

Textile Industry Polluting Sector in Varied Forms

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ABSTRACT: Dye wastewater comes out from textile industries in Sanganer, Pali, Bagru, which are in Rajasthan. The wastewater is disposed containing many dyes especially azo dyes which are maximally hazardous. The dyes enter water bodies and cause destruction of water plants and fish. Detergents are also disposed from textile sector due to washing and bleaching of clothes which cause eutrophication in water bodies means increment of algal species and algal layer is formed on water surface. This depletes oxygen and the undersurface plants and animals like fish die.

KEYWORDS: dye wastewater, textile, sector, eutrophication, oxygen depletion, water bodies, fish

I. INTRODUCTION

Textile industries are famous in India for making clothes and fabrics of different varieties. These are dyed for beauty and show and exported to foreign places which is an important economical boon for India. Leheria, Bagru, Bandhej, prints are very famous all over the world and are exported at high costs. ¹However the textile dye wastewater disposed in water bodies goes to agricultural plants and the vegetables were seen to be enlarged like big sized brinjals, cucumber, tomatoes, etc. the farmers were happy to get them. However the investigation showed that dyes containing heavy metals were absorbed by plants creating big sized vegetables. The heavy metals like copper, aluminium, iron, etc are actually poisonous and cause health hazard like cancer. It takes a lot of water to produce textile, plus land to grow cotton and other fibres. It is estimated that the global textile and clothing industry used 79 billion cubic metres of water in 2015, while the needs of the EU's whole economy amounted to 266 billion cubic metres in 2017. To make a single cotton t-shirt, 2,700 litres² of fresh water are required according to estimates, enough to meet one person's drinking needs for 2.5 years. Textile production is estimated to be responsible for about 20% of global clean water pollution from dyeing and finishing products. Washing synthetics releases an estimated 0.5 million tonnes of microfibres into the ocean a year.³ Laundering synthetic clothes accounts for 35% of primary microplastics released into the environment. A single laundry load of polyester clothes can discharge 700,000 microplastic fibres that can end up in the food chain. It is estimated that the fashion industry is responsible for 10% of global carbon emissions – more than international flights and maritime shipping combined. According to the European Environment Agency,⁴ textile purchases in the EU in 2017 generated about 654 kg of CO₂ emissions per person. The way people get rid of unwanted clothes has also changed, with items being thrown away rather than donated. Since 1996, the amount of clothes bought in the EU per person has increased by 40% following a sharp fall in prices, which has reduced the life span of clothing. Europeans use nearly 26 kilos of textiles and discard about 11 kilos of them every year.⁵ Used clothes can be exported outside the EU, but are mostly (87%) incinerated or landfilled. Globally less than 1% of clothes are recycled as clothing, partly due to inadequate technology.⁶

There are three basic needs that a man possesses food, clothing, and shelter. The global textile and clothing industry is bound to be huge, as it fulfills the second basic requirement of man. It is worth \$480 billion at present and is expected to reach \$700 billion, shortly. This is because people are getting increasingly conscious of the way they dress. It has become a means to create an impression and represent their personality. Everybody wants to strike an impression with different and fashionable clothes. But the sad fact is that the human greed to look appealing and wear glamorous clothes has ended up causing harm to the environment. The textile industry is one of the most pollutants releasing industries of the world. Surveys show that nearly five percent of all landfill space is consumed by textile waste. Besides, 20 percent of all fresh water pollution is made by textile treatment and dyeing. Pollutants released by the global textile industry are continuously doing unimaginable harm to the environment. It pollutes land and makes them useless and barren in the long run. Surveys show that cotton consumes the highest amount of harmful pesticides and

International Journal of Multidisciplinary Research in Science, Engineering, Technology & Management (IJMRSETM)

(A Monthly, Peer Reviewed Online Journal)

Visit: www.ijmrsetm.com

Volume 7, Issue 9, September 2020

fertilizers. Majority of them fall on land while they are sprinkled on the crop. Similarly, textile manufacturing units release hazardous waste into the nearby land.⁷

A study was conducted to test the amount of metals present in soil and groundwater located near to the textile and tannery industries in Haridwar, India. Results indicated all the metals like Chromium, Iron, Manganese, Copper, Lead, and Cadmium were present in amounts larger than that prescribed as safe by World Health Organization (WHO).⁸ They can cause many problems in living beings. The hazardous effects of the use of toxic fertilizers in the farms are the highest in India, Pakistan, and Bangladesh. A case of 1991 caught attention when four US companies based in South Carolina mixed large amounts of hazardous wastes into a shipment containing fertilizers. The wastes contained huge quantities of lead and cadmium. This shipment was purchased by Bangladesh. Before the reality came into limelight, it was used in farms across the country. Children sprinkled these fertilizers in farms without any protection and were negatively affected by its exposure.⁹ The textile industry uses millions of gallons of water everyday. The problem does not rest in the high usage, though! The waste is not treated to remove pollutants from it before it is disposed to water bodies. The waste water usually contains PBDEs, phthalates, organochlorines, lead, and many other chemicals that cause severe health problems and diseases in human beings. The liquid effluents released by the textile industry are the most disturbing area of concern. This is because the toxic material released through liquid waste is vast in quantity. It consists of chemicals such as formaldehyde (HCHO), chlorine, and heavy metals. Besides, it is disposed into water bodies that reach far away areas and is consumed by a large number of people for drinking or for daily activities. They need to be treated to reduce their toxic content before being released into water bodies¹⁰. Air pollution caused by the textile industry is also a major cause of concern. Boilers, thermo pack, and diesel generators produce pollutants that are released into the air. The pollutants generated include Suspended Particulate Matter (SPM), sulphur di oxide gas, oxide of nitrogen gas, etc. The nearby areas with human population get affected adversely owing to the release of toxic gas into the atmosphere.¹¹

It has become utterly necessary to reduce the pollutants emitted by the textile industry. Contamination of the air, water, and land by textile industries and its raw material manufacturing units has become a serious threat to the environment. It has endangered the life of human beings and various other species on Earth. Global warming is a direct result of the pollutants released by such industries.¹² It also causes harmful diseases and health issues in people getting exposed to the pollutants in the long run. The use of organic raw material can help in fighting the emission of pollutants by the textile units. Organic cotton is especially beneficial as the production of cotton asks for the maximum amount of pesticides and fertilizers. Besides, the waste generated from textile manufacturing plants should be processed in a manner that it is free from toxic chemicals before it is disposed.¹³ Environment friendly methods of cultivation and manufacture should be resorted to. There is no doubt to the fact that the textile industry releases harmful pollutants into the atmosphere in large quantities. It is agreed all over the world that textile industry is one of the most pollutants emitting industries of the world. Almost 2000 different types of chemicals are used in this industry. It consumes as well as contaminates fresh water. There is a need to take actions in this direction, urgently.¹⁴

II. DISCUSSION

The pollution produced by the textile industry has a huge impact on the planet, and reasons are quite easy to understand. Clothes are probably the most common items that people buy in today's world, and the average number of clothes that an individual buys every year increased drastically in the recent years: a research from a McKinsey & Company showed that the number of garments produced annually became double since 2000 and exceeded 100 billion pieces for the first time in 2014. According to the Lenzing group, the world's textile consumption was 95.6 millions of tons in 2015. Due to the numbers that the fashion industry generates, the impact on the environment can be truly deep and damaging.¹⁵

The main environmental problems caused by the textile industry include water pollution, air pollution and solid waste pollution. The textile industry uses millions of gallons of water everyday. That's because to produce 1 kg of fabric, typically, 200 litres of water are consumed: washing the fiber, bleaching, dyeing and then cleaning the finished product.

The problem does not rest in the high usage, though, but in the fact that often waste waters are not treated to remove pollutants before they are disposed in the environment. As a consequence, according to some studies 20 percent of all

International Journal of Multidisciplinary Research in Science, Engineering, Technology & Management (IJMRSETM)

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Volume 7, Issue 9, September 2020

fresh water pollution is made by textile treatment and dyeing. The high volumes of water and discarded in the textile producing process are responsible for aquatic life toxicity.¹⁶

Substances such as formaldehyde, chlorine and heavy metals are disposed into water bodies and they are consumed in daily activities by a large number of people.

According to some studies, the apparel industry accounts for 10% of global carbon emissions and is the second largest industrial polluter.¹⁷

Specifically, air pollutants produced by the textile industry include:

- nitrous oxides and sulphur dioxide produced in the energy production stages;
- volatile organic components (VOCs) produced in coating, curing, drying, waste water treatment and chemical storage;
- aniline vapours, carrier Hydrogen sulphide, chlorine and chlorine dioxide produced in dyeing and bleaching stages.¹⁸

The textile industry also produces lots of solid waste.

Globally, each year, about 90 million items of clothing end up in landfills.¹⁹

Moreover, the waste produced ends up in water bodies, causing environmental issues. Some of the pollutants that end up in landfills include:

- Fiber lint, fiber scraps, trimmings and packaging waste produced in the fiber preparation
- Wasted and retained sludge in waste water treatment
- Flock, chemical and dye containers used in dyeing and finishing of woven fabrics

This various kind of pollution released in the environment by the textile industry are becoming dangerous, both for the planet and for human being.²⁰

A new approach to the production, consumption and disposal of apparel has become absolutely necessary.

With 1.7 million tons of CO₂ emitted annually, accounting for 10% of global greenhouse gas emissions, the textile industry is a major contributor to global warming. At the European level, clothing is the fourth most environmentally sensitive consumption category, preceded by food, housing, and transport (1). Indeed, the demand for clothing is increasing with unprecedented speed. Despite this high demand for clothing, 80% of French consumers are willing to take into account the environmental impact of their purchases, but generally lack reliable information to act effectively (3). This helps explain the emergence of new European regulations in favor of sustainable and circular textiles.²¹

III. RESULTS

An industry subject to robust and growing regulation.

1. The Anti-waste for a Circular Economy Law (AGEC)

Effective January 1, 2018, the Act prohibits the destruction of unsold nonfood products. Companies will now have to reuse, donate or recycle their unsold products, rather than landfill or incinerate unsold goods.²² Under Article 13 of the law, consumers are required to be informed of certain environmental characteristics of purchased products. As of January 1, 2018, all producers and importers whose annual turnover is greater than €50 million and who distribute more than 25,000 units per year, must communicate the following information on a dematerialized medium for a minimum period of two years:

- Geographical traceability of the 3 main manufacturing stages (weaving, dyeing, assembly/finishing);
- as well as a warning concerning synthetic fabrics that reject micro-plastic fibers during washing.

International Journal of Multidisciplinary Research in Science, Engineering, Technology & Management (IJMRSETM)

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Visit: www.ijmrsetm.com

Volume 7, Issue 9, September 2020

2. The EU Strategy for Sustainable and Circular Textiles

Adopted on March 30th 2018, alongside a series of legislative proposals from the European Commission, this strategy proposes measures that target the entire life cycle of textile products by 2030 (5). The measures envisaged include:

- A minimum of recycled fibers in the composition of fabrics to make them more resistant and easier to repair and recycle;²³
- Greater textile information and a digital product passport;
- Strict controls on greenwashing to protect consumers.

The strategy takes into account the key role of the consumer in achieving the ecological transition, as they will be entitled to compensation for infringement, once the law has been transposed into the national legislation of the Member States.²⁴

3. The Climate and Resilience Law

Resulting from the work of the Citizens' Climate Convention, the Climate and Resilience Act dates from August 24 2019, and is based on five themes. More importantly, it sets out to create an environmental label for consumers. Similar to a Nutri-score, this display is presented in the form of a visual rating, between A and E to be displayed on products in stores and online. Currently, ecolabelling is not mandatory in France. However, as of January 1, 2018, it will gradually come into force for textile clothing products. This new regulatory context for the textile industry is not only a sign of a growing societal commitment but also of the awareness of governments. Just like the NFRD (soon to be CSRD), the laws in favor of the environment are becoming more and more precise and affect more and more industries considered as extremely polluting.²⁵

IV. RESULTS

In line with these regulations, it is necessary for companies to adopt a solid environmental approach. This starts with measuring your carbon footprint. At ClimateSeed, we have developed the ideal emissions monitoring tool, which facilitates the calculation of your carbon footprint whatever your sector. The different missions we have conducted with textile companies have allowed us to build robust databases and to have a detailed understanding of the sector's value chain. Contact us to start your approach. The apparel industry is one of the biggest polluters on the planet. Textile mills generate one-fifth of the world's industrial water pollution and use 20,000 chemicals, many of them carcinogenic, to make clothes. Chinese textile factories alone produce about three billion tons of soot—air pollution linked to respiratory and heart disease—every year by burning coal for energy. Most of the world's textile factories are in developing countries where governments can't keep pace with the industry's massive pollution footprint.²²

NRDC's Clean By Design initiative works with major apparel retailers and brands by using their buying power as leverage to clean up the factories in their supply chains. Our experts study textile mills abroad and identify simple ways to reduce pollution and cut water, chemical, and energy use while saving money. Through the program, we promote a 10-step process designed to reduce the hottest spot of the industry's environmental impact: dyeing and finishing. As we encourage factories to adopt these best practices to save water, fuel, and electricity, we also push them to track water, steam, and electricity use. The apparel industry is one of the biggest polluters on the planet. Textile mills generate one-fifth of the world's industrial water pollution and use 20,000 chemicals, many of them carcinogenic, to make clothes. Chinese textile factories alone produce about three billion tons of soot—air pollution linked to respiratory and heart disease—every year by burning coal for energy. Most of the world's textile factories are in developing countries where governments can't keep pace with the industry's massive pollution footprint. NRDC's Clean By Design initiative works with major apparel retailers and brands by using their buying power as leverage to clean up the factories in their supply chains. Our experts study textile mills abroad and identify simple ways to reduce pollution and cut water, chemical, and

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Volume 7, Issue 9, September 2020

energy use while saving money. Through the program, we promote a 10-step process designed to reduce the hottest spot of the industry's environmental impact: dyeing and finishing. As we encourage factories to adopt these best practices to save water, fuel, and electricity, we also push them to track water, steam, and electricity use. In partnership with major brands like Target, Gap, and H&M, as well as with high-profile designer Stella McCartney, NRDC has introduced Clean by Design to nearly 200 textile mills and has tracked about 50 of them to quantify the results²³. Every mill using the program—old and new, large and small, cotton and synthetic, woven and knit—has seen huge benefits. Each mill in the 2014 program reduced water use by up to 36 percent and cut energy use by as much as 22 percent while also cutting 400 tons of chemicals from their processes. An added bonus? Each mill saved an average of nearly \$500,000. As we continue to see success, we are reaching more factories and providing innovative training to drive changes. As we add more multinational apparel retailers and brands in the program, we are also promoting better sourcing programs that consider environmental performance when qualifying and evaluating suppliers. With successes now in hand, Clean by Design is poised to become a self-sustaining tool for change within the industry. In 2015 and 2016, NRDC is partnering with the Sustainable Apparel Coalition, which represents more than 30 percent of global clothing manufacturing, from discount retailers to sports labels to high-end fashion. The group's membership is committed to assessing and improving the environmental performance of factories in their supply chains; Clean by Design offers the system to achieve these goals.²⁰

V. CONCLUSIONS

The environmental impact of the textile sector has become one of today's most worrying issues. The huge amounts of waste created, coupled with a low recycling rate (only 1% is transformed into new garments) is one of the critical aspects in the production process of companies in the textile value chain. Likewise, the vast amounts of water and chemicals consumed, the emission of microplastics and the emission of greenhouse gases, together with the aforementioned, urgently require new technological developments to create sustainable options.²³

1. Waste generation

The global production of textile fibre has doubled in the last 20 years, reaching an all-time high of 111 million tonnes in 2019 [1] and maintaining growth forecasts for 2030. This increase, together with the current consumption model, leads to the generation of vast amounts of textile waste; in Spain alone it is estimated that annual clothing waste is 900,000 tonnes.²⁴

2. Low recycling rate

The recycling rate for textile waste is very low. More than 85% of products discarded by consumers end up in landfills or incinerators and only 13% is recycled in some form after use. Most is transformed into other lower value items such as rags, insulation or filler material and less than 1% is recycled into new fibre. Therefore, in order to comply with the new regulations, it will not be enough to ensure the selective collection of textile waste, but will require the research and development of technologies that enable the recycling of the fibres with the aim of maintaining their value for as many cycles as possible.

3. High water consumption (water footprint)

Textile production uses a lot of water, as well as land to grow cotton and other fibres. It is estimated that the global textile and clothing industry used 79 billion cubic metres of water in 2015, while the needs of the entire EU economy amounted to 266 billion cubic metres in 2017. To make a single cotton T-shirt, estimates indicate that 2,700 litres of fresh water are needed – the amount of water a person drinks in two and a half years.²⁵

4. Use of chemicals

Chemicals are used in virtually all textile production processes, from fabric preparation and bleaching to finishing. Although at the legislative and regulatory level the use of permitted chemicals is well controlled (e.g. REACH regulation in Europe), the pollution load of these chemicals is still a major problem, especially for water treatment. It is estimated that between 1.5 and 6.9 kg of chemicals are used in the production of 1 kg of garments [3], meaning that the amount of chemicals used is greater than that of the textile product itself. Hence, the development of technologies to reduce chemical consumption, and generate as low a pollution load in effluents as possible, is critical.²⁴

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Volume 7, Issue 9, September 2020

5. Water pollution and the emission of micro-plastics

According to estimates, the dyes and finishing products used in textiles are responsible for about 20 % of global drinking water pollution. The laundering of synthetic materials releases about 0.5 million tonnes of microfibres each year, which end up in the oceans. Synthetic laundry accounts for 35% of the primary microplastics released into the environment: a single load of polyester clothing can shed 700,000 microplastic fibres that can find their way into the food chain. [4]

6. Greenhouse gas emissions (carbon footprint)

The fashion industry is estimated to be responsible for 10% of global carbon emissions, more than international flights and shipping combined. According to the European Environment Agency, textile purchases in the EU in 2017 generated around 654 kg of CO₂ emissions per person. To help reduce these impacts, AITEX places its full array of technical facilities and resources at the disposal of the textile industry. Through the development of R&D projects, obtaining certifications that accredit good practices and specific training in sustainability and circular economy, companies will be able to reduce their costs and implement new sustainable business models.²⁵

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Volume 7, Issue 9, September 2020

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