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A STUDY ON -ROLE OF TEXTILE INDUSTRY IN ENVIRONMENT POLLUTION: A CASE STUDY

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ABSTRACT
A man has three essential necessities in life: clothing, food, and shelter. Given that textiles and apparel satisfy man's second basic need, the global textile and apparel sector is certain to grow significantly. It is constantly expanding, which is driving up demand and contributing to global pollution. One of the sectors of the global economy that is thought to produce the greatest pollution is the textile sector. Every year, as "fashions" come and go, our closets get overflowing with endless amounts of apparel made of environmentally unfriendly materials. Textile mills use 20,000 chemicals to make garments, many of which are known to cause cancer. These pollutants account for one-fifth of all industrial pollution worldwide. The significant environmental impact of the textile industry is beyond the capacity of governments in many developing countries.

KEY WORD: *Pollution, Textile industry, Environment, Health, Water, Air, Noise, Soil, Dyes.*

INTRODUCTION

Numerous goods are produced by the Indian textile industry, such as home textiles, technical textiles, clothing, accessories, and textiles made of cotton and synthetic materials. The sector serves both local and foreign consumers. The main centres of India's textile industry are found in the states of Tamil Nadu, Gujarat, Maharashtra, and Punjab. The infrastructure and supply networks in these areas are well-established, which helps the business flourish.

Despite being essential to world economies, the textile industry nonetheless contributes significantly to environmental pollution. This study looks into the various ways that textile consumption and production affect environmental deterioration. It examines the heavy reliance on energy, chemicals, and water in textile production processes, illuminating the ensuing contamination of the air, water, and land. The study also looks at how textile waste is disposed of, particularly synthetic fibers that are not biodegradable, which frequently wind up in landfills or incinerators and pose serious environmental risks. A discussion of how fast fashion has contributed to the current environmental catastrophe is also included, with a focus on the textile industry's need for sustainable practices and circular economy models.

It is believed that one of a person's basic requirements is clothing. As a result, the need for stylish and fashionable clothing is being met, leading to a daily growth in the worldwide textile sector. One of the major issues facing many nations in the modern world is pollution, which is growing quickly and harming the ecology as a whole.

The textile production sector is often regarded as one of the world's most intricate, advanced, and established sectors. Through many stages of its production processes, the textile sector, an essential part of global manufacturing, considerably contributes to environmental pollution. Every stage of the process, from the extraction of raw materials to the disposal of finished goods, includes environmental issues that need to be addressed. The industry's dependence on products that need a lot of resources, like cotton, frequently results in excessive use of pesticides and water, which negatively affects agricultural areas and ecosystems.

WATER POLLUTION

Water contamination occurs when a reservoir - such as a lake, river, ocean, etc. - becomes poisonous due to environmental or human pollution. Substances like chemicals or microbes may be the reason. Water contamination has wide-ranging effects. One in three people on the planet lack access to safe drinking water, according to UNICEF and the World Health Organization, and the UN estimates that 1.5 million people each year pass away from drinking water contamination.

Twenty percent of the wastewater produced globally is produced by the fashion sector, and textile dyeing is the second-largest global water polluter. Manufacturers utilize a lot of water to make apparel and household goods, and the wastewater that is left over has a bad impact on the environment. impacts soil/groundwater contamination, animals, humans, and ecology.

A 2019 World Bank report said that "some studies have indicated that around one-fifth of the world's water contamination is caused by the textile industry. The textile business uses a lot of water for procedures like scrolling, bleaching, and dyeing. The primary source of the pollution component is wastewater. Wastewater can lower oxygen concentrations, which can be detrimental to aquatic life and the aquatic ecosystem as a whole, if it is not treated before being added to the reservoir.

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Approximately two thousand different chemicals are utilized in the textile industry to transmit anything from agents to dyes. The textile industry's extensive use of chemicals has significantly worsened the water pollution that is currently creating the water crisis and will eventually have an impact on the environment in the long run. Water that has been tainted, paints, fragrances, bleach, and other strong chemicals contaminate the environment, trap heat, and eventually lead to global warming.

Every day, millions of gallons of water are used by the textile industry. However, the issue is not with the heavy consumption! Before the waste is dumped into aquatic bodies, it is not cleaned to remove toxins. Lead, phthalates, organochlorines, PBDEs, and many other chemicals that seriously harm human health are typically found in waste water.

The most concerning area of concern is the liquid effluents that are emitted by the textile sector. This is due to the large amount of hazardous material that is discharged by liquid excrement. It is composed of heavy metals, formaldehyde (HCHO), and chlorine. In addition, a lot of people use it for daily activities or drinking, and it is dumped into water bodies that reach far places. Before being put into water bodies, they must be treated to lessen their hazardous content.

Contaminants in the natural environment are mixed to form pollution, negatively impacting the ecosystem. For example, noise, heat, and light all constitute forms of pollution. It's the pollutants that make pollution what it is. Various forms of pollution are putting our environment & lives at risk these days. Dye, printing, & finishing businesses are polluting the environment at an alarming rate. Despite its obvious appeal, colour may be harmful to the environment and other living things. To get the desired hue, we turn to various dyes and pigments. Natural dye has been the primary dye source for textiles in ancient times. As demand for coloured and printed textiles continues to grow, natural dyes seem unable to meet this need due to their inadequacy.

Consequently, natural dyes have been replaced on the market by synthetic hues. Synthetic dyes are used in many aspects of textile printing and dyeing nowadays. Conversely, artificial coloring poses a serious threat to both human health and the environment. Many dyes and chemicals, including sulphides (indigo and azoic), metal compounds, acidic acids, nitrates, complex compounds, enzymes, and other auxiliary chemicals, can produce toxic textile effluent. Businesses engaged in printing and dyeing generate wastewater that contains a diverse range of dyes or other colouring agents. They are ideal for transporting across lakes and rivers because to their high solubility in water.

Because there is a high demand for coloured and printed garments, we are unable to resist using these synthetic dyes during the dyeing process, despite their significant toxicity. This is a major problem. To stop the dangerous dye water from contaminating the surface of ordinary water, we must put mitigation measures in place. Finding a solution to this problem mostly depends on identifying and quantifying the compounds present in wastewaters.

Approximately 1.5 trillion Liters of water are utilized annually by the textile industry, which accounts for 2% of all drinking water extraction and 10% of all water used by all industries worldwide.

AIR POLLUTION

The production of garments is responsible for the second-largest industrial polluter and more than 10 percent of global carbon emissions.
Several air pollutants are caused by the textile industry, including:

- The sulphur dioxide and nitrous oxides produced during energy generation
- Volatile organic compounds, also known are produced during coating, wastewater treatment, curing, drying, and chemical storage.
- Chlorine, hydrogen sulphide, aniline vapours, and chlorine dioxide are produced throughout the dyeing and bleaching procedures

The gases that make up ambient air are complicated mixtures, with oxygen making up 20% and nitrogen making up 78% of the overall volume. Carbon dioxide takes up 0.033% of the entire volume, while argon makes up 1%. When discussing air pollution, experts point to the increase in particulate matter or gas concentrations in the atmosphere brought on by industrial emissions. Particulate matter includes fine dust, aerosols, fumes, and gases that can mix with air.

The main sources of various forms of air pollution are the spinning and weaving industries. Dust is produced in various quantities during the yarn and fabric production process. The ecology is nonetheless harmed by the wet processing industry, despite its low air pollution levels. The main source of air pollution in the printing and dyeing industries is steam produced from coal and water. The process of producing steam also releases carbon monoxide and sulphur into the atmosphere. Air pollution poses a threat to both humans and animals. A few effects of air pollution include pain, decreased vision, eye and respiratory diseases, and persistent fog.

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Pollutants	Effects of human being	Sources
Sulphur dioxide	Irritates respiratory system and causes bronchitis	Boiler flue gas, rayon plant etc.
Aldehydes	Irritates all parts of respiratory system	Polyester plant
Chlorine	Causes lung irritation and irritation in eyes	Processing house
Carbon dioxide	Deprives body cells of oxygen and cause unconsciousness by CO combining with haemoglobin	Boiler house

SOIL POLLUTION

the textile industry produces solid waste. An estimated 90 million garments are thrown away annually in landfills across the globe. Consequently, the waste that is produced contaminates waterways.

Examples of contaminants that end up in landfills include the following:

- During the fiber processing, waste from packing, fiber trimmings, fiber lint, and fiber scraps are produced.
- Sludge that was either kept or squandered during the treatment of wastewater
- Used as chemical, flock, and dye containers while dyeing and finishing woven textiles.

Alkalis, residual colors, starches and cellulose (mostly soluble calcium and sodium salts), oil, silicate, and other pollutants (mainly soluble calcium salts) make up the majority of industrial effluents emitted from textile mills. These quickly expanding textile and dyeing businesses produce a lot of industrial effluent, which is frequently deposited untreated into the Amanishah drainage system or onto the ground surface due to a lack of affordable and efficient technologies for treating industrial wastewater. The quality of the soil and even subsurface water has declined as a result, and there is a chance that other biological resources along the discharged region may also be contaminated.

NOISE POLLUTION

In the textile sector, noise levels have been found to be generally high in most processing facilities, particularly in poorer nations. Employees and personnel that are exposed to noise over time are known to experience hearing loss and eardrum damage. Numerous additional issues are also brought on by it, including a decline in productivity, absenteeism, anxiety, annoyance, and changes in the workers' blood pressure and pulse rate. One of the biggest problems brought on by noise pollution is sleep disorders. Even though there are many serious health concerns caused by noise, these problems are not addressed because they are gradual and long-lasting, possibly because the discomfort and repercussions are not brought to light.

The auditory impact can cause hearing loss that is either short- or long-term. Both prolonged exposure to sound levels above 85 dBA and repeated exposure to such levels can harm hearing. On the other side, hearing loss resulting from extremely high sound frequencies cannot be corrected medically or surgically, and wearing hearing aids may not give enough tolerance for amplification.

Non-auditory consequences include mental disease, social difficulties, and other psychological illnesses. The problem of deafness in the textile industry is not new, and among individuals who have worked in this profession, phrases like “weaver deafness” have made their way into the medical vocabulary.

CHEMICAL USAGE

The textile sector uses about 25% of the chemicals produced worldwide. Textile processing involves the use of up to 2000 distinct chemicals, many of which are known to be detrimental to human and animal health, particularly in textile wet processing. A portion of these substances evaporate, while others dissolve and end up in treatment water that is released into the environment or are trapped in fabric. The National Institute for Environmental Health Sciences (a division of the US Department of Health and Human Services) has released a list of the most widely used chemicals, some of which are utilized in the production of fabrics and connected to health issues in humans ranging from minor to serious.

TEXTILE WASTE IN LANDFILLS AND LOW RECYCLING RATES

Unwanted clothing is now disposed of differently, with goods being thrown away as opposed to donated. Because the methods needed to turn used clothing into virgin fibers are still developing, less than half of all old clothing is gathered for recycling or reuse, and just 1% of used clothing is recycled into new garments.

The average amount of clothes worn has declined, despite a twofold increase in apparel production between 2000 and 2015. Europeans use nearly 26 kilos of textiles and discard about 11 kilos of them every year. Used clothes can be exported outside the EU, but are mostly (87%) incinerated or landfilled.

The new approaches to address this issue include creating new clothing rental business models, designing products to facilitate recycling and reusing them (circular fashion), persuading customers to purchase higher-quality, longer-lasting clothing (slow fashion), and generally influencing consumer behaviour toward more environmentally friendly choices.

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PHTHALATES

Phthalates are a class of chemicals, often known as plasticizers, that are used to soften PVC and are also used in the coating and printing of textiles, the production of artificial leather and rubber, and some colors. There are serious worries regarding the toxicity of phthalates, such as bis(2-ethylhexyl) phthalate (DEHP), which is reprotoxic (i.e., it reduces the fertilization rate and impairs the development of embryos in mammals), negatively affecting the viability and function of human gametes and embryos.

CLIMATE CHANGE

The different stages involved in the life of a garment, and each of them contributes to the problem of greenhouse gas (GHG) emissions, which hurt the environment. In recent research on the environmental impact of the global apparel and footwear industries done by Quantis, it was reported that these industries, currently, are responsible for 8 per cent of global GHG emissions, almost as much as that of the EU as a whole. The apparel industry alone generates 6.7 per cent of global greenhouse gas emissions, which is equivalent to around 3.3 billion metric tons of carbon dioxide. It is important to note that over 50 per cent of emissions are brought about by these 3 stages - dyeing and finishing, yarn preparation as well as fibre production.

The several phases of a garment's life, each of which adds to the issue of greenhouse gas (GHG) emissions, which have a negative impact on the environment. According to recent research conducted by Quantis on the environmental impact of the worldwide textile and footwear industries, these sectors currently account for 8% of global greenhouse gas emissions, which is nearly equal to the emissions of the European Union. 10% of the world's greenhouse gas emissions, or around 3.3 billion metric tons of carbon dioxide, come from the garment industry alone. It is significant to remember that these three processes - yarn preparation, fibre finishing, and dyeing and finishing - account for more than 50% of emissions.

HEALTH AND SAFETY PRECAUTIONS

Improperly treated textile effluents can pose a serious threat to both human and environmental health when released into the environment. It is common knowledge that several chemicals used in finishing, coloring, and preparation can be hazardous if handled improperly or carelessly. As a result, producers of chemicals and dyes have made substantial contributions to product preparation and presentation, guaranteeing that goods are easy to handle and safe, and that packaging is recyclable or easily disposed of. Electrical equipment needs to be utilized within the manufacturer's recommended bounds and installed in compliance with current standards. Since there is always some risk involved in operating machinery, management has an obligation to make sure all employees are properly trained and knowledgeable about all.

STRUCTURE OF THE TEXTILE INDUSTRY

The Textile Industry's, The bulk of chemicals used in the textile industry are used in "wet processing," which includes fabric finishing, dyeing, washing, and printing. Water used in textile dyeing and finishing mills is significantly higher—up to 200 tons are used for each metric ton of textiles produced. Just a small percentage of the chemicals used in the production of textiles are potentially dangerous, while the majority are not. However, because there are so many chemicals used in the textile industry, a sizable amount of hazardous compounds are utilized in total.

OBJECTIVES

- To identify the role of textile industry in environment pollution
- To identify the components of environmental pollution

RESEARCH METHODOLOGY

In order to perform a description analysis, this case study employed secondary data. A variety of sources, including research papers, articles, journals, websites, electronic journals, and various report, files, were used to compile the data.

DATA ANALYSIS

The primary themes pertaining to the textile industry and environmental contamination were examined in the chosen studies' content analysis. Analysis of soil, air and noise pollution, global warming, and water deterioration. The influence of textile waste generated by the textile industry on pollution.

FINDINGS

In a number of ways, the textile sector seriously contributes to environmental pollution:

1. Water Pollution: Overall, the industry contributes 20% of the water pollution in the globe, which is equivalent to 110 million people's annual water needs. The production of textiles uses a lot of water and releases wastewater that is contaminated with chemicals into bodies of water. Groundwater, rivers, and streams can become contaminated by dyes, bleaches, and other chemicals used in the dyeing and finishing processes.
2. Soil pollution: Improper waste disposal or runoff can introduce chemicals and residues from the textile industry, such as dyes and other processing chemicals, into the soil, compromising ecosystems and soil quality.
3. Air Pollution: Global warming is mostly caused by the textile sector, which emits 10% of the world's greenhouse gases. The production of textiles releases a number of pollutants into the atmosphere, such as greenhouse gases, particulate matter, and volatile organic compounds (VOCs). Air pollution is a result of burning fossil fuels for energy as well as chemicals emitted during dyeing and finishing procedures.
4. Waste generation: The sector produces a significant quantity of trash, such as packaging materials, fabric scraps, and production byproducts, which frequently wind up in landfills and exacerbate environmental problems.
5. Energy Consumption: A large amount of energy, mostly from non-renewable sources, is needed for the manufacture of textiles. High energy use increases the industry's overall environmental impact and carbon emissions.

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The textile sector is continuously working to embrace sustainable practices, such lowering energy usage, investigating alternative materials, employing eco-friendly dyes, and putting water recycling systems in place to lessen its environmental impact.

SUGGESTIONS

- Re-evaluate local natural raw materials,
- To bring ancient culture back to the centre of knowledge

SCOPE OF FUTURE STUDY

- To control the textile industry, lessen its negative effects on the environment.
- A research on the textile industry's goal of having zero carbon emissions by 2050.
- A study on – organic farming reduces the impact of textile industry on climate change
- Putting circularity into practice from concept to production to final customer

CONCLUSION

The production of textiles requires a lengthy series of steps that result in a large amount of waste and a high resource consumption, including fuel, water, and other chemicals. The worldwide textile sector is a major source of pollutants that are continuously harming the environment beyond belief. In the long term, it renders the land, air, and water unusable and unproductive due to pollution. Reducing the toxins released by the textile sector has become imperative. The textile industry's and its raw material manufacturing units pollution of the air, water, and land has become a major environmental issue. It has put the lives of many other species on Earth, including humans, at jeopardy. utilizing organic raw materials

Manufacturers ought to be contacted. There is an urgent need to go in this direction. The multiple steps in the textile manufacturing process harm the environment in a number of ways, including continuous and comparatively large greenhouse gas emissions, water extraction, the release of toxins from pesticides and herbicides used to cultivate cotton into our ecosystem, and many more consequences. It is crucial that the worldwide apparel sectors employ eco-friendly materials for clothing production, give up on or utilize less fossil fuels for energy generation, and switch to renewable energy sources in order to solve these issues before they become serious ones. An eco-friendly product is one that is produced, utilized, or disposed of in a way that substantially lessens the harm it would otherwise cause to the environment. In addition to assisting.

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