

**Building resiliency:  
The intersection of business and community responses to climate change  
in the cotton apparel supply chain**

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## **Executive Summary**

This report presents initial research identifying anticipated impacts of climate change in the cotton apparel supply chain and how these impacts may affect poor communities that contribute to this supply chain. This report also identifies opportunities for building resiliency in the apparel supply chain, including cotton production, to minimize negative impacts on poor communities.

Recent declines in food productivity that can be at least partially attributed to altered weather conditions such as floods and droughts demonstrate how vulnerable agriculture production is to climatic conditions. Lowered agriculture productivity is felt by local communities in developing countries as well as global brands whose supply chains depend on these agriculture outputs.

The current debate on how arable land should be used and how best to increase agriculture production is currently focused on food and fuel crops. Fibers such as cotton do not currently receive as much attention, despite their importance to the global economy – from the millions of farmers who depend on cotton for their livelihoods to global apparel brands that rely on cotton for the majority of their products.

While higher food prices and expansion of biofuels may provide opportunities for some farmers, small-scale farmers in developing regions may not be able to take advantage of these opportunities. Farmers would require local buyers and/or processors for the alternative crop; alternative crops may require soil conditions, water, or other inputs that may not be available to them; or they may risk a higher rate of spoilage for perishable crops. Additionally, a shift from cotton to other crops would pose business risks to other members of the cotton apparel supply chain, including global apparel brands.

### *Global cotton supply chain*

Cotton is one of the most versatile textile fibers in the world, accounting for over 40 percent of all world fiber production. It is grown in more than 100 countries, 50 of which depend on cotton for a significant portion of their export earnings. More than 100 million family units are engaged directly in cotton production, and ancillary involvement is estimated to reach one billion people worldwide (ICAC, 2008).

The cotton supply chain is a complex web of actors including cotton producers, traders, yarn spinners, fabric mills, garment manufacturers, and retailers that are located in different parts of the world. Each of these actors plays an important role in the transformation of seed cotton into a garment. Given the importance of cotton in apparel garments, the success of each of these actors to adapt to climate change is vital to maintaining a healthy cotton apparel industry.

### *Climate change impacts*

Climate change impacts affecting one segment of the supply chain can ultimately affect all segments of the cotton supply chain and its actors. Small-scale farmers are the most vulnerable supply chain actors, and their ability to adapt to climate change will be vital. Yet, they are the least equipped to adapt.

Rising atmospheric greenhouse gas concentrations are causing large-scale changes to the Earth's climate system. The Intergovernmental Panel on Climate Change (IPCC) notes: "Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level" (Bernstein et al. 2007). Furthermore, the IPCC projects that these changes will accelerate in the future, particularly if we fail to drastically reduce greenhouse gas (GHG) emissions.

In general, developing countries are most vulnerable to climate change impacts because "they are more exposed by virtue of being at lower latitudes, where impacts such as increased disease and extreme heat and drought will be more pronounced and because they derive a larger proportion of their economic output from climate-sensitive sectors such as agriculture. In addition, developing countries generally have lower per capita incomes, weaker institutions, and less access to technology, credit and international markets—hence, lower adaptive capacity" (Burton et al. 2006). For example, one-third of global research spending in agriculture addresses problems in developing countries in which most of the world's supply of cotton is produced and apparel is manufactured (Pardey et al. 2006).

Several regions and nodes of the cotton supply chain will be affected by climate change. For example, South and Southeast Asia (e.g., Bangladesh, Cambodia, Vietnam), key garment manufacturing regions for United States (US) apparel companies, are projected to experience greater frequency and intensity of floods and storms. Additionally, the IPCC projects that agricultural productivity will decline in sub-Saharan Africa and India, both of which are significant sources of cotton used in garment manufacturing.

Climate change will directly affect the cotton production stage of the supply chain as a result of changes in temperature, precipitation, and extreme events. Additionally, climate change will pose indirect impacts on the fabric mill, garment manufacturing, and consumer stages of the cotton supply chain through changes in the availability, timing, quality, and demand of water. All of these impacts will likely be more severe in water stress regions.

#### *Climate change mitigation and resilience*

While the cotton industry is generally aware of climate change risks to their industry, some key players, such as traders and retailers, are less aware of these risks despite their dependence on cotton for a successful business and their strong positions to motivate positive change in the supply chain.

The majority of apparel companies do not fully understand how their supply chain operates or the risks that climate change impacts can have on their business, nor do most apparel companies have strategies to better understand and/or address these impacts.

Although many retailers are reducing energy consumption and GHG emissions at owned and operated facilities and operations, few have a strong understanding of risks from climate change in other, more vulnerable parts of their supply chains, such as cotton production.

Apparel companies tend to shift a portion of their sourcing base more than other industries, based on different factories' ability to meet the fast changing nature of fashion. Additionally,

apparel retailers tend to purchase only finished garments, thus cushioning themselves from fluctuations in cotton prices. Despite this inherent resiliency in their supply chain, apparel companies are still heavily reliant upon cotton as a raw material, as well as on a functioning supply chain, to ensure a healthy and productive business.

Given the scientific evidence that climate change is happening more rapidly than previously expected (Climate Change 100, 2008), it is clear that it is in business's best interest to understand how climate change will likely impact their supply chain and to take action accordingly.

There are several ways to reduce climate change risks in the cotton supply chain. Some opportunities are relatively easy to implement and can have lasting benefits. For example, identifying and pursuing opportunities to improve energy and/or water efficiency can mitigate climate change, prepare for potential restrictions of energy and water, as well as quickly result in cost savings and other business benefits.

Other efforts, such as building resiliency at the farm level, will likely require support at an industry and/or multi-stakeholder level. These efforts will require leadership from within the cotton industry and will take time to reach the millions of cotton farmers worldwide.

Some highlights of opportunities to build resiliency in the cotton apparel supply chain are provided below.

*Cotton farmers (especially those in developing countries)*

- Advance research efforts directed toward developing countries, raising efficiencies, productivity, and quality of the cotton fiber produced
- Support efforts to promote better agricultural practices
- Assist farmers to improve and maintain the quality of their cotton
- Finance and/or install irrigation in water-stressed cotton producing regions
- Promote transparent and fair pricing
- Advocate for policies and subsidies that promote responsible farming practices, including the conservation of natural resources

*Fabric mills and garment manufacturers*

- Promote water conservation through training and improved system operations
- Finance water/energy-efficient technology/equipment
- Promote water conservation and recycling
- Work with local municipalities to improve public water treatment capabilities and capacities
- Improve disaster preparedness at factory level
- Provide disaster aid
- Engage in stakeholder/community dialogue regarding the factories' environmental/water impact in local community
- Contribute to charitable activities to improve well-being of local population

### *Consumers*

- Promote cold-water washing and line drying on product care labels
- Raise awareness of climate risks in developing countries
- Promote support of organizations that assist cotton farmers and surrounding communities

The research conducted for this report, and suggestions on ways supply chain actors can build resilience in the cotton supply chain, are not exhaustive. The authors suggest further research, preferably at a regional level, to better understand potential impacts and resiliency-building opportunities for a given community and/or segment of the cotton supply chain.