The Negative Impacts of Fast Fashion on the Environment

by Andy Parsons

INTRODUCTION

Fast fashion is defined as the mass-production of runway trends that are sold at a low cost when demand for these trends are highest. While this business model is monetarily attractive to both retailers and consumers, it comes with a high price in terms of international environmental harm. Analysis in 2015 found that fast fashion's production alone emitted 1.2 billion tons of carbon dioxide (Maiti, 2022), and Earth.org identifies the fashion industry as the third most polluting industry (Shulka, 2022). The pollution caused by fast fashion harms marine ecosystems and its addition to global greenhouse gas emissions have contributed to the increase in Earth's surface temperature. These issues are present not only in the entire production process of fast fashion, but in the disposal of it as well. The current production and disposal of fast fashion has negative impacts on the environment by increasing greenhouse gas emissions, causing pollution, and contributing to global warming.

INCREASED GREENHOUSE GAS EMISSIONS

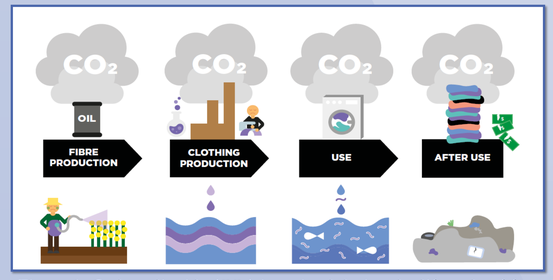

Figure 1: Carbon dioxide (CO_2) is emitted during the lifecycle of fast fashion (Image Credit: Ellen MacArthur Foundation, 2017).

Fast fashion makes up 10% of the world's greenhouse gas (GHG) emissions (Shulka, 2022), and every stage of fast fashion's lifespan contributes to this percentage (Figure 1). One of the most significant contributors is the production of synthetic fibres, which are derived from fossil fuels and require 342 million barrels of crude oil for one year's worth of production (Ellen MacArthur Foundation, 2017). This manufacturing process comprises 2-8% of global GHGs (Ellen MacArthur Foundation, 2017).

The disposal of fast fashion is also environmentally significant. In 2012, it was estimated that 60% of the 150 billion garments produced were thrown out after just one year (Shulka, 2022). These clothes end up in landfills, where they will emit carbon dioxide and methane, the latter of which is estimated to be 28 time more potent than CO_2 (Shulka, 2022).

Donation isn't always a more environmentally-friendly option either. Garments are sent to Ghana in West Africa to be resold, however, out of the 15 million articles that its capital Accra receives weekly, approximately 40% will be dumped in local landfills or burned due to being of such low quality that they cannot be resold (Besser, 2021).

Figure 2: A man standing among discarded clothing in Accra, Ghana. (Image Credit: Andrew Greaves, 2021).

POLLUTION

Fast fashion pollutes the Earth by several means, one of which is the use of synthetic dyes during production. These dyes contain over 8000 chemicals (Table 1), and it's estimated that up to 20% of these dyeing products will enter the wastewater system (Kant, 2012). This toxic wastewater makes its way into lakes and rivers, where it increases turbidity. This prevents photosynthesis from taking place as sunlight cannot penetrate the barrier created by the chemicals, depleting oxygen levels in the water that marine life need to survive (Kant, 2012).

Sr No.	Chemical	Quantity Kg/month
1	Acetic Acid	1611
2	Ammonium Sulphate	858
3	P V Acetate	954
4	Wetting Agent	125
5	Caustic Soda	6212
6	Softener	856
7	Organic Solvent	247
8	Organic Resin	5115
9	Formic Acid	1227
10	Soap	154
11	Hydrosulphites	6563
12	Hydrochloric Acid	309
13	Hydrogen Peroxide	1038
14	Leveling & Dispersing Agent	547
15	Solvent 1425	321
16	Oxalic Acid	471
17	Polyesthylene Emulsion	1174
18	Sulphuric Acid	678
19	Disperse Dyes (Polyester)	1500
20	Vat Dyes (Viscose)	900
21	Sulphur Dyes	300
22	Reactive Dyes	45

Table 1: 22 of the chemicals used in the synthetic dyeing process, with their serial number and the quantity in kilograms used per month (Image Credit: SciRes, 2012).

Another pollutant and risk to marine life are the microplastics –tiny particles of plastic less than 5mm in length– that are shed by synthetic fibers. Fast fashion accounts for 35% of all microplastics found in the ocean (Shulka, 2002). These microplastics are swallowed by marine life, which were observed to accumulate in their digestive tract and inhibit their growth (Li et. al., 2021) (Figure 3). When these microplastics are absorbed, they can have toxic effects on marine life: in one study, fertility decreased due to lowered ovulation rate and sperm mobility, and white bloods cells were damaged which resulted in immunodeficiency (Li et. al., 2021). This could potentially lead to reduced numbers of marine populations.

Figure 3: Damselfish larvae that has ingested microplastics (Image Credit: Oona M. Lönnstedt, 2016).

Microplastics can also provide a favourable breeding ground for bacteria, creating a biofilm. When present in a body of water contaminated by other industrial waste, antibiotic-resistant bacteria can cling to this biofilm and infect marine life; as with the ingestion of microplastics, this also has the potential to reduce marine populations (Wu et al., 2019).

But it's not just the production of synthetic fibres that cause pollution. Cotton crops uses $2 billion of pesticides annually (Farnworth, 2015), producing runoff wastewater that's loaded with harmful chemicals. These chemicals deplete oxygen levels in bodies of water and kill aquatic plants responsible for oxygen production (Mahmood et. al., 2015). Pesticides like atrazine and carbaryl have been found to be toxic to both fish and amphibian species, and the herbicide glyphosate has been associated with a high mortality rate in tadpoles and juvenile frogs (Mahmood et. al., 2015).

CONTRIBUTIONS TO GLOBAL WARMING

Earth has seen an increase in global temperatures in the past century, largely due to anthropogenic greenhouse gas emissions. As previously stated, fast fashion is responsible for 10% of global GHGs (Shulka, 2022). The current fibre production and dyeing processes are reliant on fossil fuels, and even washing and drying clothes can emit an estimated 120 million tons of carbon dioxide (Ellen MacArthur Foundation, 2017).

Methane is produced by the treatment for the wastewater from fibre production and dyeing, where it is released upon the breakdown of organic material in wastewater (United States Environmental Protection Agency, 2023). Methane is also produced by livestock's digestive system – sheep, whose wool is used in textile production, are a major source of methane in livestock (United States Environmental Protection Agency, 2023).

Deforestation caused by the cotton industry is another contributor to the increase in GHGs produced by fast fashion. A forest's trees can hold up to 200 gigatons of carbon – the equivalent of 4-5 years' worth of manmade carbon emissions (Lai, 2022), but forests are being destroyed to make room for crops. Not only does this remove an essential carbon sink from the carbon cycle, but the act of deforestation itself releases the carbon stored in trees back into the atmosphere.

CONCLUSION

Earth is the only planet in our solar system that supports life, so it is essential that we identify practices that contribute to climate change and modify them so that the Earth does not become inhabitable. With the promotion and consumption of fast fashion being plastered all over social media, it is important to recognize just how harmful this business model is. Fast fashion produces high quantities of greenhouse gases responsible for global warming and pollutes marine ecosystems, and its negative impacts on the environment will only increase if allowed to continue (Ellen MacArthur Foundation, 2017) (Figure 4). The Ellen MacArthur Foundation, which researches environmentally-friendly economic practices, suggests that focusing on sustainable clothing practices such as recycling textiles, phasing out fossil fuels in favour of renewable resources, and encouraging consumers to value the quality of their clothes over quantity will reduce the environmental harm caused by the fashion industry, and help preserve the Earth for years to come.

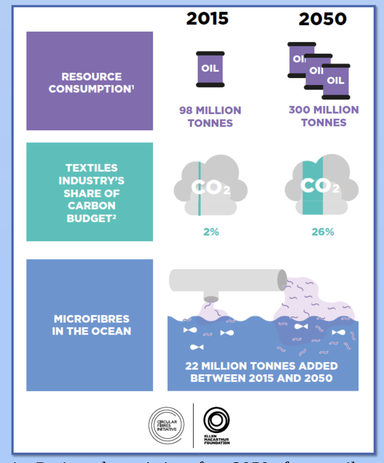

Figure 4: Projected statistics for 2050 for textile resource consumption, carbon budget, and microfibres in the ocean (Image Credit: Ellen MacArthur Foundation, 2017).

LITERATURE CITED

Besser, L. (2021, August 11). *Dead white man's clothes*. Retrieved from https://www.abc.net.au/news/2021-08-12/fast-fashion-turning-parts-ghana-into-toxic-landfill/100358702

Ellen MacArthur Foundation (2017). *A New Textiles Economy: Redesigning fashion's future.*

Farnworth, G (2015). *Cool Cotton: Organic cotton and climate change*. Retrieved from https://www.soilassociation.org/media/11662/coolcotton.pdf

Kant, R. (2012). Textile dyeing industry an environmental hazard. *Natural Science 04*. doi: 10.4236/ns.2012.41004.

Lai, C. (2022, June 27) *How Does Deforestation Affect the Carbon Cycle?* Retrieved from https://earth.org/how-does-deforestation-affect-the-carbon-cycle/

Li, Y., Sun, Y., Li J., Tang R., Miu, Y. & Ma, X. (2021). Research on the Influence of Microplastics on Marine Life. IOP Confer. Ser.: Earth Environ. Sci 631 012006. doi: 10.1088/1755-1315/631/1/012006.

Mahmood, I., Imadi, S., Shazadi, K., Gul, A., Hakeem, K. (2015). Effects of Pesticides on Environment. *Plant, Soil and Microbes Volume 1: Implications in Crop Science*. doi: 10.1007/978-3-319-27455-8_13

Maiti, R a(2022, December 1). *Fast Fashion and Its Environmental Impact*. Retrieved from https://earth.org/fast-fashions-detrimental-effect-on-the-environment/

Shulka, N. (2022, February 21). *Fast Fashion Pollution and Climate Change*. Retrieved from https://earth.org/fast-fashion-pollution-and-climate-change/

United States Environmental Protection Agency (2023). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021. *U.S. Environmental Protection Agency, EPA* 430-D-23-001.

Wu, X., Pan, J., Li M., Li, Y., Bartlam, M., Wang, Y. (2019). Selective enrichment of bacterial pathogens by microplastic biofilm. *Water research, 165*, 114979. doi: 10.1016/j.watres.2019.114979