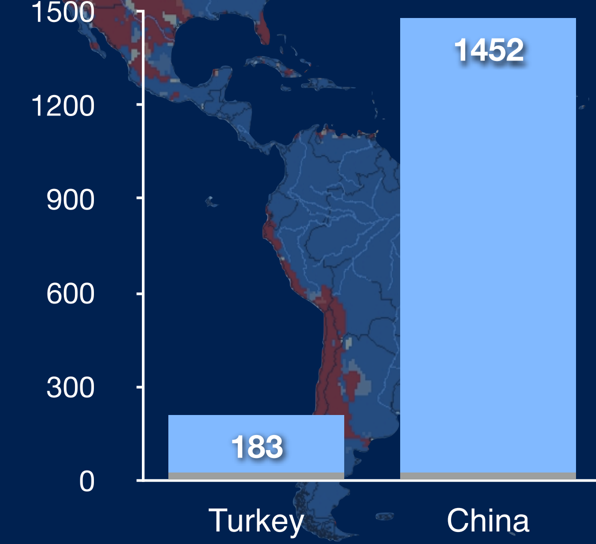
Turkey → *United States* →

		Growing and harvesting cotton	Spinning raw cotton into fibers/yarn	Knitting the fibers/yarn into fabric	Dyeing the fabric into various colors	Cutting and sewing the fabric into a T-shirt. Printing graphic.
Water Use	Intensity	HIGH	*No significant direct water use*	*No significant direct water use*	Low	*No significant direct water use*
	Description	Water required to mature a cotton crop			Water used for bleaching and dyeing fabric	
Volume	Blue	243L	-	-	3L	-
	Green	457L	-	-	-	-

← *That's 4 average bath tubs...* **703L**

...Taking a closer look at cotton production

Regionalizing the impacts of consumed blue water in cotton growing using the Water Stress Index (WSI) begins to communicate the environmental impacts of cotton production on water resources.



Regionalized Blue Water Volume (per T-shirt)

Blue Water Volume x (WSI / WSI Global Average)

Comparing Suppliers...

Organic cotton can be sourced from both Turkey and China. Suppose we assume that the same volume of blue water is consumed to produce the same amount of raw material in both regions. Also, suppose that both regions have a grey water dilution volume of 26L per T-shirt. The region in Turkey has a WSI of 0.126 and the region in China has a WSI of 1.0. Assuming both growers require the same volume of consumptive blue water, the footprint in China grows because they're in a water stressed region.

Growing cotton is a water intensive process and the impact assessment can be used to compare supply chain actors.