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Inspired by a Crisis: Fashion Design Addresses Water Depletion and Scarcity

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Abstract: The diverse set of risks and opportunities that now confront the textile and apparel industries and emerging fashion designers make examining the environmental impacts in design a necessary consideration. Bringing sustainability into the ethos of design is required since 80 percent of a product’s environmental costs are decided in design. The manufacturing of clothing and textiles is the second most polluting global industry. As much as 20 percent of global industrial water pollution comes from the treatment and dyeing of textiles. When water scarcity and water depletion are the inspiration for a young fashion designer, it confirms that a paradigm shift has finally started to happen. Designers need to understand the ramifications and consequences of every choice they make in the design process. Designing for sustainability means that designers can recognize how their choices are shaping product sustainability and can identify resources to improve them.

Key words: sustainability, sustainable fashion design, fashion design.

Fashion is a very thirsty industry. All stages of the textile and apparel production process use significant amounts of water for producing, treating, and dyeing fibers and fabrics. As much as 20 percent of global industrial water pollution comes from the treatment and dyeing of textiles, and about 600 liters of wastewater are discharged per kg of textile (Maxwel and McAndrew, 2015). How can the fashion industry evolve to one that produces “no unnecessary harm and has a positive impact on the people and communities that are associated with its activities” (Solidaridad). By acknowledging the consequences of fashion design decisions, fashion design education can inspire emerging designers and provide them with the necessary information to make informed design decisions.

As a fashion educator, I am continually faced with challenging question of, ‘can the fashion industry continue to clothe the world without destroying the environment?’ In an effort to spark curiosity about the environmental impacts of the fashion industry to students, I present a few startling statistics about water usage in apparel production. For example, approximately 11,000 liters of water are required to produce a traditional pair of jeans, and 510,000,000 pairs of jeans are purchased in the USA every year. How much water does that take? An Olympic sized swimming pool with ten lanes holds approximately 2,500,000 liters of water, which is the amount of water needed to produce about 220 pairs of jeans. That means that it would take enough water to fill over 2,300,000 swimming pools to produce all those jeans. That is a truly staggering number when it is predicted that by 2025, 1.8 billion people will be living with water scarcity (Water for Life Decade) and over 2,000 people die every day because they do not have access to clean water (UNICEF). Those are just the liters of water used to produce the cotton fabric and manufacture the jeans without consideration for the amount of water needed to care for them. Apparel and textile product care, laundering, and maintenance use an average of 1650 liters of water per kilogram washed (Maxwell and MacAndrew, 2015). Reducing the amount of water needed to care for garments during the use phase will have far reaching and immediate impact on the planet and is yet another challenge in fabric production and selection.

When water scarcity and water depletion are the inspiration for an emerging fashion designer, it confirms that a paradigm shift has finally started to happen. A former student was passionate about the issue of water scarcity and water depletion and considered fashion a way to bring awareness and educate different audiences. Her senior thesis project was inspired by the declining water level of Lake Meade and the disappearance of the Aral Sea. Her biggest challenge was identifying and understanding which fabrics require the least amount of water to produce. During a critique with a fashion industry professional, the student presented an image of a young girl drinking dirty water to which the professional responded, “fashion doesn’t want to see that.” The statement was disheartening for the student and me. The experience lead me to further my research about the textile and apparel industry’s use of water and how it is impacting the planet. Among the four heaviest impact areas of the textile and apparel industry, selection of raw materials, manufacturing, transportation, and consumer care, textile dyeing and finishing is the second ranked impact area (National Resource Defense Council).

Do fashion designers think about being a responsible water steward? Do they know what virtual water is and the difference between blue, green, and gray water? The answer is arguable, no. Which begs the question, 'how can educators cultivate and celebrate creativity while ensuring that emerging designers are aware of their role in the environmental impacts of the garments they design? How can more designers be inspired at the undergraduate university level to incorporate sustainable design into their process? Investigating the apparel industry's use of water is generally not an objective in a fashion design studio course. Designing apparel is normally far removed from the impacts of its production. The challenge for fashion design education is to determine how to embed science in studio courses and ensure the content is understood as relevant to design practice. The student featured in this paper was frustrated with the availability of low impact and sustainable fabrics. Her sourcing was well researched but limited to the US. She was dissatisfied because it limited her design options. She developed her own printed fabric and fabric technique to represent the dry, cracked land.

Figure.1 Student's screen-printed fabric

Tara St. James, designer STUDY NY, believes the textile industry has not caught up with the needs of designers (CFDA Fashion Education Summit: PASSION). With all of the environmental issues fashion has to consider, it is difficult to focus on just one. The issue of water presents unique opportunities to educate designers about their fabric choices. Sass Brown, advises that it is vital to educate young designers about the ramifications of their material choices. 'The process of design must change to include evaluation of material properties and process, so that design decisions are not based solely on aesthetic considerations, but equally on the means of producing the fabric and the ramifications of those choices" (Brown, 2015). With this advice in mind, emerging designers need fabric guidelines and information about what resources are available to help them make the best fabric choices. It would be advantageous for designers to have a set of guidelines for making their fabric selections and to also learn about textile programs that are working with manufacturers and brands to improve water management in the production of textiles.

The amount of information a new designer needs to know about textile production is daunting. The following is a proposed set of basic guidelines and resources that should be presented to fashion design students to ensure they are making informed fabric choices. In 2015, The Global Leadership Award in Sustainable Apparel, GLASA, selected water as the topic for their apparel sector report. GLASA has identified cleaner production textile programs that bring capacity, technology, finance, and government together to improve water management in the world's high stressed regions (Maxwel and McAndrew, 2015). Their list includes Sustainable Water Resources (SWAR) and Bangladesh Water PACT. SWAR has programs in India, China, Bangladesh, Turkey, and Ethiopia and is run by the Stockholm International Water Institute (SIWI). Bangladesh Water PaCT: Partnership for Cleaner Textile, is collaborating with global apparel brands such as C&A, H&M, Inditex, G-Star, KappAhl, Lindex, Primark, and TESCO. PaCT is also working with IFC, Solidaridad, Water Footprint Network (WFN) and TNO to create a textile sustainability platform (Maxwel and McAndrew, 2015). Other cleaner production programs that incorporate water include NRDC's 2014 Clean by Design (CBD) and Better Mill Initiative. The CBD program works with 33 textile mills in China and with global brands Target, Gap, Levi Strauss and Co, H&M, and IFC. Solidaridad and H&M lead the Better Mill Initiative, which is also in China. Additionally, there are apparel industry collaborations that focus on guidance and tools such as the Sustainable Coalition's Higg Index and The Sustainability Consortium's clothing, footwear, and textiles working group Kpis and cotton commodity mapping (Maxwel and McAndrew, 2015).

While building a set of guidelines for considering and selecting fabrics, the newest technologies and innovations that have significant water reductions in textile production is also imperative to understanding the options available when selecting textiles with low environmental impact. Technology identified by GLASA as examples of solutions with significant water reduction include 1) spun dyed/fiber dyed which pre-dyes the fiber at manufacturing suitable only for synthetic fibers such as modal and viscose, 2) ColourZen, which changes cotton's molecular structure to allow dye to settle with the fibers using 90 percent less water, 3) AirDye printing and dyeing technology, which saves up to 95 percent less water compared to conventional print and dye methods, 4) Ozone and laser technologies achieve distressed or faded finishes on denim, and 5) Technologies like Novozymes, CombiPolishTM, Genercors, PrimaGreen and Rahu Catalytics that reduce chemical and water impacts (Maxwel and McAndrew, 2015). Are these discussed in the classroom?

Cotton and polyester are the dominant fibers used in apparel (Maxwel and McAndrew, 2015). The average water footprint for one kilogram of cotton is 10,000-20,000 liters depending on where the cotton is grown (Maxwel and McAndrew, 2015). GLASA reports that an estimated 100-150 liters of water is needed to process one kilogram of textile material and nearly 28 billion kilograms of textiles are dyed per year. Cellulosics, such as lyocell feature many sustainable characteristics such as being harvested from responsible managed forests and closed loop processing. Trade named TENCEL® and MODAL®, these fabrics are biodegradable and compostable. TENCEL® blends easily with cotton, polyester, hemp, and flax. Blended fabrics, such as lyocell, hemp, flax, nettle, and recycled polyester, though not biodegradable when blended, do help to ease the reliance on cotton fiber. Until there is a fabric that is considered zero impact, staying abreast of research and innovations in recycled fibers such as recycled cotton, recycled polyester, and recycled nylon is critical to responsible and sustainable design.

The Materials Sustainability Index (MSI) is a logical starting point. The MSI was originally developed by Nike and has been adapted by the Sustainable Apparel Coalition (SAC) and is incorporated into the Higg Index (http://msi.apparelcoalition.org/#/). Designers can select from a list of fabrics and learn about the fabric's geographic location, production method, chemistry, energy and GHG, water and land use. Similar information found on the Materials Sustainability Index can be accessed in the MAKING app also developed by Nike. This app features a user-friendly interface that provides information on the four key impact area of chemistry, energy, GHG, water, land, and physical waste. These programs, technologies, and resources are not typically presented in fashion design studio courses, but the future of fashion design education will require that information such as this be intergraded in as many fashion courses as possible.

Figure.2 Detail of reverse applique representing the cracks in dry land and finished screen-printed fabric

What started as an inspiration for a senior thesis project has transformed a fashion design graduate to focus her career on water conservation efforts and a fashion design educator to identify ways to better inform students about the amount of water the fashion and textile industries use and the knowledge to make better fabric choices. According to a survey conducted by the Business of Fashion, only 44 percent of students in their ranked fashion programs are satisfied with teaching on sustainability in the curriculum, the lowest satisfaction scores in their entire survey (Amed and Mellery-Pratt, 2015). This finding suggests that fashion design programs can do more to educate emerging designers about the negative impacts of textile and apparel production and provide fabric selection guidelines for designers. When emerging designers are equipped with this new sustainable design knowledge, they can then be catalysts for change, express their expectations and demands, and have their voices heard along the entire supply chain. One of the most comprehensive resources for a complete account of the fashion industry’s water use is The State of the Apparel Sector 2015 Special Report-Water that is produced by the Sustainable Business Group for the Sustainable Fashion Academy (SFA) and The Global Leadership Award in Sustainable Apparel. The report can serve as the foundation for a course on sustainable fashion. This research needs to continue with the development of a curricular roadmap that identifies sustainable design objectives and the strategies necessary to incorporate them into a creative learning environment. In developing a more sustainably focused fashion design curriculum, findings from a survey to determine how designers are using sustainable guidelines when making fabric decisions and selections will help guide educators in identifying the most relevant information.

Organization or Trade Name	Description
Solidaridad http://www.solidaridadnetwork.org/	An international civil society organization that facilitates the development of socially responsible, ecologically sounds and profitable supply chains on 5 continents.
Natural Resource Defense Council (NRDC) Clean by Design (CBD) http://www.nrdc.org/international/cleanbydesign/	An innovative program to use the buying power of multinational corporations as a lever to reduce the environmental impacts of their suppliers abroad. CBD focuses on improving process efficiency to reduce waste and emissions and improve the environment.
Global Leadership Award in Sustainable Apparel (GLASA) http://glasaaward.org/	Launched in 2013 to inspire leadership in the apparel sector and mobilize key stakeholders around ideas or practices that can significantly increase the sustainability performance of the apparel industry.
Sustainable Water Resources (SWAR) http://about.lindex.com/en/sustainable-water-resource-management-swar/	Project in conjunction with SIWI that consists of worksops focused on efficient energy supply, wastewater treatment, chemicals, and sustainable training for factory workers.
Stockholm Water Institute (SIWI) http://www.siwi.org/about/	Provides and promotes water wise solutions for sustainable development in five thematic areas: water governance, transboundary water, management, climate change and water, the water-energy-food nexus, and water economics.
Bangladesh Water PaCT: Partnership for Cleaner Textile http://www.textilepact.net/	A partnership between textile wet processing factories in Bangladesh, international apparel buyers, wet processing technology suppliers, the Embassy of the Kingdom of the Netherlands (Dhaka), the International Finance Corporation (IFC), and the NGO Solidaridad.
International Finance Corporation (IFC) http://www.ifc.org/wps/wcm/connect/corp_ext_content/ifc_external_corporate_site/home	A member of the World Bank Group, IFC is the largest global development institution focused exclusively on the private sector in developing countries.
Water Footprint Network (WFN) http://waterfootprint.org/en/	Global network provides science-based, practical solutions and strategic insights that empower companies, governments, individuals and small-scale producers to transform the way we use and share fresh water within earth’s limits.
TNO https://www.tno.nl/en/	Working to create an international network comprised of leading scientific institutes, companies with ambitious development profiles, universities and other partners in knowledge.
Better Mill Initiative	Working to improve wet processing in China and dying and finishing in China as well as global brands and retailers.
	Working with brands and retailers across the apparel,

Sustainable Apparel Coalition (SAC) http://apparelcoalition.org/	footwear, and textile sector to develop a universal approach to measuring sustainability performance.
Higg Index http://apparelcoalition.org/the-higg-index/	A suite of-self assessment tools to empower brands, retailers, and facilities to measure their environmental, social, and labor impacts and identify areas for improvement.
The Sustainability Consortium (TSC) http://www.sustainabilityconsortium.org/	A global organization dedicated to improving the sustainability of consumer products whose partners include manufacturers, retailers, suppliers, service providers, NGOs, civil society organizations, governmental agencies and academics.
Materials Sustainability Index	Originally developed by NIKE, a cradle-to-gate index informed by life cycle assessment derived inventory data to engage product design teams and the global supply chain of the apparel and footwear products in environmental sustainability.

Table 1. List of organizations and trade names in the order in which they appear.

References

Maxwell, D. and McAndrew, L. Ryan, J. (2015) State of the Apparel Sector Report – Water (Online PDF). Available at http://glasaaward.org/wp-content/uploads/2015/05/GLASA_2015_StateofApparelSector_SpecialReport_Water_150624.pdf [Accessed 10 September 2015]

Solidaridad. Available at http:// http://textiles-solidaridad.org/ [Accessed 15 September 2015]

http://www.un.org/waterforlifedecade/scarcity.shtml (Accessed 24 January 2015)

http://www.unicef.org/eapro/media_20634.html (Accessed 24 January 2015)

Maxwell, D. and McAndrew, L. Ryan, J. (2015) State of the Apparel Sector Report – Water (Online PDF). Available at http://glasaaward.org/wp-content/uploads/2015/05/GLASA_2015_StateofApparelSector_SpecialReport_Water_150624.pdf [Accessed 10 September 2015]

National Resource Defense Council. Available at http://www.nrdc.org/international/cleanbydesign/default.asp [Accessed 15 September 2015]

Figure. 1 Photo taken by Emily Muro. 2 February 2015

CFDA Fashion Education Summit: PASSION. Available at https://www.youtube.com/watch?v=uuKC0iT5FTU [Accessed 2 February 2015]

Brown, Sass. Personal Interview. 6 August 2015.

Maxwell, D. and McAndrew, L. Ryan, J. (2015) State of the Apparel Sector Report – Water (Online PDF). Available at http://glasaaward.org/wp-content/uploads/2015/05/GLASA_2015_StateofApparelSector_SpecialReport_Water_150624.pdf [Accessed 10 September 2015]

Maxwell, D. and McAndrew, L. Ryan, J. (2015) State of the Apparel Sector Report – Water (Online PDF). Available at http://glasaaward.org/wp-content/uploads/2015/05/GLASA_2015_StateofApparelSector_SpecialReport_Water_150624.pdf [Accessed 10 September 2015]

Maxwell, D. and McAndrew, L. Ryan, J. (2015) State of the Apparel Sector Report – Water (Online PDF). Available at http://glasaaward.org/wp-content/uploads/2015/05/GLASA_2015_StateofApparelSector_SpecialReport_Water_150624.pdf [Accessed 10 September 2015]

Maxwell, D. and McAndrew, L. Ryan, J. (2015) State of the Apparel Sector Report – Water (Online PDF). Available at http://glasaaward.org/wp-content/uploads/2015/05/GLASA_2015_StateofApparelSector_SpecialReport_Water_150624.pdf [Accessed 10 September 2015]

Maxwell, D. and McAndrew, L. Ryan, J. (2015) State of the Apparel Sector Report – Water (Online PDF). Available at http://glasaaward.org/wp-content/uploads/2015/05/GLASA_2015_StateofApparelSector_SpecialReport_Water_150624.pdf [Accessed 10 September 2015]

Maxwell, D. and McAndrew, L. Ryan, J. (2015) State of the Apparel Sector Report – Water (Online PDF). Available at http://glasaaward.org/wp-content/uploads/2015/05/GLASA_2015_StateofApparelSector_SpecialReport_Water_150624.pdf [Accessed 10 September 2015]

Materials Sustainability Index (MSI). Available at http://msi.apparelcoalition.org/#/ [Accessed 6 November 2013]

Figure. 1 Photo taken by Jay Paul. 16 May 2015

Amed, I and Mellery-Pratt, R. (2015) Is Fashion Education Selling a False Dream available at http://www.businessoffashion.com/articles/education/global-fashion-school-rankings-2015 [Accessed 30 August 2015]

Table 1. List of organizations and trade names