

# Economic considerations of water in the cotton supply chain: the risk of shortage

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# Overview

- 70 % of cotton is grown in arid regions: China, USA, India, Pakistan, and Uzbekistan
- It is processed through a complex supply chain with access to clean water being vital to many processes
- Production, laundering, dyeing and consumer washing are the most significant water users
- Opportunities and solutions exist but often require large capital investments and/or collective action



# Cost of inaction is greater than the cost of action



**July – September, 1989**



**August 12, 2003**



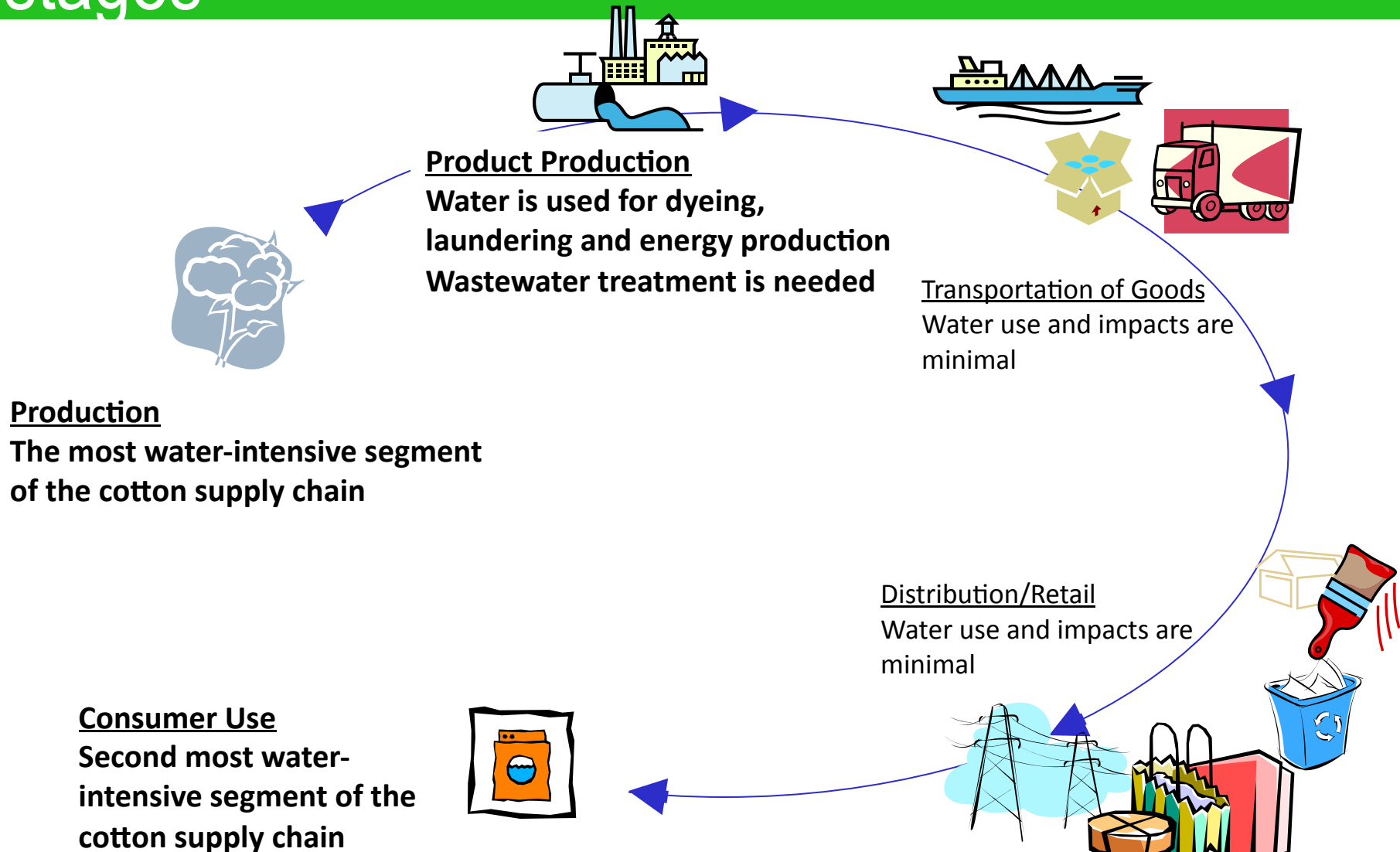
**August 16, 2009**

**Cotton cultivation has had a significant role in the depletion of the Aral Sea (above).**

Credit: University of Maryland Global Land Cover Facility and NASA Goddard Level 1 and Atmospheric Archive and Distribution System.

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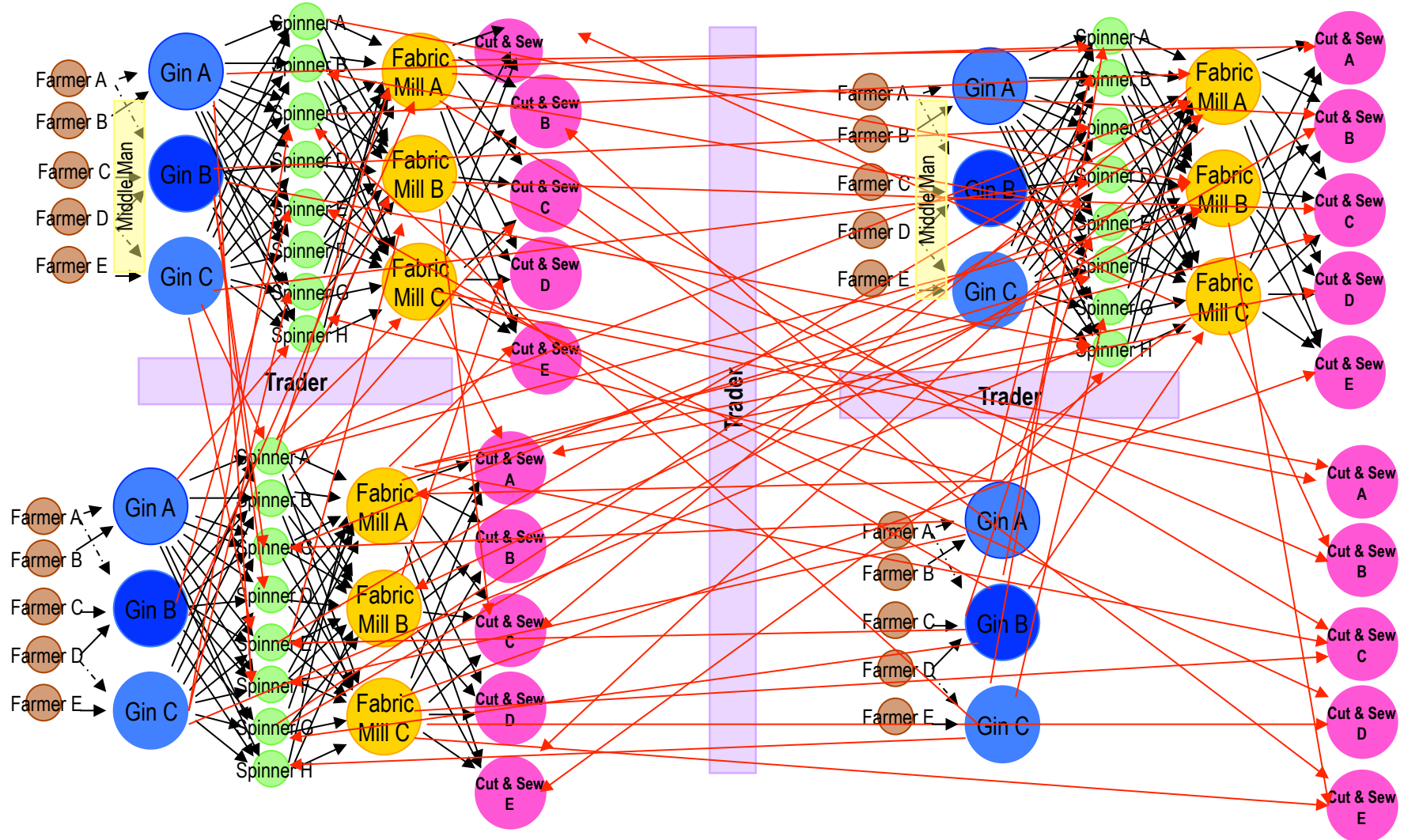
# The cotton supply chain uses water at various stages



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# Global Cotton Supply Chain (it is really a web)



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# Water Footprint Network frames the development of a water footprint assessment in four phases

- Phase 1: Setting goals and scope
- Phase 2: Accounting
- Phase 3: Sustainability assessment
- Phase 4: Response formulation

# Industry will face increasing competition for water

➤ Water availability will be impacted by:

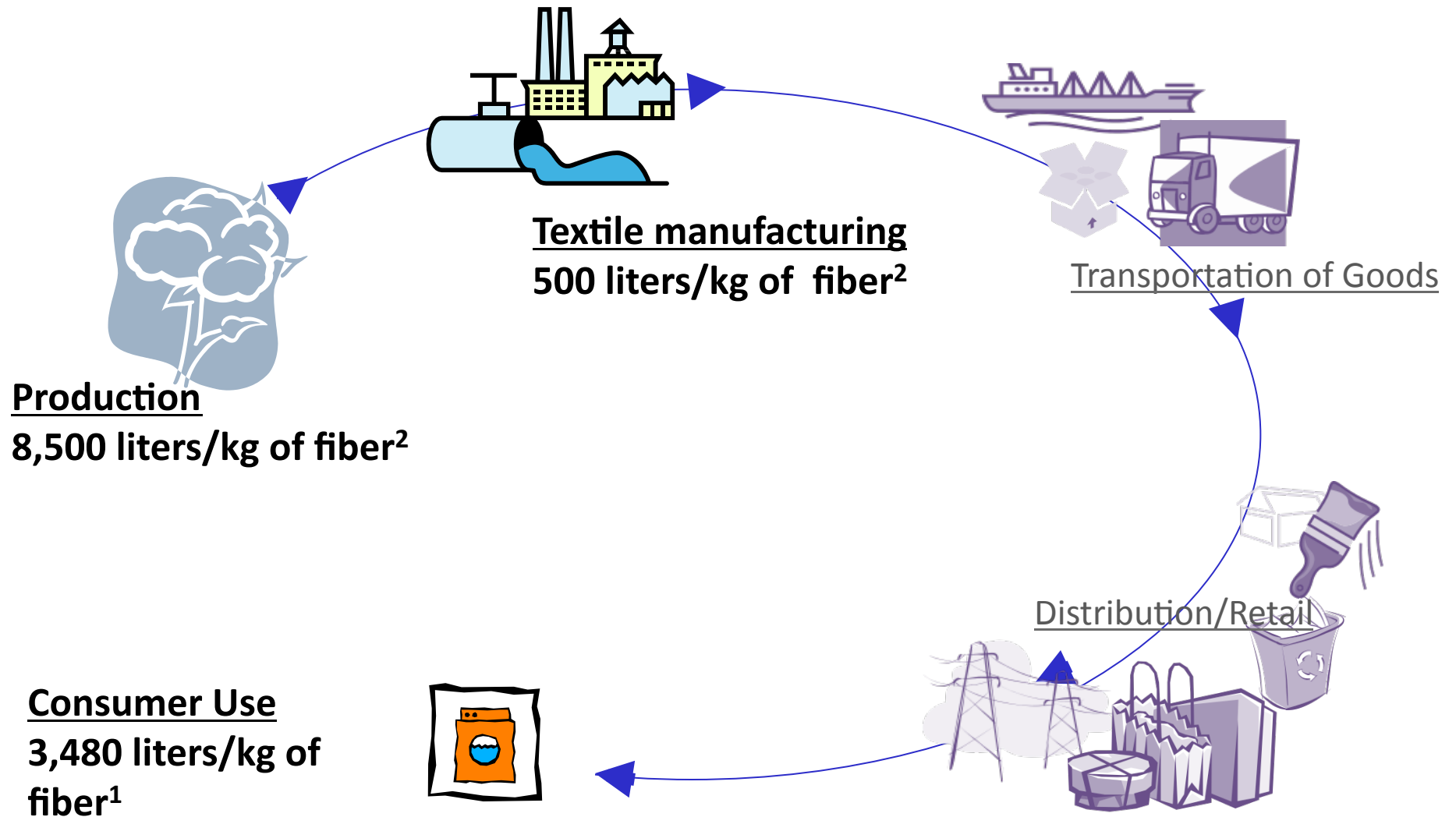
- Climate change
- Increasing demand (agricultural and rural)
- Shifts in water allocation and rights

# Water related risks come in various forms

- Supply chain risks
- Regulatory risks
- Reputational risks

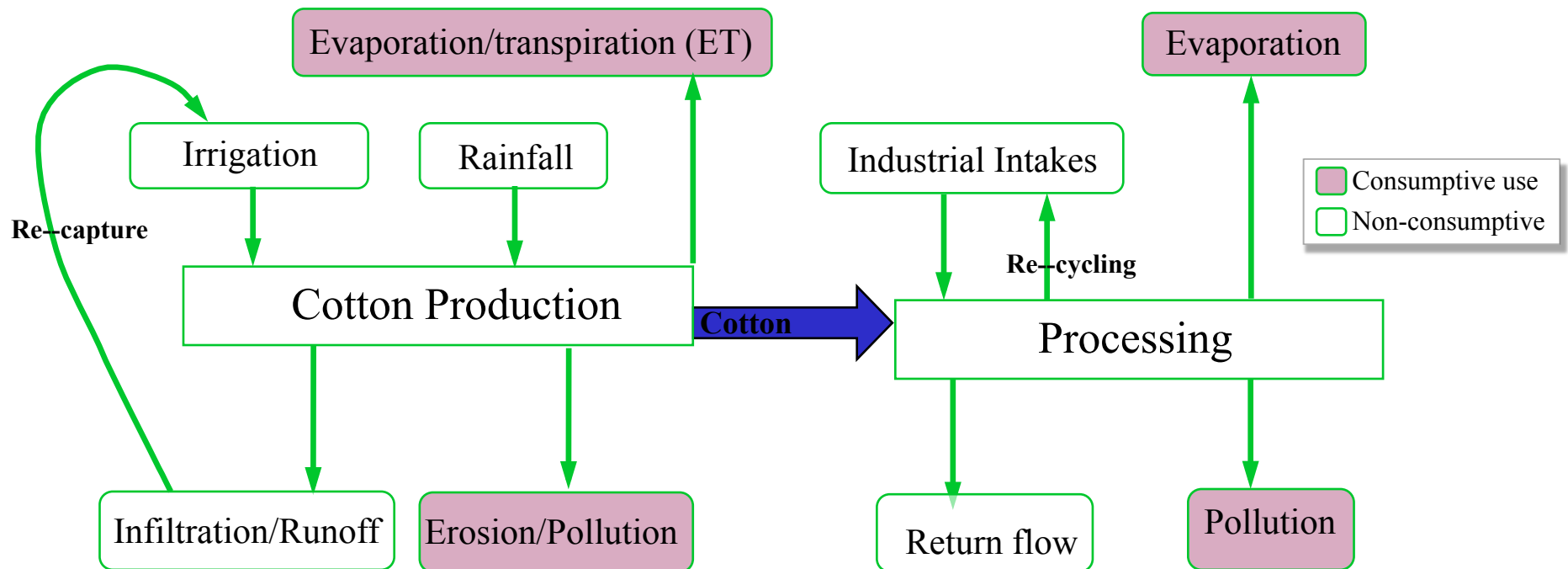


# Focus should be given to the production and processing segments of the supply chain



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# Cotton Production: consumptive and non-consumptive uses exist in the cotton life cycle



Source: Biofuels and Water: impact assessment across regions and along the supply chain (Fingerman, 2010)

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# Water demands will be greater for irrigated production

- **Rain-fed cotton:** cotton that is grown without supplemental irrigation. Approximately 45% of cotton is rain-fed or partially irrigated (Chaudhry n.d.)
- **Irrigated cotton:** cotton that is irrigated from canals, groundwater, or other bodies of water. This comprises approximately 55% of the world's cotton area (Chaudhry n.d.)

# Water use during production varies considerably

	<b>Volume of Water Used (1997-2001)</b>	
<b>Country</b>	<b>Water withdrawl (L/kg of cotton seed)</b>	<b>Rain water (L/kg of cotton seed)</b>
China	760	1258
USA	576	1673
India	2150	6512
Pakistan	3860	1054
Uzbekistan	4377	83

# Good agricultural practices are cost effective ways to save water

- Maximize storage, distribution and application efficiency
- Deepen farm dams to reduce evaporation (losses can range from 15-45%)
- Monitor water use and calculate efficiencies
- Achieve uniform application
- No till farming to help retain soil moisture
- Use new, more efficient methods of irrigating (e.g. overhead irrigators, bank-less channels)
- Grow appropriate cotton varieties that require less water

# Efficient irrigation will be needed

	Drip Irrigation	Furrow-Irrigation
<b>Irrigation Water Applied</b> (inches of water/acre)	20-25	60
<b>WUE</b> (.lbs of lint produced)	70-80	20-25

Subsurface drip can increase efficiency by an additional 10 percent



# Building resiliency in cotton production

- Advance research efforts directed toward developing countries, raising efficiencies, productivity, and yields
- Support efforts to promote better agricultural practices
- Use more appropriate varieties of seeds (e.g. drought tolerant)
- Finance and/or install irrigation in water-stressed cotton producing regions
- Provide more affordable crop insurance

# Water-intensive processes include dyeing, bleaching, mercerizing, and scouring



- Only 10% of facilities are reusing their water for purposes such as irrigation and toilets
- Recycling water for apparel processing must meet stringent quality parameters and is cost prohibitive
- Wastewater is often treated at the facility level then discharged into the municipal treatment facility

# Industry-level action should be supported

## **NRDC Clean by Design findings:**

- Considerable opportunities exist for low-cost improvements in time, materials, water and energy
- Increases in production efficiency equal increased profits due to reductions in energy usage, time and materials

## **BSR Sustainable Water Group study:**

- Current government regulations and enforcement offer little incentive to improve water management; thus, factories managers have little to no rationale for improvement
- Most factories believe that regulatory compliance meets the brands' management requirements

# Wastewater treatment is a costly investment

- Wastewater 600 liter/kg of textiles
- Wastewater treatment averages \$0.30 - \$1.50/kg of textile
- **\$1,226,993 - \$61,234,965/factory**

Source: (Bluesign Technologies, 2007)

# Industry solutions are charting the course forward

- Better Cotton Initiative - agriculture production
- NRDC Clean by Design - water efficiency in processing and pollution prevention
- BSR's Sustainable Water Group - water effluent /pollution prevention in processing

# Questions



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