Facultad de Ciencias Humanas y Sociales

Grado en Relaciones Internacionales

Trabajo Fin de Grado

Analysis on the effectiveness of the Chinese government environmental legislation to reduce the impact of fast fashion in river water

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Index

1 Introduction

Fast Fashion is defined as low cost, trendy clothing, that samples ideas from the catwalk or celebrity culture and turns them into garments in high street stores at lightning speed (Rauturier, 2022). The concept appeared in the late 90s and 2000s, in those years, online shopping took off, and Fast Fashion retailers like H&M, Zara and Topshop became fashion phenomenon. These brands copy the looks and design elements from the top fashion houses and reproduced them in a fast and cheap way. The main characteristic of fast fashion is its low lead-time, which is the time that passes from the first step of the chain until the product is purchased. For example, it takes two weeks to Zara to design, produce and distribute a new piece of clothes; eight weeks in the case of H&M (Cline, 2012).

Now everyone can buy trendy clothes whenever they want, and fast fashion has rapidly become part of our daily lives. Fast fashion has changed people's shopping trends. In the past, people bought quality garments, mostly handmade, to keep them for many years, nowadays, people buy cheap but low-quality clothes, they wear them for a brief period, and once those garments are no longer trendy, they discard them. Around 85% of all textiles go to the dump each year. According to the UN environment programme, the average buyer consumes 60% more pieces of apparel than 15 years ago, but only keeps the clothes half as long (Nijman, 2019).

Fast-Fashion has become a worldwide phenomenon that does not seem to stop growing and expanding. Globalization has contributed to fast-fashion’s expansion because companies have outsourced their production to developing countries in which labor is cheaper, market entry barriers, government labor and environmental regulations are lower than in developed ones. This outsourcing process has benefited companies that now are able to produce garments at a much lower cost and consequently, sell these clothes at a cheaper price that attracts consumers (Klein, 1999).

Another factor that has contributed to fast-fashion popularity is the change in consumer’s behavior. Nowadays, consumer preferences vary rapidly to follow fashion’s trends. Fast fashion brands grew by 9.7% between 2010 and 2015 (Queensland, 2018). A key factor of this growth is fast-fashion online presence. Customers are not only able to buy clothes directly in the shops but also through online websites which is an easier and more comfortable option. According to a September 2018 Hitwise study, an American marketing company, that measures search and visitors' behavior on fast-fashion related sites, visits to fast fashion websites grew 20% or more monthly between March-June 2018 (Garcia, 2018). A representative example of this is the online shop Shein. Shein is a Chinese company that has no physical store, it is an online retailer. According to Bloomberg, the brand was valued at 91 billion EUR in April 2022. Its model of manufacturing garments, plus customers demand for them, means it churns out up to a staggering 10,000 new products a day (Fressynet, 2022).

Moreover, social media have become a marketing platform for fast-fashion brands. The role of influencers is important. Fashion influencers post their looks tagging the fast-fashion brands and explaining to their audience where they can get the look. In the past, people used to watch celebrities looks on TV or brands collection in the catwalks and wonder whose brand is that from, nevertheless those looks were far from the reach of a middle-class consumer. Nowadays, thanks to social media and fast fashion, not only it is easier to find out which brand are the clothes from, but also these clothes are affordable to everyone.

Fast Fashion is a worldwide tendency that has conquered the Western World but also the Eastern hemisphere, specifically Asia. Fast fashion houses are expanding aggressively across Asia and the average capital spent on clothing is set to rise by almost 10% annually. For instance, in 2018 China accounted for almost one-third of regional demand for clothing. (Wong, 2015) In the case of China, fast fashion is notable because it has quickly expanded from the coastal regions to the smaller interior cities that are growing. These cities offer strong potential for affordable brands because consumers are more aspirational than in big cities where people's income is much higher, and they are more attached to luxury brands.
Fast-fashion retailers are also present in other areas of Asia. It is the case of Japan, the most important Asian country when it comes to fashion. Japanese street fashion continues to influence apparel and footwear trends in many countries – which is one of the reasons behind Uniqlo's expansion in the wider Asian region; the brand is expanding in South Korea, Taiwan, and Southeast Asia (Wong, 2015).

1.1 <u>Motives</u>

As an International Relations and Global Communication student, international issues like the climate change and the role governments have in tackling this issue are especially relevant to me. In the case of the fast fashion industry, my interest on the topic started when I watched the documentary “The True Cost” in high school, since that moment the industry, its labor conditions, and its impact on the environment drew my attention. Throughout the five years at the university, I have been able to study closely the fast fashion industry impacts on Asia, but I did it solely from the labor conditions perspective, so I wanted to research more about the environmental impacts and the role of governance.

The main reason behind this project is the personal interest to find out if government regulations are truly effective in terms of reducing pollution produced by this industry or if these measures just stay on the paper.

The impact on the environment of fast fashion is huge. Sometimes this is an unnoticed issue, especially by the population who is used to buy without thinking where their clothes are coming from and what are the consequences of both producing, using, and throwing this clothing. One of the motives for studying this topic is to raise awareness of the effects that fast fashion has on the environment, which will be explained later.

I wanted to take this opportunity to study an issue that I am interested in and research in detail relevant issues that I felt enthusiastic about, something that this paper aims to portray and the reason this section of the project is written in first person. However, the following sections will not use the first person to assure the objectivity and seriousness this paper aims to achieve.

1.2 Theorical framework

This section of the project provides a series of definitions of essential concepts that will be mentioned throughout the analysis and the project, as well as the main sources and authors on which this research is based.

Fast Fashion

According to Fernie and Sparks, fashion is defined as "an expression accepted by a group of people through time, and it has been characterized by some marketing factors such as low predictability, high impulse purchase, short life cycle, and high volatility of market demand" (Fernie and Sparks 1998).

The fashion industry has been evolving hand in hand with technological advances. The Industrial Revolution transformed the fashion industry, and the apparel production. During this time, new textile machines were introduced and instead of being made by order, clothes were produced in a range of sizes. In 1846, the sewing machine was a breakthrough in the industry as it increased productivity, while reducing production costs and lowering clothes prices. During this time, sweatshops started to emerge. In the 90s and 2000s, low cost-fashion became the norm with the rise of online shopping and the entrance in the market of brands like Zara and H&M (Rauturier, 2022).

There are several definitions for the term fast fashion, but there is not a common definition of the concept used by academics. According to Barnes and Lea-Greenwood, "fast fashion is a business strategy which aims to reduce the processes involved in the buying cycle and lead times for getting new fashion product into stores, in order to satisfy consumer demand at its peak" (Barnes and Lea-Greenwood, 2006). Another definition is provided by Annamma: "Fast fashion refers to the clothing's which are low cost and imitate the present luxuriousness fashion trends. It reflects the desire of young people." (Annamma, et al 2012).

The term fast fashion was used for the first time at the beginning of the 1990s, when Zara opened its first shop in New York. "Fast fashion" was firstly used by The New York Times newspaper to describe Zara's business model based on the brief time between the designing stage of the clothes and its availability in stores. Zara is a Spanish retailer founded in A Coruña in 1975 by Amancio Ortega (Inditex, 2022). The brand is the origin of fast fashion. At the beginning, its popularity came from offering versions of luxurious brands at a lower price. In the 80s, the founder changed the design, manufacturing, and distribution process to reduce lead times and react to new trends more quickly, which Ortega called "instant fashion", a synonym of fast fashion, a concept that meant changing Zara's collections every week instead of every three months, turn made the variety of items virtually infinite and invited consumers to buy much more in a short period of time (Hansen, 2012). The brand was able to reduce its costs thanks to the outsource of manufacturing, mainly to Asian countries. After the success in Spain, the company started an internationalization process. Nowadays, the company has 2001 stores in ninety-five different markets (Inditex, 2022). In 2020, it produced more than twenty clothing collections. Nowadays, the biggest players in the fast fashion industry include Zara, UNIQLO, and H&M (Maiti, 2020). UNIQLO is a clothing company that was originally founded in 1984 as a fabric manufacturer in the Japanese city of Yamaguchi. Today, it is an international brand with more than 1000 shops worldwide (UNIQLO, 2022). Since its creation, UNIQLO has focused on quality, textiles, and technical fabrics which have been key to its success. The brand offers low cost but quality clothing, this is possible because of the relocation of their manufacturing to foreign countries, same case as Zara (Hyde, 2007). H&M is a Swedish company founded by Erling Persson in 1947. It focuses on fast fashion for all genders and ages (H&M Group, 2021). It is the second largest world retailer, after Zara. In 2021, the number of H&M stores worldwide was 4801 (Smith, 2022). The design team located in the Swedish office controls manage the production stages, from planning goods to setting specifications, and production is outsourced to approximately 800 factories in Europe and Asia. Its business model is based on outsourced production, which to date has generated high profit margins (Vogue, 2022).

Technology is in part guilty for the environmental and ethical aftereffect of fast fashion consumption; there is now waste disposed in the ecosystem, and an extensive amount of energy necessary both to produce and to take care of all the garments (Scaturro, 2008). However, nowadays technology’s is focusing on increasing miniaturization and awareness, the request for higher performance in clothing and textiles, and the booming global eco consciousness suggest great promise in this sector for further investigation and development (Monika Holgar, 2009).

The global shift of textile and garment production to lower-labor-cost countries that characterized fast fashion led to a relocation of production centers from developed countries to developing ones, which increased complexity and reduced transparency through the supply chain. In the chapter about the environmental price of fast fashion of the book Nature Reviews: Earth and Environment, Niinimaki et al, explain thoroughly the garment supply chain, its stages, where each stage takes place and the environmental impact of each one (Niinimaki et al, 2020). At each stage of the supply chain, the fast fashion industry generates environmental impacts, from water and chemical use during production to CO2 emissions during the manufacture. (Fig. 1).

The globalization process that the textile and fashion industry has undergone has resulted in an unequal distribution of these environmental externalities, with developing countries, where textile and clothing are produced, carrying the burden for developed countries, where these products are consumed (The Carbon Trust, 2011). The increased globalization and decentralization of garment manufacturing has complicated the process of assessing environmental impacts for example, due to uncertainty in raw-material sourcing and processing (Niinimaki et al, 2020).

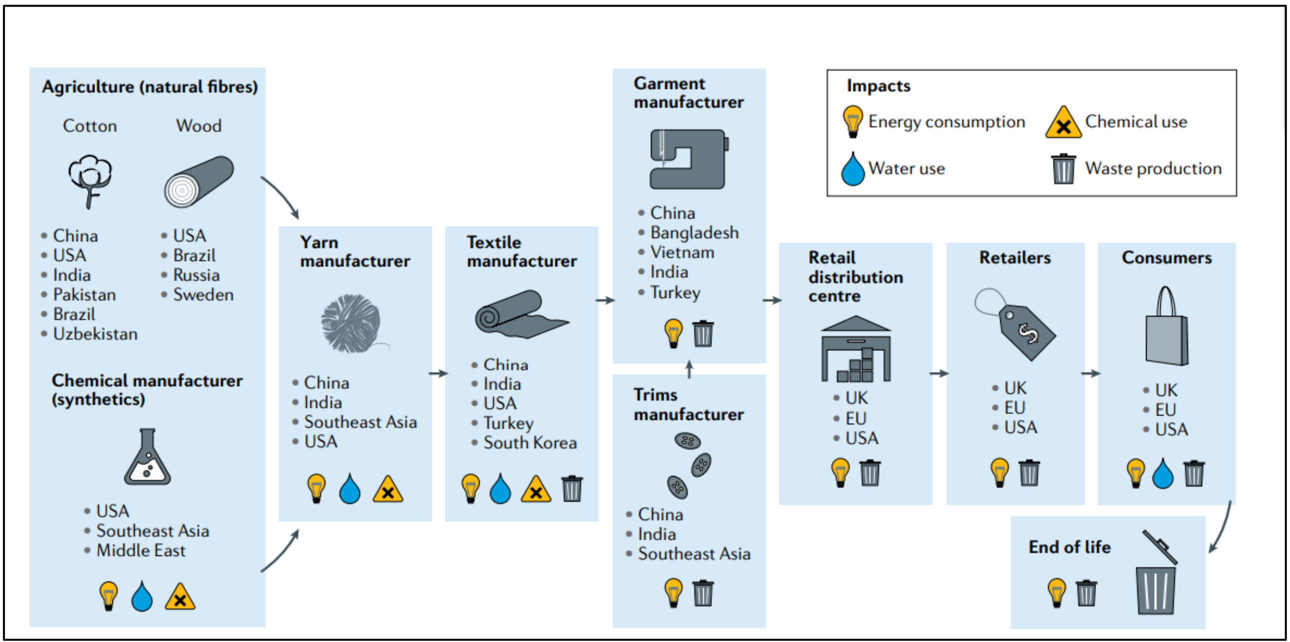


Figure 1: Garment Supply Chain

Source: Nature Reviews: Earth and Environment, (2020) Throughout this project, the environmental impact of this supply chain will be explained in more detail. In academic study, fast fashion has been mainly studied from a business model perspective with a fast reaction strategy to cut down production times (Bailey, 2001). Literature on fast fashion is focused on pressure on lead-time cutback and management of the different participants in the supply chain (Barnes and Lea-Greenwood, 2006). It is in this context of lack of extensive literature on the effectiveness of governance in reducing environmental effects of industry that this project has been undertaken, to contribute to the academic literature on the subject.

Environmental legislation

Environmental legislation refers to collection of laws, regulations, agreements, and common law that rules how humans interact with their environment. The aim of environmental law is to protect the environment and create guidelines about the usage natural resources. Environmental laws have as an objective protecting the environment from harm, but they also determine who can use natural resources and on what conditions. Laws can regulate pollution, the use of natural resources, forest protection, mineral harvesting, water and air protection, and animal and fish populations (Dernbach et al, 2011).
According to Ribé, "environmental legislation serves to prohibit, restrict, and regulate environmentally harmful practices. Recently, however, the importance of environmental, legal, and policy frameworks to work as incentives for activities that benefit the environment has increased, that is, to discourage negative externalities by encouraging positive externalities" (Ribé, 2018).

The origin of environmental legislation goes back to the 18th century when European countries started to passed laws with the aim of improving natural resources conservation (Kiss and Shelton, 1994). In the case of China, environmental legislation started later, specifically in 1797, focusing on environmental pollution control. Nowadays, China's environmental legislation is one of the most active legal fields of the country. Until the end of August 2014, the Standing Committee of the National People's Congress had approved thirty laws about environmental protection and resources conservation, which include five comprehensive laws, five pollution prevention and treatment laws, eleven resources conservation and utilization laws, four energy laws, and five other diverse types of laws (Mu et al, 2014). Nevertheless, this legislation had many flaws and deficiencies.

The reason China's past environmental pollution controls are ineffective is the enforcement of environmental law, at the same time the existing weaknesses and the problems with environmental legislation contribute to legislation inefficacy. For instance, Professor Zhou Ke believes: "the number of environmental laws did not mean good quality equally; problems with the system design of these laws were the root cause of poor effects about environmental protection work. Moreover, people have no qualification to talk about the completeness of China's environmental legislation because there are still too many gaps in environmental legislation between China and Western countries, whether from the view of legislative ideas, legislative techniques, or legislative approaches" (Zhou, 2013).

As it is going to be explained in this project, since 2014 the Chinese government has continued to pass environmental legislation. It is within this framework of ineffectiveness of previous environmental legislation, that this project will be conducted to study whether this issue is still occurring.

Chemical Oxygen Demand (COD)

Chemical Oxygen Demand (COD) is the estimate of oxygen required for the portion of organic matter in wastewater that is subjected to oxidation and the amount of oxygen consumed by organic matter from boiling acid potassium dichromate solution. COD is a water quality indicator used not only to determine the amount of biologically active substances like bacteria but also biologically inactive organic matter in water (Häder et al., 2018).

COD is often used as a measurement of pollutants in water, wastewater, and aqueous wastes. One application of the COD test is to measure soluble COD in wastewater since characterization of total COD in wastewater is critical for accurate modeling of biotransformation in wastewater treatment processes (Hu & Grasso, 2005). In this project, COD will be used as an indicator to evaluate the improvement of water quality in China rivers.

Regarding the main literature of this project, there are several sources that have been relevant. The River Blue Documentary, a film that illustrates how the fast fashion industry is destroying rivers, affecting population, and the viable solutions to secure a sustainable future. This film has been the main source for the chapters on the environmental impact of fast fashion in the world and specifically in China. It has been relevant because it provides substantial information about the quality of rivers in Asia, personal testimonies of China and Bangladesh citizens that explains how they have seen their rivers deteriorate, and the opinion of water and environmental experts on the topic and their recommendations for solutions to the issue.

Reports published by the Chinese government have been the main source to find data about the quality of water in the country. Specifically, the National Surface Water Quality Report, the Report on the State of Ecology and Environment, and the China Statistical Yearbook.

1.3 Current situation

Nowadays, there are several problems related with the fast fashion industry: carbon emissions, water consumption and wastage, water pollution and microfibers, textile waste, extensive land use and deficient labor conditions are the most important ones.

High carbon emissions

The United Nations Alliance for Sustainable Fashion stated that the fashion industry is responsible for 8-10% of total carbon emissions, which is higher than the emissions of both flights and marine shipping combined. In 2015, polyester production for garments emitted 282 billion tons of CO_2 (Dottle & Gu, 2022). If we observe Europe emissions, textile purchases in the EU in 2017 generated about 654 kg of CO_2 emissions per person (European Environmental Agency, 2021).

Water consumption and wastage

The water consumption of the fashion industry usually goes unnoticed by consumers. Nevertheless, it should be a matter of concern. It is estimated that the fashion industry consumes annually seventy-nine trillion liters of water of which five trillion liters of water are used during the dyeing process (Niinimäki et al, 2020). Furthermore, it takes around 7500 liters of water to produce a classic pair of jeans and 2700 liters to make a basic cotton shirt. (UNEP, 2021).

Water pollution and microfibers

Many products involved in the fast fashion industries such as dyes, pesticides and insecticides, and plastics are responsible for water pollution.

Fast fashion accounts for a fifth of the three hundred million tons of plastic made yearly in the world. Polyester, which derived from petroleum, has become the main material used in clothing production. For instance, according to Bloomberg 95.2% of Shein products contains plastic materials like polyester or nylon (Dottle & Gu, 2022). Clothing made from polyester and synthetic fibers are a main source of microplastic pollution that harms marine wildlife. Around 35% of all the microplastics found in oceans comes from textiles, being the largest source of microplastic pollution in the Earth's oceans (Boucher & Friot, 2017). As stated in *A New Textiles Economy Report of 2017*, it has been estimated that around half a million tons of plastic microfibers are thrown into the oceans annually during the washing of plastic-based clothing such as polyester or nylon (Ellen Macarthur Foundation, 2017).

Textile Waste

The fashion industry Approximately 87% of the total fiber used for clothing production ends up being incinerated or thrown into landfills (Dottle & Gu, 2022).

The US Environmental Protection Agency published that in 2017 10.2m tonnes of textiles were sent to landfills, while another 2.9m tonnes were incinerated. Furthermore, it estimates that each year 85% of all textiles end up in landfills (EPA, 2020). In the UK, an estimated 350,000 tonnes of clothes end up in landfill every year (WRAP, 2019).

Extensive land use

A considerable amount of the materials used in clothing production like cotton, rubber, leather, viscose, and wool use land. As a result of this, fast fashion is an important contributor to global deforestation. For instance, it is estimated that 150 million trees are logged per year to be turned into cellulosic fabrics, like viscose (Canopy, 2018). The fashion industry is expected to use 35% more land for fiber production by 2030 – an additional 115 million hectares (Boger et al, 2017).

Deficient labor conditions

Due to the globalization process, many fast-fashion companies have moved their production centers overseas, mainly to Asiatic countries with less rigid labor regulations than in European countries where wages are low, and employees are used to work overtime. Just imagine how low must be the wage of a textile worker, if the product you are buying, a T-shirt in Primark costs five euros. For example, the United States Labor Department discovered that factory workers for the brand Fashion Nova were paid only $2.77 per hour and seamstresses for Shein worked 75 hour per week for insignificant wages (Kitroeff, 2019). By relocating their factories, fast fashion companies are able to reduce costs and increase their profit at expense of their workers' conditions.

1.4 Methodology

This project is divided in two parts. In the first place, there is a more theoretical approach in which the concept of fast fashion will be defined, alongside with the impact of this industry in the environment, and the chapters of the case study related with environmental legislation published by the Chinese government. In this part of the study, it has been used information and data from books and articles related to fast fashion, its environmental impact, China textile industry and Chinese environmental legislation.

In the second place, an analysis of the improvement of water quality in China's main rivers will be conducted. Firstly, the changes in the discharge of pollutants in wastewater through the years will be studied. In this part, the author has used data about main pollutant emission in wastewater from 2013, 2015 and 2017 to calculate the percentage of either decrease or increase in the amount of pollutants thrown in the water.

Secondly, the evolution of the proportion of water quality categories of major rivers in China. In this section of the study, the author has used a quantitative data analysis. The data that has been analyzed is the one provided by the Chinese government itself in its official reports and pages. Throughout the process of data searching, the author has met complications to find data about Chinese water quality coming from various sources. Therefore, it is important to highlight that the study has been conducted based solely on data published by the Chinese administration, due to the difficulty to access data about the topic from other sources, which is why the quality and reliability of the data may leave room for improvement.

1.5 Hypothesis and objectives

By doing this project, the author would like to analyze the impact of fast-fashion on the Chinese environment and the effectiveness of regulations implemented by the Chinese government to reduce the environmental impact of fast-fashion in the country, specifically in its water. The hypothesis of this study is the following: Regulations and laws implemented by the Chinese government have been effective to reduce water pollution, partly caused by the fast-fashion industry and improve the country's water quality.

To be able to answer this hypothesis, I based my study in the following objectives:

- Analyze the impact of fast fashion in the Chinese environment, mainly on water sources.

- Explain Chinese laws and regulations related to the preservation of the environment and the reduction of pollution.

- Investigate the evolution of China's river water quality after the implementation of environmental legislation by the government.

2 Fast-Fashion impacts on the environment

Fast fashion's impact on the planet is massive. The fashion industry is the second most polluting industry in the world, after the oil industry. According to a recent report from the United Nations Economic Commission for Europe (UNECE), the fashion industry is the second largest user of water worldwide, it generates 20 percent of wastewater and releases half a million tons of synthetic microfibers into the ocean per year. It also contributes to 10 percent of global carbon emissions (Quantis, 2018). These emissions mainly come from pumping water to use in crops, mostly cotton ones, oil-based pesticides, equipment for harvesting and emissions from transportation. Moreover, the fashion industry is accountable for 24% of insecticides and 11% of pesticides (Nijman, 2019).

According to a 2019 report, the World Bank stated that “some studies have shown that the textile industry is responsible for about one-fifth of global water pollution”. Water use is a key aspect of the garment industry, it is used for scrolling, bleaching and dyeing processes. The pollution’s aspect comes mainly from wastewater. If this contaminated water is not treated before being thrown in water bodies, this wastewater can reduce the concentration of oxygen, which can be harmful to both aquatic life and the aquatic ecosystem in general (Islam, 2020).

An example of the misuse of water by the fast-fashion industry is the case of the city of Dhaka, in Bangladesh, where the water table is dropping two to three meters per year, due to a lack of control on water usage and appropriate equipment. Dhaka’s textile factories use six times more water than international best practices standards. A recent World Bank report suggests the textile factories in and around Dhaka may consume nearly as much groundwater as all of Dhaka’s 12 million residents (Yu, 2018).

Cheap, toxic textile dyes are used in the production process. These toxic dyes end in the rivers and oceans with the result of polluted water and the intoxication of many animals that form part of the ocean life.

The Buriganga, one of the most polluted rivers in the world, is located in Bangladesh. According to Mark Angelo, an international river conservationist, two-thirds of the pollution in the Buriganga comes from chemicals dumped by the city tanneries. Moreover, cheap textiles like polyester or cotton are the most used in the fast-fashion industry. These types of textiles contribute to global warming (River Blue, 2017).

For instance, polyester is derived from fossil fuels, which contribute to raising the global temperature. During washing, polyester garments drop microplastic fibers that end up in the oceans and are later eaten by the fish that people consume. A single 6kg domestic wash has the potential to release as many as 700,000 fibers. On average, a synthetic garment will drop more than 1,900 microplastics during a single wash (Yu, 2018).

Moreover, the production of cotton requires huge quantities of pesticides and water. It takes 2,700 liters of water to produce one cotton shirt (Drew & Reichart, 2019). The massive use of cotton has as a result risks of drought, environmental problems related to biodiversity and soil quality, and a fight for resources between the companies and the local communities. For instance, the Aral Sea located in Central Asia, which was once the fourth biggest lake in the world with 68000 square kilometers, is now almost completely dry due to the cotton plantations in the surrounding areas (Yu, 2018).

Furthermore, pesticides used in the cotton cultivations have killed almost all the fish in the Aral Sea, polluted the drinking water and soil, and even produced toxic dust storms. Pesticides have also affected the population that lives nearby the plantations, the exposure to chemicals pesticides has led to lower fertility rates and higher rates of some types of cancers and heart and kidney disease (Yu, 2018).

Post-Manufacturing pollution is also an issue for the fast-fashion industry, mainly textile waste. In total, up to 85% of textiles are thrown into landfills annually (McFall-Johnsen, 2020). As I have mentioned before, cheap prices of fast-fashion garments encourage people to buy new clothes more often than ever, consequently more waste is generated. Textile waste must be destroyed or discarded which leads to the following negative consequences for the environment. Firstly, groundwater pollution with chemicals and finishing agents when textile waste is thrown in landfills. Secondly, air pollution when textile waste is incinerated. Thirdly, climate change due to prominent levels of methane released as natural and semi-synthetic textiles decompose in landfills (Yu, 2018).

The problem is that factories are not located in Europe where the offices are, factories are mainly located in Asian countries like India, Bangladesh, Cambodia, Sri Lanka, and Indonesia. The ones who pay the highest price and suffer the consequences of these types of production are these Asian countries, and they are not the biggest beneficiaries once the production process has finished. Brands exploit and misuse Asian resources, leaving environmental issues there, but taking profit back to Europe. The fashion industry is a leading polluter of water, air, and land and its rapid growth has inflicted serious environmental damage in manufacturing bases across Asia.

3. Case Study: China

3.1 Chinese textile industry

The Chinese textile industry is the biggest in the world. In terms of production, China produces up to 75% of global key fashion raw materials. In 2020, China manufactured around twenty billion pieces of clothing accounting for half of the world's textiles. In April 2022, approximately 3.23 billion meters of clothing fabric were produced in China. Monthly textile production volume was consistently above three billion meters (Ma, 2021).

Furthermore, China is the number one textile exporter in the world. In 2020, China held a 43.5% share of the global textile exporting market, putting it in the top spot. Followed by the European Union (18.1%, including the UK), India (4.2%), and Turkey (3.3%). The US ended up fifth with a 3.2% share (WTO, 2021).

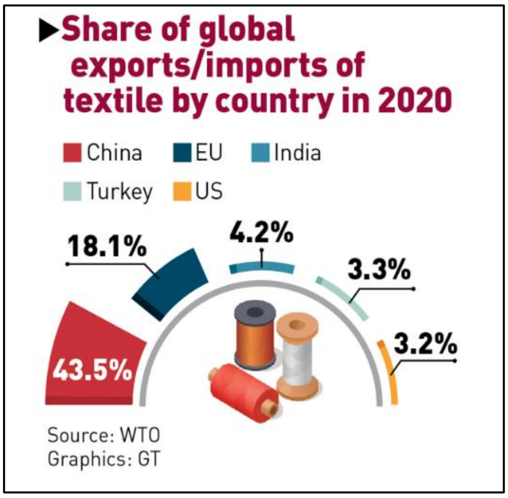


Figure 2: Share of global exports of textile by country in 2020
Source: World Trade Organization, (2021)

The key behind Chinese textile industry success has been that China had a low wage advantage and few business and environmental restrictions. Originally, the cost of producing textile related goods was lower than other developing countries. Nowadays, with the increase of environmental and labor regulations, the cost of producing textile has augmented, resulting in many companies moving its production to other Asian countries.

As stated in the 2020 China Statistics Yearbook, in 2019 there were 18018 enterprises in charge of manufacturing textile, 9110 companies which manufacture textile, wearing apparel and accessories and 6148 entities manufacturing leather, fur, feather, related products and footwear (National Bureau of Statistics of China, 2021).

According to the OEC, China is the number one export of cloth articles in the world. In 2019, the value of Chinese exports of textile yarns, fabrics and articles was 12018703 US$, meanwhile the value of exports of clothing and accessories was 15134880 US$ and the value of exports of footwear was 4769956 US$ (China Statistical Yearbook, 2020). In 2020, the main textile export of the country was other cloth articles exports which value was 60.7B$ The main destination of these products are United States, Germany, France, Japan, and United Kingdom (OEC, 2020). In 2021, China garment exports grew 8.4 per cent reaching a record of $315.5 billion (Fibre2Fashion, 2022).

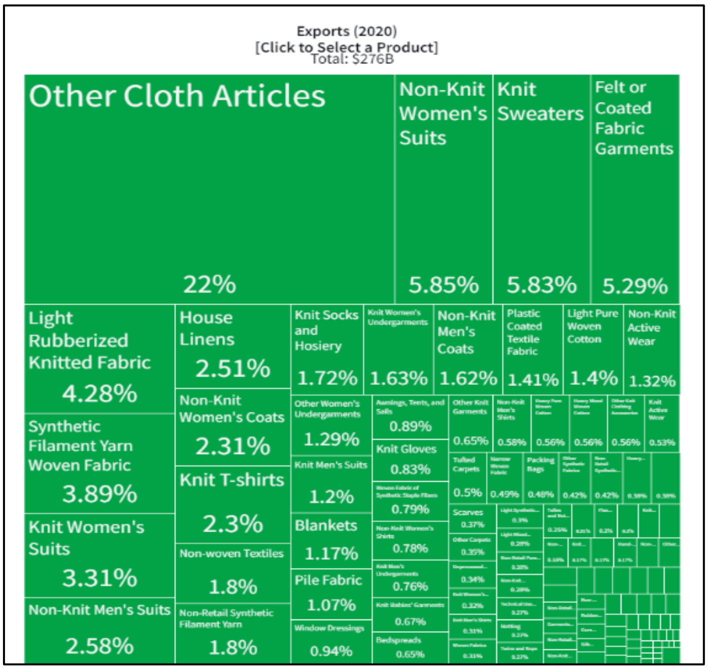


Figure 3: Main Chinese textile exports categorized by products in 2020
Source: OEC, (2020)

The Chinese textile industry is transforming into a more sustainable one. Sustainable brands are emerging, consumers are taking more into account sustainability in their purchasing decisions, and textile manufacturers are more aware of the environmental impact that their activities have. In a survey of 85 Chinese textile manufacturers conducted by China Water Risk, we can see hope towards the transition of the industry into a circular economy. The results of the survey show how 74% of them recycle water, 54% received circular related inquiries, 46% were impacted by circular regulations and 72% see business advantages in going circular (McGregor, 2017).

3.2 Impacts on Chinese water environment

In the report published by the World Bank in collaboration with the Government of the People's Republic of China, it is estimated that air and water pollution is costing the Asian country 5.8% of GDP. The study found that the health costs of pollution in China add up to about 4.3% of its GDP (World Bank, 2007). The report analyzes the health and non-health impacts of both air and water pollution through indicators like the economic burden of premature mortality and morbidity associated with air and water pollution, crop and material damages or access to piped water.

The country underwent a structural transformation from an agriculturally based country to an industrial one. This transformation came with a huge environmental cost because industries were developing without adequate pollution control. One of the major sources of this pollution is western markets and the fast fashion industry because textile manufacturers in China dump into rivers and lakes the wastewater full of toxic chemicals they have used for printing and dyeing clothes.

According to the World Bank, 17 to 20% of industrial water pollution comes from textile dyeing and treatment; seventy-two toxic chemicals in China's water originate solely from dyeing of which thirty cannot be removed. "There is huge room for improvement in the textile industry as a whole,'' said Ma Jun, director of the Institute for Public and Environmental Affairs (IPE). He estimates that "70 percent of lakes and rivers in China are polluted, as well as 90 percent of the groundwater. In all, an estimated 320 million Chinese do not have access to clean drinking water – more than the whole United States population". (River Blue Doc, 2017).

According to China's Ministry of Environmental Protection, the textile industry was the third largest source of industrial wastewater in China in 2015. It accounted for 10 percent of China's total industrial wastewater discharge and produced 1.5 times more wastewater than the coal industry. Because of this wastewater, the proportion of wastewater unfit for human contact in the Yangtze River is 17.6 percent and 10.2 percent for the Pearl River (Yu, 2018). As stated in the 2018 "China's Water Resource Bulletin", only 81.6% of the rivers, 25.0% of lakes, 87.3%

of reservoirs, and 23.9% of shallow groundwater met the criteria for drinking water points of supply (Ministry of Water Resources, 2018).

Regarding water pollution, as reported by the Ministry of Environmental Protection (MEP), in 2007 China’s Chemical Oxygen Demand (COD) discharge, a primary measurement of water pollution, was estimated to be 13.8 million metric tons. The recent census however indicates that the figure is in fact more than double and nearer 30.3 million metric tons. Moreover, the main pollutants in Chinese rivers are oxygen-demanding organic matter, nitrogenous fertilizers (including some nitrogenous organic matter), mercury and volatile phenols (IPE, 2019).

An example of how water pollution created by the textile industry is destroying Chinese rivers is the East River, also called the Blue River, located in Xintang. The Chinese city is known as the "denim capital of the world" because it produces more than 260 million blue jeans a year. It accounts for one in every three pairs of jeans sold at a global level. Due to insufficient control, by 2013 the city rivers had a dark blue colour and they gave off a strange odor. The cause of this colour and smell is the untreated wastewater dumped by local textile factories. The wastewater discharged is full of chemicals, toxic metals like mercury, lead, and cooper, and dyes used to dye blue jeans. In November 2010 Greenpeace published a survey which found that at three sampling sites in Xintang, the amounts of lead, copper and cadmium in the riverbed surpassed national "soil environmental quality standards". The study included a sampling of river mud with cadmium levels 128 times over the maximum and another where the water pH level was 11.95, the optimum pH level for river water is around 7.4 (Guang et al., 2020).

These rivers flow into the Pearl River delta, distributing the toxic waste in an area where many rivers converge. Furthermore, residents of the city depend on these polluted rivers for drinking and bathing. Some citizens have reported rashes, lesions and, in some cases, infertility related to water pollution in the city rivers (River Blue Doc, 2017).

Figure 4: Picture of the East River in which the pollution can be appreciated

Source: Guang.L & Greenpeace, (2010)

Water pollution is a big public health risk for the hundreds of millions of Chinese citizens who are exposed to this issue. According to the World Health Organization, in China, polluted water causes 75 percent of diseases and over 100,000 deaths annually (WHO, 2018). In villages located alongside river basins, it can be observed extraordinarily high rates of cancer and other diseases related to the poor water quality. For example, some villages located alongside the Yangtze River basin are known as “cancer villages.” According to data from the China Centre for Disease Control and Prevention, deaths caused by stomach, esophagus or liver cancer in these areas duplicated or in some cases triplicated the national Chinese average. The Centre has linked this escalation to water pollution in the Yangtze River (The Economic Times, 2020). Furthermore, Stuart Bunn, a water consultant to China, explains that it exists a high rate of liver cancers associated with the existence of blue-green algal toxins in water bodies of the country (River Blue Doc, 2017).

It is important to highlight that not only the Chinese environment is being affected by water pollution, but also Chinese population. In the River Blue documentary, Tianjie Ma, a Chinese toxic campaigner, explains: “There are cities where their whole drinking waters sources are threatened by pollution. In some cases, cities have had to shut down their whole water supply because of the fear of drinking contaminated water” (River Blue Doc, 2017).

3.3 Environmental legislation and action plans

The growing deterioration of the environment caused by the fast fashion industry in Asia has led to an increase of the pressure for governments and companies to enact environmental legislation and improve environmental compliance. The best example of this is China. Once indifferent in checking and enforcing environmental compliance, the Chinese government has stepped up its environmental compliance efforts considerably over the past few years. In the last years, the Chinese government has enacted many laws and regulations with the objective of improving the environmental situation of the country. In fact, China announced a war on pollution in 2014.

In 2010, the Chinese administration revised the "Entry Conditions for Printing and Dyeing Industry" to foster the sustainability of the industry. The textile industry is affected by these changes because dyeing industry is part of the clothing industry supply chain. The aims of the revised edition are to speed up the structural adjustment of the printing and dyeing industry, standardize the entry of printing and dyeing projects, promote energy conservation, emission reduction and elimination of backwardness in the printing and dyeing industry, and promote the sustainable development of the printing and dyeing industry (Ministry of Industry and Information Technology, 2010).

The document present new conditions for business wanting to enter the printing and dyeing industry. For instance, no new printing and dyeing projects shall be newly built within the scenic spots, nature reserves, drinking water reserves and the borders of the main riverbanks as stipulated by the State Council. In principle, no new printing and dyeing projects shall be built in areas with water shortage or poor water quality. For new printing and dyeing projects in areas with relatively sufficient water sources, relevant local government departments must plan scientifically and make rational arrangements. They must be built in an industrial park, and centralized heating and centralized treatment of pollutants must be implemented. Moreover, new, or renovated printing and dyeing projects should adopt advanced technology, use equipment with low pollution intensity, energy saving and environmental protection, and realize online detection and automatic control of main equipment parameters (Ministry of Industry and Information Technology, 2010).

Furthermore, existing printing and dyeing enterprises should have the conditions for wastewater and solid waste treatment, strengthen wastewater treatment and water quality analysis and monitoring during operation, conduct comprehensive treatment of wastewater and solid waste, and implement online monitoring of wastewater discharge. Companies whose wastewater treatment facilities cannot operate normally and whose wastewater discharge does not meet the standards shall not continue to engage in production activities if they still fail to meet the standards after rectification by relevant departments within a time limit (Ministry of Industry and Information Technology, 2010).

In 2015, the government amended the Environmental Protection Law. It was the first large-scale reform of environmental legislation in more than twenty years. It included the following:

1. The enforcement of strict financial penalties on companies infringing environmental laws. Before the amendments, the cost of compliance with the previous Environmental Protection Law (EPL) was much higher than the cost of noncompliance so companies decided to pay the penalties instead of complying with the environmental requirements. According to statistics, the average cost of noncompliance under the ECL was less than 10 percent of the cost of environment rectification (He, 2016). As a response to this issue, the new EPL established a new penalty system that calculated penalties daily until compensation is finished.

2. The suspension or shutdown of infringing companies. The revised EPL states that if a company discharges excessive pollutants, the authorities have the power to suspend or shut down the factory production. In 2017, 88% of 85 Chinese textile manufacturers surveyed by China Water Risk reported they have had to modify their factory to avoid being shut down (He, 2016).

3. The seizure of equipment and facilities. Article 25 of the EPL gives competent environmental protection authorities the authority to seize facilities and equipment where a polluter's illegal discharge causes or may cause serious pollution. Furthermore, they can detain infringing company executives (He, 2016).

4. Administrative detention. Under Article 63 of the revised EPL, individuals that commit noncriminal environmental offenses can be punished with up to 15 days of administrative detention (He, 2016).

5. Reclassification of some industrial lands as residential lands to push polluting factories to relocate away from residential areas that are affected by their activities.

6. It gives non-governmental organizations the power to denounce violators of the environmental requirements (Pang, 2020).

Textile industry related facilities, mainly printing and dyeing factories are ones of the most targeted by inspections.

These laws have been firmly enforced by the Chinese administration. In addition to national reforms, many local administrations within the country are within China are adopting green initiatives. For example, the city of Shanghai has taken actions to protect its local environment after the implementation of the Environmental Protection Law of 2015. Through the medium of planning, reporting, investing, inspecting, and other polices, Shanghai has become an environmental ally for the national government (Pang, 2020).

In April 2015, the Chinese Government issued the "Water Pollution Prevention and Control Action Plan", commonly now as the "Water Ten Plan". It aims to reduce water pollution, especially pollutants that comes from industries. The plan includes ten general measures which can be divided into thirty-eight sub-measures with objectives and responsible government departments identified for each action (Fa, 2015). The plan covers the following four broad actions:

1. Control pollution discharge, promote economic and industrial transformation, and save and recycle resources. It applies a discharge quota to main water pollutants and reinforce penalties for extreme discharges.

2. Promote science and technology progress through investments, use market mechanisms and enforce law & regulations.

3. Strengthen management and inspections to safeguard water environment safety.

4. Clarify responsibilities and duties and encourage public participation (Fa, 2015).

Several are the industries targeted by this plan, including industries related to the garment production: textile dyeing, dyes production and leather. The textile industry was the most targeted in the "Water Ten Plan", it had the most mentions in the plan (China Water Risk, 2015).

Aside from the plan mentioned before, the Chinese Government adopted in 1984 the Water Pollution Prevention and Control Law which have been amended several times, the last one in 2017. According to the Article 1 of the law, its purposes are "protecting and improving the environment, preventing and controlling water pollution, protecting water ecology, guaranteeing the safety of drinking water, protecting the health of the public, promoting the construction of ecological civilization, and promoting the sustainable economic and social development." (MEE, 2017).

In the Article 47, the government declared: "The state prohibits the building of small-scale production projects of paper making, leather making, printing and dyeing, dyestuff, coking, sulfur refining, arsenic refining, mercury refining, oil refining, electroplating, pesticides, asbestos, cement, glass, steel, thermal power etc. that seriously pollute water environment and do not conform with the state industrial policies" (MEE, 2017) This law targets directly the dyeing industry which is part of the fast-fashion industry supply chain, and it is one of the most water pollutants in the country.

The Chinese government is still working to reduce the environmental impact of the textile industry in the country. In 2018, government officials warned 219 textile printing and dyeing factories in Zhejiang Province, a textile industry center of the country, to reduce their pollution levels or face closure by the end of September. In addition, law enforcement officers seized fifty-three dye tanks and disassembled 232 sets of production equipment in Jiangsu Province that exceeded the amount of emission authorized (Yu, 2018).

On March 1st, 2021, the Chinese government implemented the China's Yangtze River Protection Law. The law bans the transportation of certain highly toxic and dangerous chemicals along the Yangtze River Basin. Companies that infringe the law will have their illegal income impounded and will have to pay a fine of between CNY 200,000 (approx. EUR 28879,15) and CNY 2 million (approx. EUR 288791,53) (GARD, 2021). Before the enactment of this law, the Chinese government have already taken actions to protect the Yangtze River. In 2019, the Ministry of Finance, Ministry of Ecology and Environment, Ministry of Water Resources and the National Development and Reform Commission created an 18-billion-yuan ($2.62 billion) fund to secure Yangtze River environmental protection and a compensation procedure by 2020 to give economic incentives to local governments (Yi, 2019).

Last year, the China National Textile and Apparel Council (CNTAC) published 14th Five Year Plan (2021-2025) in which it determined the development objectives and growth plans of action for the China's textile and apparel sector from 2021 to 2025. In the plan, there is a point dedicated to the relation between the sector and sustainability: "China intends to develop a "greener" and more sustainable textile and apparel industry. However, instead of simply reducing pollutants and water usage, China plans to develop a sustainability-led growth model, emphasizing areas including circular economy and creating new value-added products based on recycled material" (Lu, 2021).

China's 14th Five-Year Plan for Its Textile and Apparel Sector: Key Figures (Part I)

Indicators	Actual Performance 2016-2020	Goals for 2021-2025 (14th five-year plan)	Comments
Annual growth rate of industry value-added	Planned to achieve a 6-7% annual growth. However, affected by COVID-19, output dropped from 7,071 billion RMB in 2015 to 4,520 billion RMB in 2020.	Achieve reasonable growth	A less specific growth target implies that growing "bigger" is no longer a priority, and the growth prospect is also facing more uncertainties over the next five years
Textile fiber manufacturing	Reached 58 million tons in 2020, accounting for around 50% of the total world output	Account for 50% + of the total world output	China has no intention to shrink the size of its textile industry, including fiber production, over the next five years
Fiber end-use ratio	40% apparel, 27% home textiles, and 33% industrial textiles by the end of 2020	38% apparel, 27% home textiles, and 35% industrial textiles by the end of 2025	China intends to prioritize more textile manufacturing over clothing over the next five years
Annual labor productivity growth	Planned to grow 8% annually	Growth faster than the total industrial output	A less specific goal suggests that as China's textile and apparel industry turns mature, improving labor productivity further will be slower and require more investments.
Exports	Accounted for 39.2% of the total world textile and apparel exports in 2019, up from 36.6% in 2016	Account for 30%+ of the total world textile and apparel exports	China expects a declining market share in the total world textile and apparel exports (particularly for apparel products) over the next five years. More output could be sold in China's domestic market.
R&D spending as a percentage of revenue	1.0%	1.3%	China will continue to increase its R&D spending to move the quality and sophistication of its products to the next level and achieve "industrial upgrading"

Compiled by Dr. Sheng Lu based on China's 14th five-year plan for its textile and apparel industry

Figure 5: Main indicators of the textile and apparel industry performance and its goals for 2021-2025

Source: Lu, (2021)

China's 14th Five-Year Plan for Its Textile and Apparel Sector: Key Figures (Part II)

Indicators	Actual Performance 2016-2020	Goals for 2021-2025 (14th five-year plan)	Comments
Number of enterprises with RMB10 billion+ (around $1.5 billion) annual sales revenue	Planned to have around 50 by 2020.	Have around 40 by 2025	China will continue to support the development of "national champions." However, the notable setback of the goal suggests that improving companies' genuine competitiveness needs more than public policy support and takes time.
Energy consumption per unit of industrial value-added	Down 25.5% cumulatively from 2016 to 2020	Down 13.5% cumulatively in 5 years	China intends to continue to develop a "greener" and more sustainable textile and apparel industry. However, instead of simply reducing pollutants and water usage, the next five years will focus more on building a circular economy, creating new value-add products based on recycled material, and contributing to China's climate change policy.
CO2 emission per unit of industrial value-added	No mention	Down 18.0% cumulatively in 5 years	
Water consumption per unit of industrial value-added	Down 11.9% cumulatively from 2016 to 2020	No mention	
Emission of major pollutants	Down 10.0% cumulatively from 2016 to 2020	No mention	
Manufacturing of recycled textile fiber	No mention; accounted for 11.3% of total textile fiber manufacturing in 2015	Account for 15% of the total textile fiber manufacturing	
Newly mentioned buzzwords/areas	/	"dual circulation", "belt and road initiative", "technological innovation", "global", "supply chain"	Given a harsher market environment for exports, the prosperity of China's textile and apparel industry will rely more heavily on its performance in the domestic market over the next five years. Meanwhile, China will continue to get involved in the global and regional textile and apparel supply chain by leveraging its belt and road initiative and other outbound foreign investment projects.

Compiled by Dr. Sheng Lu based on China's 14th five-year plan for its textile and apparel industry

Figure 6: Main indicators of the textile and apparel industry performance and its goals for 2021-2025

Source: Lu, (2021)

The tables above include the indicators used to analyze the performance of the last five-year plan and the objectives for each indicator in the 14th five- year plan.

The most recent measure taken by the Chinese Administration related with the textile industry was the publication of a document about implementation options on accelerating the recycling of waste textiles in April 2022. The aim of the measure is to accelerate the construction of waste textile recycling system. It was the first time that the development goal of recycling waste textiles had been clarified. This document establishes the main goals for 2025 and 2030. A recycling rate of 25% by 2025 and of 30% by 2030, alongside with an output of recycled fibers of two million tons and three million tons, respectively (Department of Environment and Resources, 2022).

3.4 Analysis

In this part of the project, we are going analyze the evolution of Chinese river's water quality through the years to determine whether the legislation explained in the previous section has been effective in achieving an improvement of the country's rivers quality. For this purpose, the number of main pollutants discharged in wastewater is going to be studied, alongside with the changes in the composition of water quality categories over the years. In the China Statistical Yearbook appendix about resources and environment, there is information on the main pollutants discharged in wastewater. Nevertheless, the newest data available is from 2017, 2015 and 2013.

As we have seen in the previous chapter, one of the objectives of the 2015 amendment of the Environmental Protection Law was to reduce and control the discharge of pollutants in the water, as well as, one of the measures of the Ten Water Plan. By analyzing the data below, we are going to see the evolution of pollutants discharged in the water from 2013 to 2017 to analyze the effectiveness of the laws and plan mentioned above. The pollutants that are going to be analyzed are: Chemical Oxygen Demand (COD), heavy metallic chemicals like chromium and arsenic, and volatile phenol. These pollutants have been chosen because they are part of the main water pollutants discharged by the textil industry (Saravanan & Kumar, 2017).

8-13 Main Pullutant Emission in Waste Water by Region (2013)

Region	Total Waste Water Discharged (10 000 tons)	Main Pullutant Emission in Waste Water						Main Pullutant Emission in Waste Water					
		COD (10 000 tons)	Ammonia Nitrogen (10 000 tons)	Total Nitrogen (10 000 tons)	Total Phosphorus (10 000 tons)	Petroleum (ton)	Volatile Phenol (ton)	Plumbum (kg)	Mercury (kg)	Cadmium (kg)	Hexavalent Chromium (kg)	Total Chromium (kg)	Arsenic (kg)
National Total	6954433	2352.72	245.66	448.10	48.73	18385.3	1277.3	76112.0	916.5	18435.7	58291.5	163117.7	112230.0

Figures 7.1: Main pollutant contents discharged in wastewater in China in 2013

Source: China Statistical Yearbook, (2014) 8-13 Main Pollutant Emission in Waste Water by Region (2015)

Region	Total Waste Water Discharged (10 000 tons)	Main Pollutant Emission in Waste Water COD (10 000 tons)	Ammonia Nitrogen (10 000 tons)	Total Nitrogen (10 000 tons)	Total Phosphorus (10 000 tons)	Petroleum (ton)	Volatile Phenol (ton)	Plumbum (kg)	Mercury (kg)	Cadmium (kg)	Hexavalent Chromium (kg)	Total Chromium (kg)	Arsenic (kg)
National Total	7353227	2223.50	229.91	461.33	54.68	15192.0	988.2	79429.5	1080.0	15819.9	23597.6	105288.0	112101.3

Figures 7.2: Main pollutant contents discharged in wastewater in China in 2015

Source: China Statistical Yearbook, (2016)

8-11 Main Pollutant Contents Discharged in Wastewater by Region (2017)

Region	Main Pollutant Contents Discharged in Wastewater COD (10 000 tons)	Ammonia Nitrogen (10 000 tons)	Total Nitrogen (10 000 tons)	Total Phosphorus (10 000 tons)	Petroleum (ton)	Volatile Phenol (ton)	Main Pollutant Contents Discharged in Wastewater Plumbum (kg)	Mercury (kg)	Cadmium (kg)	Hexavalent Chromium (kg)	Total Chromium (kg)	Arsenic (kg)
National Total	2143.98	96.34	304.14	31.54	7639.3	244.1	52321	2059	8429	24844	76414	43297

Figures 7.3: Main pollutant contents discharged in wastewater in China in 2017

Source: China Statistical Yearbook, (2021)

From 2013 to 2015, there has been a decrease in the amount of tons of COD discharged in wastewater of 5.5%, meanwhile from 2015 to 2017, the amount declined by 3.6%. From 2013 to 2017, the discharged of COD was reduced by 5.5 percentage points.

Regarding the discharge of chromium, it decreased a 35.4% between 2013 and 2015, it continued decreaseing between 2015 and 2017 by 27.4 %. In the period of four years, the amount of chromium discharged in wastewater was cutted more than a half, specifically a 53.1%.

In the case of arsenic's discharge, the change between 2013 and 2015 is practically non-existent as it only decreased by 0.1%. However, between 2015 and 2017 the amount of arsenic dumped in wastewater decreased by 61.3%. From 2013 to 2017, the quantity was reduced by 61.4%.

From 2013 to 2015, the amount of volatile phenol discharged in wastewater decreased a 22.6%. In addition, between 2015 and 2017 the quantity of volatile phenol was hugely reduced by 75.2%. Over the 4 years, the amount of volatile phenol released in wastewater was considerably reduced by 80.8 %.

Analysing the changes explained above, we can see that in all the indicators studied there has been a notable reduction, which shows how the laws implemented by the Chinese government mentioned previously have been effective in reducing the amount of pollutants discharged into the water, thus improving water quality.

The next part of the analysis is going to investigate the proportion of water quality categories of the major rivers in China during the years to see if there has been an improvement in the quality of water. The evolution is going to be studied by checking the data from March through different years: 2016, 2018, 2020 and 2022. Also, the proportion of water quality categories of the major rivers in China per year is going to be analyzed. Unfortunately, in this case the most recent data is from 2020. The data analyzed will be from 2014, 2016,2018 and 2020. In order to study this, information from the National Surface Water Quality Reports published by the China National Environmental Monitoring Centre and the Report on the State of the Ecology and Environment in China by the Ministry of Ecology and Environment is going to be used.

To analyze Chinese Water Quality, the Environmental Quality Standard for Surface Water (GB 3838-2002) created by the Chinese government has been used. This Standard categorized Surface Water in five classes explained below according to the quantity of each pollutant present in the water.

Table 1 The environmental quality standards (GB3838-2002) and the variation range (unit: mg/L)

Level	I	II	III	IV	V	Normal change
DO	7.5	6	5	3	2	−1.0~1.0
COD_{Mn}	2	4	6	10	15	−2.0~2.0
BOD_5	3	3	4	6	10	−1.0~1.0
NH_3-N	0.15	0.05	1.00	1.50	2.00	−0.35~0.35
Pb	0.01	0.01	0.05	0.05	1	−0.04~0.04
Hg	0.00005	0.00005	0.001	0.001	0.001	-5×10^{-5}~5×10^{-5}
Oil	0.05	0.05	0.05	0.5	1.0	−0.45~0.45
Volatile phenols	0.002	0.002	0.005	0.01	0.1	−0.003~0.003

Figure 8: Environmental water quality standards per pollutant

Source: Ministry of Ecology and Environment of the People's Republic of China, (2017)

CHART 1

Water Grade Levels

GRADE	DESCRIPTION
I	EXCELLENT *main water source for population use, national protected*
II	EXCELLENT *for human drinking and living, rare aquatic life habitation, fish and shrimp spawning grounds and young fish feeding ground purposes*
III	GOOD *for human drinking and living, fish and shrimp species hibertation, migration, aquatic life cultivating and swimming purposes*
IV	LIGHTLY POLLUTED *for industrial and entertainment purposes without direct human contact*
V	MODERATELY POLLUTED *for agricultural and display purposes*
V+	HEAVILY POLLUTED

Source: Ministry of Ecology and Environment of the People's Republic of China

Figure 9: China Water Grade Levels

Source: Ministry of Ecology and Environment of the People's Republic of China, (2017)

As it is shown in the table above, the Ministry of Ecology and Environment of the People's Republic of China categorizes its water bodies in six different grades. Rivers under Grades I, II and III are considered to have good water quality, meanwhile grades IV, V and worse than V are used to define rivers that are polluted.

Study of the evolution of the proportion of water quality categories of major rivers in China.

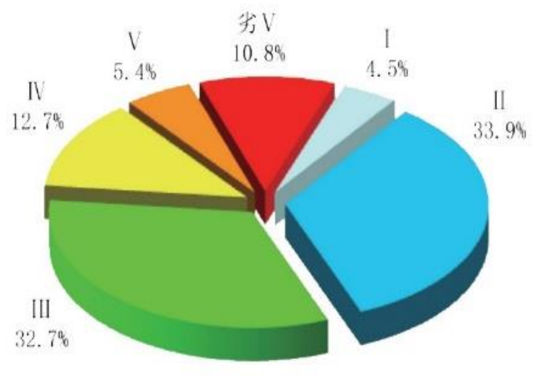


图1-1 2016年3月全国主要江河水系水质类别比例

Proportion of water quality categories of majors rivers in China in March 2016

Figure 10.1 Categories of major rivers in China in March 2016

Source: China National Environmental Monitoring Centre, (2016)

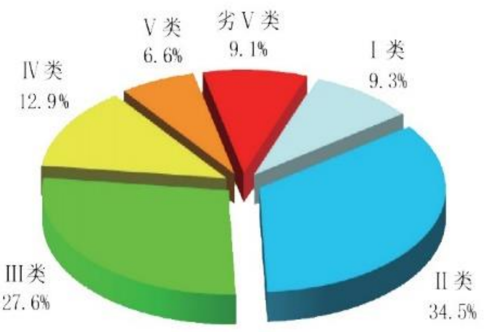


图1-3 2018年3月全国主要江河水系水质类别比例

Proportion of water quality categories of major rivers in China in March 2018

Figure 10.2 Categories of major rivers in China in March 2018

Source: China National Environmental Monitoring Centre, (2018)

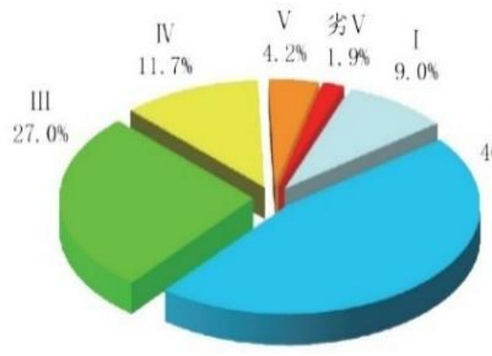


图1-3 2020年3月月全国主要江河水系水质类别比例

Proportion of water quality categories of major rivers in China in March 2020

Figure 10.3 Categories of major rivers in China in March 2020

Source: China National Environmental Monitoring Centre, (2020)

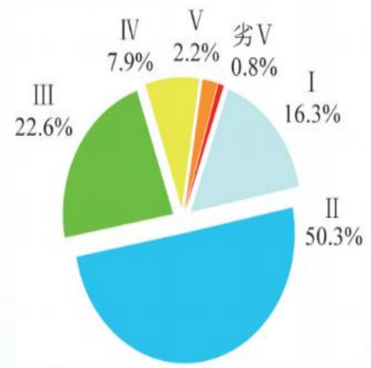


图1-3 2022年3月全国主要江河水质类别比例

Proportion of water quality categories of major rivers in China in March 2022

Figure 10.4 Categories of major rivers in China in March 2022

Source: China National Environmental Monitoring Centre, (2022)

The four graphics including above represent the proportion of water quality categories of major rivers in China in March in 2016, 2018, 2020 and 2022. In March 2016, the major rivers sections that were monitored are divided in the following categories: Grade I water quality sections accounted for 4.5%, and Grade II water quality sections accounted for 33.9%, Class III accounted for 32.7%, Class IV accounted for 12.7%, Class V accounted for 5.4%, and inferior to Class V accounted for 10.8%. Overall, slightly dirty water. The main pollution indicators were chemical oxygen demand, ammonia nitrogen, total phosphorus, five-day biochemical oxygen demand and permanganate index. Sadly, the exact data of these indicators has been difficult to found, but if this data would have been accessible these indicators would have been studied.

In March 2018, the main rivers in the country were slightly polluted, and the main pollution indicators were ammonia nitrogen, chemical oxygen demand, total phosphorus, five-day Biochemical oxygen demand and permanganate index. Among the sections of the major rivers monitored: Class I water quality sections accounted for 9.3%, Class II accounted for 34.5%, Class III accounted for 27.6%, Class IV accounted for 12.9%, Class V accounted for 6.6%, and inferior to Class V accounted for 9.1%.

We can see how in two years the Class I sections incremented by 4.8%, Class II sections went up by a 0.6%, Class III sections decreased by 5.1%, Class IV sections increased by 0,2% which is barely noticeable, Class V sections augmented by 1.2% (this is not necessarily negative since the increase could be due to a change of category from inferior to Class V to Class V) , and inferior to Class V sections diminished by 1.7%. One of the factors that have contributed to the improvement of water quality was the Water Pollution Prevention and Control Law amended in 2017.

If we look at March 2020 data, the overall water quality of major rivers in the country was good. Among the sections of the major rivers monitored: Class I water Quality section accounted for 9.0%, Class II accounted for 46.2%, Class III accounted for 27.0%, Class IV accounted for 11.7%, Class V accounted for 4.2%, and inferior to class V accounted for 1.9%.

Compared with the same period two years ago (2018), the water quality has improved. The proportion of Class I water quality sections decreased by 0.3%, Class II increased by 11.7 percentage points, Class III diminished by 0.6 percentage points, Class IV decreased by 1.2 percentage points, Class V decreased 2.4 percentage points, and the inferior Class V dropped by 7.2 percentage points.

If we analyzed the latest data, March 2022, the overall water quality of major rivers in the country was good this month. Among the sections of the major rivers monitored: 16.3% of the water quality sections were of Class I, 50. 3% were of Class II, 22. 6% were of Class III, 7.9% were of Class IV, 2.2% were of Class V %, and 0.8 % were inferior to Class V. Compared with the same period in 2020, there was notable change in water quality. Among them: the proportion of water quality section of Class I increased by 7.3 percentage points, Class II rose by 4.1 percentage points, Class III decreased by 4.4 percentage points, Class IV diminished by 3.8 percentage points, Class V dropped by 2 percentage points, and inferior Class V reduced by 1.1 percentage points.

In the graphics below, the main Rivers Basin Water Quality by year are represented.

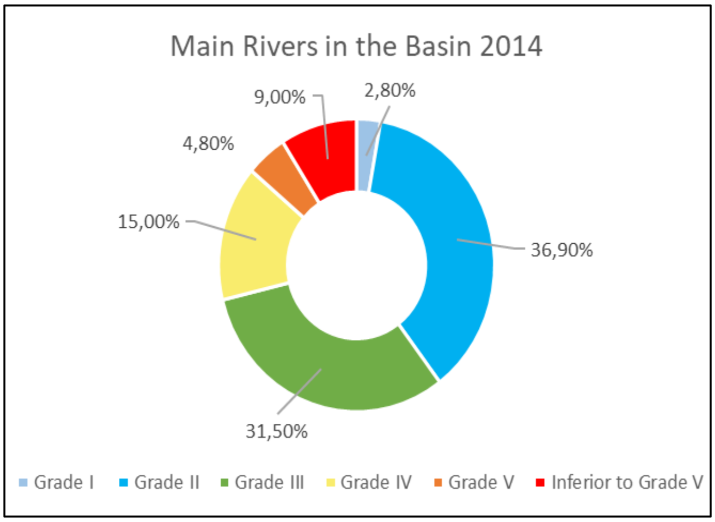


Figure 11.1 General water quality of river basins in 2014

Source: MEE, (2015)

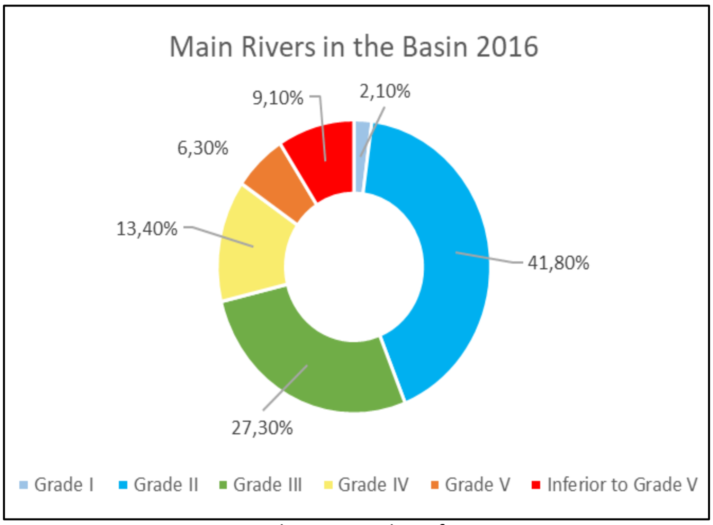


Figure 11.2 General water quality of river 2016

Source: MEE, (2017)

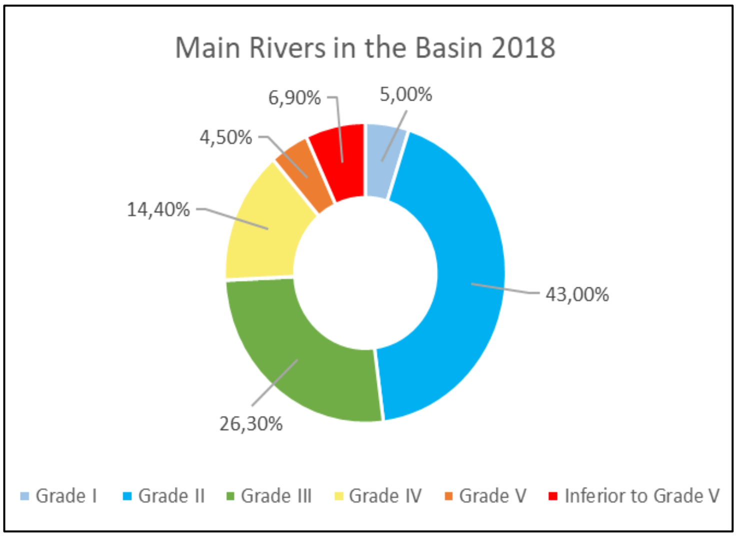


Figure 11.3 General water quality of river basins in 2018

Source: MEE, (2019)

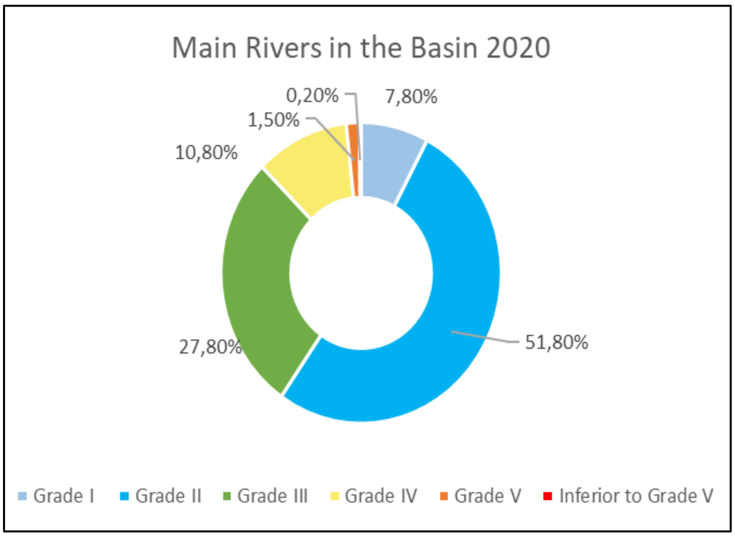


Figure 11.4 General water quality of river basins in 2020

Source: MEE, (2021)

The data used to design the graphics above comes from the report on the State of the Ecology and Environment in China published by the Ministry of Ecology and Environment of the People's Republic of China (MEE).

If we look at the evolution of water quality between 2014 and 2016, we can see that the percentage of Grade I rivers decreased by 0.7 points, Grade II rivers data augmented by 4.9 percentage points, in the case of Grade III rivers the percentage reduced by 4.2 points, Grade IV also decreased by 1.6 points, and Grade V and inferior to Grade V percentages went up by 1.5 and 0.1 points respectively. Both in 2014 and 2016, the main pollutants were COD, TP, and BOD5.

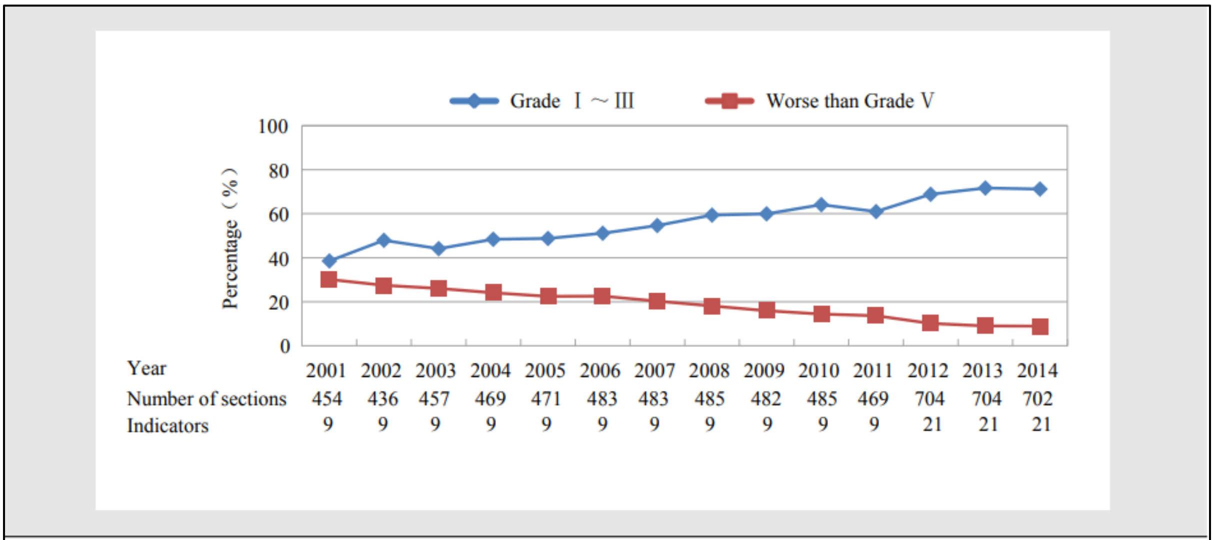
By studying data from 2016 and 2018, we can determine that the water quality is better. The percentage of Grade I rivers has increased 2.9 percentage points, Grade II percentage has augmented 1.2 percentage points, Grade III number of rivers has decreased by 1 percentage points, meanwhile Grade IV has increased 1 percentage point, Grade V has declined 1.5% and lastly, inferior to Grade V has decreased by 2.2%.

Regarding the data from 2018 and 2020, there has been an improvement of water quality. In the case of Grade I, it increased by 2.8 points, Grade II raised by 8.8 points, Grade III augmented by 1.5, Grade IV decreased by 3.6 points, Grade V cut down by 3 points and lastly, inferior to Grade V decreased 6.7 points. In 2020, the major pollution indicators were COD, permanganate index and BOD5.

Lastly, between 2014 and 2020, China river water quality has considerably improved. In the case of Grade I, it increased 5 percentage points, Grade II augmented 14.9 points, and Grade III percentage decreased 3,7 points, Grade IV decreased 4.2 percentage points, Grade V was reduced 3.3 points and inferior to Grade V was cut down 8.8 points.

After evaluating the data, both in the study comparing the water quality of a particular month during different years and in the study comparing the water quality during different years, we can see how there has been an increase in the percentage of good water quality categories (Grade I,II and III), while at the same time the percentage of polluted water categories (Grade

IV, V and inferior to V) has been reduced considerably. Therefore, it can be stated that the water quality of China's rivers has improved, especially in recent years.



Inter–annual variability of water quality in 10 major river basins in 2001–2014

Figure 12: Evolution of water quality in 10 major river basins between 2001 and 2014.

Source: Ministry of Ecology and Environment of the People's Republic of China, (2015)

Since the data analyzed previously started in 2014, the graph above has been selected to represent the evolution of water quality before 2014. By looking at the chart, it can be seen how the overall water quality in the Chinese major river basins has improved during 2001-2014. The percentage of sections with water quality at Grade I-III increased by 32.7 percentage points, meanwhile the percentage of sections worse than Grade Ⅴ decreased by 21.2 points.

By analyzing all this data, it can be seen how Chinese water quality has been improved in the latest years, specially after the implementation of laws in 2015 and 2017. For example, it has been shown how between 2016 and 2018 the percentage of Grade I and II categories augmented, meanwhile the number of rivers in the water polluted categories (Grade IV, V and inferior to V) decreased considerably.

4.Conclusion

The purpose of this project was to evaluate the effectiveness of Chinese environmental legislation in reducing surface water pollution caused by the fast-fashion industry. With this goal in mind, the project has explained what the fast-fashion industry and its negative impact on the environment is. Furthermore, the case study of China has been analyzed. Firstly, it has been explained what the textile industry in China is like and the effects it has on the environment in the Asian country. Secondly, the main environmental legislation created by the Chinese government to reduce pollution in general and water pollution in particular has been listed. Finally, data on water quality in the country was investigated to find out whether water quality has improved because of the aforementioned laws.

Like other industries, the fast fashion industry has been found to have a major impact on the environment, contributing to worsening the effects of climate change. Clothing production processes generate copious amounts of CO_2 emissions, they are water-intensive activities, and once used, they dispose the untreated water polluted by chemicals and dyes into rivers, polluting the planet's water bodies. Moreover, they use extensive amount of land for the growth of crops like cotton and the raise of cattle used to produce leather. In addition, during the washing process, garments made mainly of plastics like polyester release microplastics that end up polluting the environment. Finally, the industry's post-production processes like the disposal of clothes in landfills in developing countries, also have an environmental impact. For example, incinerating clothes that have been thrown away contributes to air pollution.

As in other Asian countries, it has been observed that the fashion industry has had a negative impact on China's environment, on air and water quality. However, the last decade has seen the country's government increase its efforts to tackle this pollution by implementing laws and actions aimed at reducing water pollution, such as the Ten Water Plan.

In this project, the efforts that the Chinese government are making to reduce water pollution and the environmental conditions of the country have been explained. Since 2014, when the country declared a war on pollution, the Chinese government has implemented several laws and plans like the Ten Water Plan or the Environmental Protection Law, with the aim of reducing pollution in the country and improve water conditions. As a result of the laws and measures taken by the Chinese administration, there has been an improvement in China river's water quality. The number of rivers in categories Grade I and II which translate in good water quality have augmented considerably, meanwhile the percentage of rivers in the rest of categories (Grade III, IV, V and inferior to V) which means polluted water except for Grade III, have decreased.

It cannot be guaranteed that government legislation has been the only factor in reducing water pollution in China because there could have been other factors that have contributed to this decrease such as private initiatives, shutdowns caused by the COVID-19 pandemic or actions taken by environmental organizations, but it can be state that environmental laws implemented by the Chinese government have had an impact on improving the country's water quality.

Regarding future trends, the apparel industry impact is expected to increase 49% by 2030 (McKinsey & Company, 2020).
The consumer is going to have a significant role, since its consumption behavior has a major influence in the issue. Fortunately, there is a tendency to look for more sustainable fashion options, especially Gen Z fashion trends which are rooted in social and environmental issues. Due to this change in consumer mindset, there has been a rise of new consumption models that replace fast fashion like circular economies, slow-fashion, and second-hand shopping. It is important that us, as consumers, start to think twice before purchasing and ask ourselves whether we really need to buy that much clothing. Furthermore, we should request our favorite brands transparency and information about their production process and environmental actions to reduce the impact of the industry. We have seen that environmental legislation can be effective, therefore is important that as citizens we demand our government actions and measures to tackle pollution and climate change.

To conclude, it is important to continue researching on the effects of fast fashion on the environment and the effectiveness of environmental laws enforced by governments. Other lines of work can be conducted from an air pollution perspective, studying the impact of the fast fashion industry emissions on Asia air quality and its population in more detail. From a point of view focused on the last stage of the fashion industry, it may be interesting to study the environmental impact of products' disposing in landfills or the incineration of clothes thrown away by consumers. Moreover, it might be relevant to study in more detail then impact of water pollution caused by fast fashion industry on citizens health. In the case of China, it would be interesting to follow up on the effectiveness of the 14th Five Year Plan that ends in 2025. Also, another topic that might be worth of study would be going a step further and analyze the impact of fast fashion in Chinese groundwater quality, not only surface water.

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