

SUSTAINABILITY IN THE TEXTILE INDUSTRY

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ABSTRACT

Sustainability in the textile industry is directly related to the disposal of waste which causes water and air pollution. Pollution is caused in each and every step of conversion of a basic element fibre to a product in the industry. For example, dyeing in the industry is the second most reason for polluting global water resources. The fashion textile industry contributes to 10% of global greenhouse gas emission and to 20% of waste water world-wide. The World Bank in 2019 observed that the textile industry was possibly polluting one fifth of global water. New technologies and the invention of synthetic fibres and dyes created enormous demand for textile products, but the industry failed to notice the impact of the huge waste generated and the methods for the disposal of such waste. This paper highlights the major sources of waste generation in the textile industry. The efficient management of the waste generated would lead to a sustainable textile industry.

Key words: sustainability; textile industry; synthetic fibres; synthetic dyes.

INTRODUCTION

Next only to the energy industry which tops global pollution, textile industry ranks second. It is polluting both air and water to a great extent. Its creation is responsible for environmental degradation through water use, energy use, and air/water pollution. The textile wet processing industries have a major role in the economic development as well as environmental welfare of a country. The textile dyeing and printing industries have to be blamed as one of the world's most offended sectors responsible for pollution. Annually, 92 million tons of textile waste is created globally by the fashion industry, and this issue is still rising. Textile waste is expected to increase by 60% between 2015 and 2030. But the unexpected and uncertain COVID19 pandemic has though reduced the forecasting it won't reduce unless the mind-set and lifestyle of people change.

MAJOR CONTRIBUTORS OF WASTE IN THE TEXTILE INDUSTRY

Synthetics fibres

Synthetics are the most commonly used fibre in the clothing industry, comprising 63% of the world's fibre production. Approximately 63,000 million tons of synthetic fibres are produced each year from petroleum, a non-renewable fossil fuel. Raw materials are also dependent on petrochemical industries and fossil fuel extraction for production, making synthetics highly energy intensive and non-biodegradable. Microfibers are also released into waterways for every wash a synthetic garment is given, deteriorating marine life and in turn the ecosystem.

Leather

Leather is derived from animal's skin. Raising livestock is directly related with massive amounts of deforestation, water-use, air pollution, and greenhouse gas emissions. The tanning process used to convert animal hide into a usable material is the most polluting phase of leather production. There are two types of tanning: chromium and vegetable. While vegetable tanning is much more sustainable, chromium tanning is more widely used. Chromium is associated with skin reactions, digestive problems, kidney or liver damage,

cancer, and reproductive problems. Moreover the wastewater from tanning industry pollutes waterways and causes marine eutrophication.

Synthetic Leather

Synthetic leather, the vegan alternative to animal leather, is produced from Polyvinyl Chloride or Polyurethane mixed with a base material of cotton, polyester, or nylon. Though synthetic leather is assumed to be up to 33% less environmentally harmful than normal leather, it is still manufactured from plastics and fossil fuels. Additionally, the phthalates in PVC leather making are toxic and banned in several countries. These plastics in synthetic leather takes years to biodegrade and accumulates to micro-plastic land fill pollution throughout its lifetime.

Textile wet processing methods

The pollutants from dyeing, printing and finishing industries have become an alarming issue. Many chemicals are disposed from mandatory processes like sizing, resizing, scouring, carbonising, bleaching, weighing of silk, dyeing, printing, special finishes, etc. colour, the main attraction of any textile material causes many hazards to environment and living beings. A variety of dyes are used for getting desired colours. Synthetic dyes are used vastly in every sector of textile dyeing and printing. The presence of different dyes like Sulphur, Azoic, indigoids, nitrates, acidic acid, soap, enzymes, complex compounds, heavy metals and certain auxiliary chemicals all are make the textile effluent highly toxic. Thus, the effluent from dyeing and printing industries carries these dyes and other additives which are used during the colouring process. The 2 major industries of application of colours to materials are:

- a. **Dyeing:** Till the midst of 19th century only natural dyes were used for textiles, until the invention of mauvine in 1856. But after the invention of synthetic dyes people started using them widely as they were cheap, easy to adopt and use, available in a variety of colours, have good colour fixing properties and were very durable. The textile industry is now manufacturing and using 1.3 million tons of toxic synthetic dyes and pigments every year. In this about, 10-25% textile dyes are wasted during the dyeing process and 2-20% is dispersed as water polluting effluent. This effluent which contaminates the rivers and ground water system as a whole is rich in harmful chemicals which are converted to chemical sedimentary rock in the land.
- b. **Printing:** Heavy metals are the basis of colorants used in printing industry. Its usage has been reduced significantly in the past 20 years, but many are still in use. These heavy metals pose serious environmental problem as it has the tendency to pollute the ground water. For example, titanium oxide, chromate, iron etc.

Other indirect contributors are obviously our life style, increasing demands, increase in production, need for change, affordability, fast fashion, etc. Zara, a well-known brand in the fast fashion arena, introduces about 11000 different design items into manufacturing annually (in five to six colours and five to seven sizes), which means 12–16 collections a year. Although the company does not present sixteen collections a year, it sustains consumers' interest by introducing new garments at intervals of only a few weeks.

SUSTAINABLE APPROACHES TO REDUCE WASTE AND POLLUTION

Cotton:

The king of fibre, cotton accounts for nearly half of the textiles used in the global clothing industry. Its environmentally demanding production requires massive amounts of water. High levels of pesticides and toxic chemicals are used for growing cotton. Cotton is accountable for 1/3 of all pesticides used globally. Chemicals also reside within the fabric and are released throughout the lifetime. It uses 10-20,000 gallons of water per jeans and about 3,000 gallons of water per t-shirt.

So recycled cotton is more sustainable than organic and conventional cotton, as it uses post-industrial and post-consumer cotton waste. Reducing water and energy consumption, recycled cotton also keeps textiles out of the landfills. Organic cotton is cultivated without pesticides and is global organic textile standard (GOTS) certified.

Wool:

Wool is one of the most reusable and sustainable textile fibres due to its good service life, biodegradability and suitability for recycling. Risks involved in the production of wool solicit a search for less hazardous alternatives. Primarily, in certain countries, cleaning options are limited to coal-fired boiler which escalates greenhouse gas

emissions. China generates 18% of the world's wool, second only to Australia in nationwide wool production. Accountably, no matter the location, the extensive cleaning process of wool factory generates effluents (i.e., dirt and animal sweat salts) which are highly contaminant to local water sources.

Recycled fibres:

Recycled polyester is a man-made fabric derived from synthetic fibres. Unlike polyester it doesn't require petroleum and is made from existing/ used plastic. Recycled nylon is typically made from fabric waste found in factories. Recycled cotton and wool are generated by converting existing cotton and wool fabrics to reusable fibres. Existing plastic items are broken down into tiny chips which are converted into yarn. When single-use plastic items are reused, GHG emissions can be dramatically reduced. Fabric is shredded and reconstructed into "pellets" with multiple reformative uses. Cotton and wool fabrics are leached of dye or sorted by colour, shredded and then spun back into yarn. Both recycled polyester and recycled nylon have the same positive impacts on the environment. The fabrication of recycled synthetics serves to divert waste from landfills and requires fewer non-renewable resources to produce. Because cotton harvesting requires intensive usage of water, pesticides and insecticides, recycling cotton helps conserve these resources. Wool recycling also preserves considerable amounts of these resources, reducing air, water and soil pollution.

Linen a natural fibre from the flax plant uses considerably fewer resources than cotton or polyester. It can grow in poor soil and can rehabilitate polluted soil, they also absorb carbon at high rates, reducing atmospheric greenhouse gas levels.

Hemp is derived from the hemp plant and requires considerably fewer resources in production than cotton or polyester. Hemp can grow in the same soil for years without exhausting it.

Spun from silkworms and biodegradable, conventional silk requires chemicals in its production process, making organic silk a more sustainable. Lyocell which is 100% biodegradable is derived from eucalyptus. It requires considerably fewer resources than cotton or polyester.

Semi Synthetics:

Semi-synthetic fibres are made from natural and raw materials which are partially hybridized with chemical substances. Rayon, the most widely produced semi-synthetic, is made from cellulose (derived from wood pulp) and treated with mineral acids. Other examples include Lyocell, Tinsel, orange fibre, pineapple fibre, and Refibra. Depending on the type of plant from which cellulose is derived, semi-synthetic fabrics can be produced entirely without the use of pesticides, fertilizers, or irrigation, resulting in lower rates of air, water, and soil pollution. Semi-synthetics are 100% biodegradable, reducing methane and other GHG emissions.

Natural dyes:

Dyes derived from natural materials such as plant leaves, roots, bark, insect secretions, and minerals were used by mankind for colouring textiles until the use of first synthetic dye in 1856. However, environmental issues in the production, application and disposal of synthetic dyes once again revived the importance of natural dyes during the last decades of the twentieth century. But natural dyes suffer from certain inherent disadvantages of standardized application methods and the standardization of the dye itself as dyes collected from similar plants or natural sources are influenced and varies based on climate, soil, cultivation methods etc. but natural dyes are reviving thanks to the extensive researchers and brands which are using natural dyes. Similarly, enzymatic finishes are replacing harsh chemical finishes. Only disadvantage is high cost of enzymes due to the demand and scarce availability of enzymes.

Conclusion:

Though there are many brands, designers and people are aware of the crisis and are adopting recycling, up cycling, eco-friendly fabric, the clothing swap, go green, enzymatic processing, natural dyes, etc. Awareness about what we opt to wear, how it is produced, processed, manufactured, finished will sort most of the issue. So as a responsible human being, it is also our responsibility to be aware of the making of a textile product we are buying and using. Also the spreading of our awareness to our near and dear ones will postpone the impact of unsustainable products. Thus, encouraging sustainable clothing habits are the need of the hour.

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