

## Fast Fashion: Toxic Wastewater in China's Industrial Belt

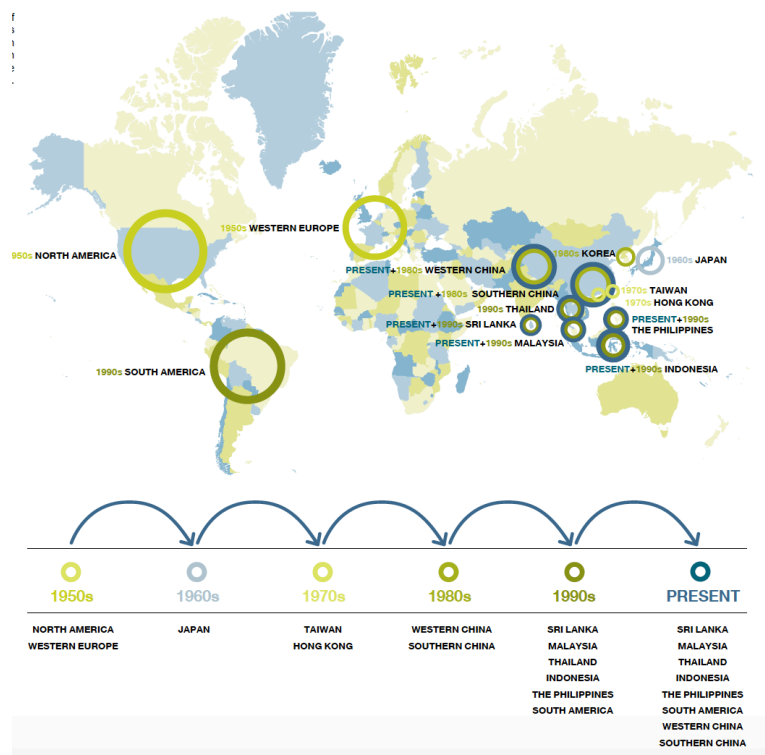
By Madeline Anderson

*How do your clothes contribute to global pollution? Toxic chemicals from China's garment manufacturing industry create hazardous wastewater for humans, animals, and the environment. Let's rethink our demand for fast fashion.*

The developed world can't get enough of **fast fashion**—the United States alone imports 1/3 of clothing from the \$3 trillion global garment industry, which creates, then disposes of, 15.1 million tons of textiles per year<sup>4</sup>. The garment industry, behind oil, is the second largest generator of greenhouse gasses and water pollution, contributing 10% of global carbon emissions<sup>4,9</sup>. Although garment manufacturing has expanded to countries like Bangladesh and India in recent years, the physical evidence of this pollution is still seen where production remains the most common: China.

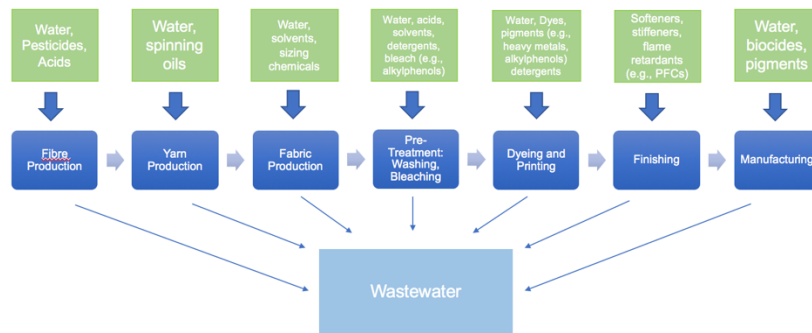
Figure 1

Shifts in the production of textiles for the global market



A quarter of **organic chemicals** produced in the world—between 8,000 and 10,000—are used in the textile industry to manufacture 400 billion square meters of fabric<sup>4,8,12</sup>. All steps of the garment production process—such as dyeing, drying, and finishing—rely heavily on chemicals and natural resources<sup>2</sup>.

Figure 2. Stages of Textile Production Wet Processes

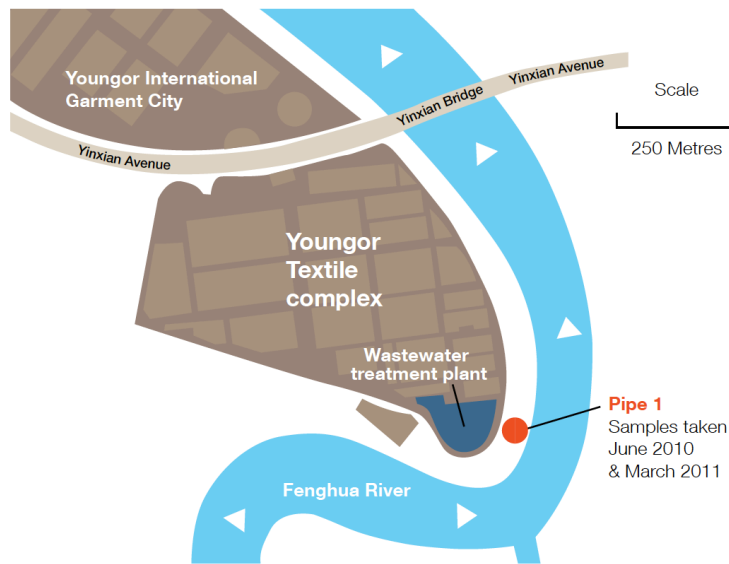


The main cause of pollution from the fashion industry is through the chemical dyeing process of garments: for example, 1,800 gallons of water are required to make one pair of jeans<sup>7,12</sup>. The chemicals from this **wet process** are then deposited directly into rivers and streams surrounding Chinese factories. Of the 640 major cities in China, over 300 face water shortages or severe water scarcities due to industrial waste pollution<sup>6,8</sup>.

However, major areas of production remain hidden within layers of the modern supply chain, either implicitly or explicitly subsidized in order to meet consumer demand for cheap, fast clothing<sup>13</sup>. The complex textile production process makes regulation and implementation of chemical processes difficult to control, resulting in numerous human rights and environmental crises.

A recent study by the environmental research organization Greenpeace International aimed to discover whether toxic chemicals from Chinese garment manufacturing facilities were being dumped into major waterways. During their initial 2011 study, Greenpeace chose to take samples from the Youngor Textile Complex, because of its association with global brands such as Nike, Adidas, Puma, H&M, and Chinese label Youngor. The Youngor Textile Complex is in Ningbo, China, situated on the Fenghua River of the Yangtze River Delta. 16 major cities surround the delta, including Shanghai. The so-called “Yangtze Industrial Belt” of manufacturing facilities contributes 40% of China’s GDP, or \$1.5 trillion<sup>8</sup>. Greenpeace researchers collected water samples from the Youngor Textile Complex in June 2010 and March 2011 at various times of day and water levels. The resulting toxicity from these water samples suggests significant and life-threatening ecological hazards.

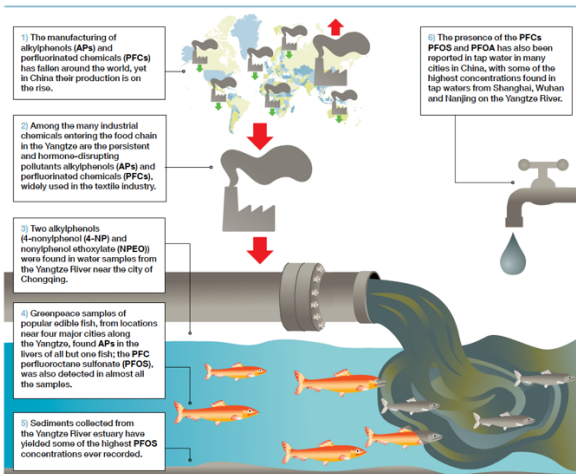
Figure 3. Youngor Textile Site



Results revealed that despite modern wastewater treatment plants at the Youngor factory, hazardous, hormone-disrupting chemicals are present, chiefly **alkylphenols** and **perfluorinated chemicals (PFCs)**. Alkylphenols are agents used to clean and dye fabric, and PFCs are flame-retardant waterproofer for leather and athleticwear<sup>5,8,12</sup>. Additionally, **heavy metals** like cadmium, mercury, and lead were also present in the water samples. The health hazards to humans and the ecological environment from China's polluted rivers are enormous. Runoff from these toxic dyes and chemicals cause serious health problems for the surrounding citizens, and—since dye wastewater contributes to 10% of ocean pollution—the world.

Figure 4.

Persistent Chemicals in fish

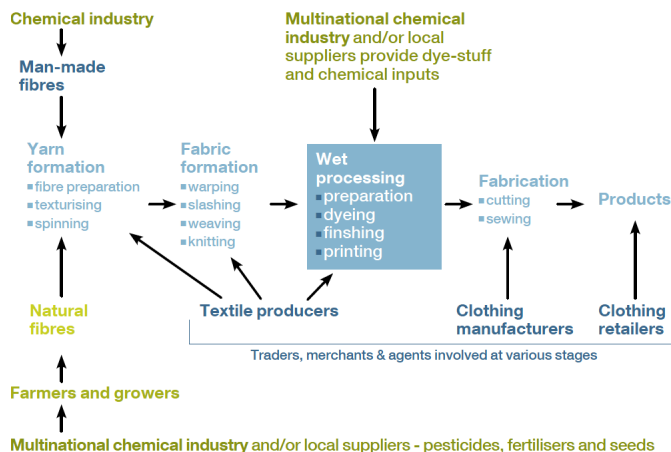


These heavy metals and organic pollutants are **persistent, bioaccumulative, carcinogenic, mutagenic,** and **reprotoxic** to humans, animals, and the environment. Alkylphenols can accumulate in body tissue and disrupt sexual development, like the resulting feminization of male fish identified all over the world. PFCs are highly resistant to degradation in the environment, and consequently can also build up in the body over time, altering growth, reproductive hormones, and damaging the liver<sup>5,7</sup>. PFCs have been found in amphibians, birds, fish, and mammals, including pandas in Chinese zoos hundreds of miles from the Youngor Textile Complex. PFCs have also been discovered in human blood systems and breast milk, mostly in the developing world where they are still widely used. The consumption of fish with levels of PFCs is likely the cause of this<sup>8</sup>. Heavy metals like cadmium can cause cancer; lead and mercury can result in irreversible damage to the nervous system and kidneys<sup>5,10</sup>.

Unfortunately, most of the organic chemicals in wastewater are still unidentified, and many can pass unaffected through treatment processes<sup>3,6</sup>. The wastewater in rivers like the Fenghua River is used as a source of drinking water, as well as for agricultural, recreational, and religious activities around the world<sup>7,10,13</sup>. Many canals and wetlands become “retention ponds” for industrial waste. The impact of water pollution on human health in China has been valued at \$3.9 billion<sup>6</sup>.

Greenpeace’s results are not unique, however. Research over the last 30 years has discovered bisphenol A and various plasticizers and pesticides released from textile wet processes all around the world<sup>3</sup>. A 2001 study from the US EPA reported that there are over 100,000 metric tons of chemicals released into surface waters by United States industrial processes alone, 20% of those being mutagens<sup>10</sup>. Greenpeace’s study, however, chose to target specific brand names associated with these toxic chemicals. Their aim with this method was for consumers to recognize these abuses as a result of poor oversight from brands they financially support, which could consequently change consumer behavior to hold these brands accountable.

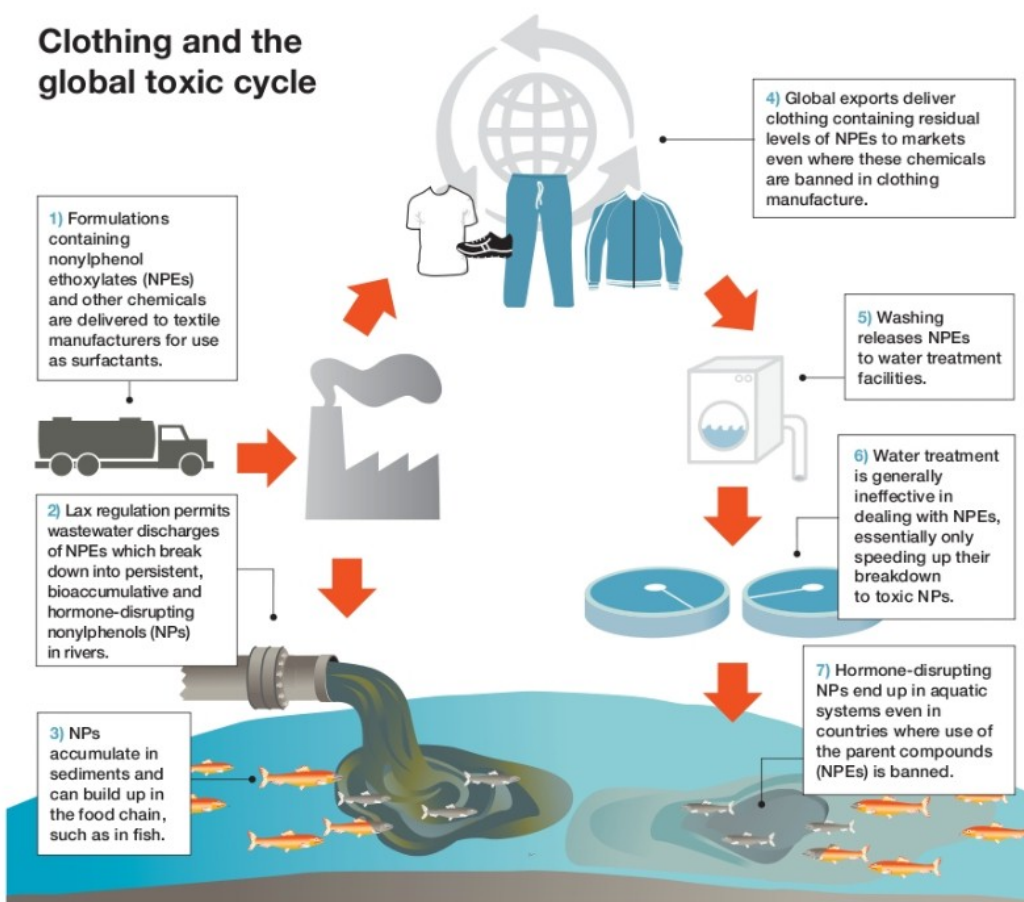
Figure 5. The Businesses Involved in the Clothing and Textile Supply Chain



Greenpeace sent these major brands their findings before publishing them, to which almost all responded that they had no affiliation with the Youngor wet processes. Greenpeace included these statements as disclaimers to their research, but further investigation uncovered a lack of comprehensive chemical management policies from these brands. Implementing regulations is far more difficult than simply stating that those rules exist.

Although **synthetic fibers** like polyester use the most water during production, natural fibers like cotton and wool still consume considerable amounts of water and pesticides, such as nitrate, during the agricultural process<sup>1,2,7</sup>. Even after we buy clothes, however, we still harm the environment. Microscopic, synthetic fibers wash off during the home washing and drying process and end up in surface waters all over the world<sup>7,9</sup>. These fibers from synthetic clothing account for 85% of the human-made material on ocean shorelines, which threatens aquatic wildlife and, consequently, our food<sup>4,7</sup>.

Figure 6.



Switching to **organic fibers**, such as linen and organic cotton, that are produced with less water and pesticides will reduce significant amounts of wastewater both before, during, and after the production

process. Today, further studies are being conducted about potential water purification solutions. Greenpeace's 2011 study of the Youngor Textile Complex led to an uproar in consumer demand for transparent production processes. Many companies like Nike and H&M are attempting to pull back on their production of synthetic fibers and chemical dyeing to join the movement of "slow" fashion. Companies are struggling to create organic chemicals that are less harmful to the environment and human health, but unless these multinational corporations ensure chemical regulation at every step of the process in every factory, not much will change<sup>12</sup>.

A survey of 15,000 people in 15 countries revealed that water scarcity and water pollution are the top two environmental concerns for the world's population<sup>7</sup>. To ensure water access to all, change ultimately starts with the consumer. Our demand to buy the cheapest products over the most ethical products is why the toxicity of our waterways persists.

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## Glossary

**Fast Fashion:** a modern phenomenon in the fashion industry where garment design, production, and marketing is expedited in order to quickly and cheaply get new trends to the consumer.

**Organic Chemicals:** Any chemical compound that contains carbon and may contain nitrogen, oxygen, hydrogen and other elements.

**Wet Process:** The dyeing, processing, printing, and finishing of textiles that involves massive amounts of water.

**Alkylphenols:** A family of organic compounds used to clean and dye fabric. They can accumulate in the body over time, disrupting sexual development.

**Perfluorinated Chemicals:** A group of manufactured compounds commonly used to waterproof textiles and many other products. PFCs are highly resistant to degradation in the environment, can build up in the body over time, and alter growth and reproductive hormones.

**Heavy Metals:** Metals of relatively high density used to pigment dyes. Heavy metals can accumulate in the body over time and cause cancer or a variety of damage to the nervous system or kidneys.

**Persistent:** Organic pollutants that don't break down in the environment over time, more specifically called Persistent Organic Pollutants (POPs).

**Bioaccumulative:** When toxins build up in an organism over time because the organism absorbs the pollutant at a faster rate than they lose it.

**Carcinogen:** A chemical substance capable of causing cancer in living tissue.

**Mutagen:** A chemical substance or radiation that causes genetic mutation.

**Reprotoxin:** A chemical substance that is toxic or interferes with reproduction.

**Synthetic Fibers:** Partially or fully man-made textiles such as rayon, nylon, or polyester.

**Organic Fibers:** Naturally-occurring materials like cotton, wool, or silk that are grown without the use of insecticides, herbicides, or fungicides.