# THE STORY OF MICROFIBERS

## Annotated Script

What do you think when you hear the word polyester?[1] 70's leisure suits? Sweaty-smelling dress shirts? That's what polyester used to be. These days, everybody wears it! Yoga pants, fleeces, even underwear! All made from synthetic fabrics, like polyester.[2] More polyester means more demand for the Stuff used to make polyester.[3][4][5] But you don't have to use new Stuff to make it; some companies are making polyester out of old Stuff – plastic bottles,[6] in fact. Every day, the world throws away billions and billions of plastic bottles.[7] That's a problem.

Of course, the real solution is that we all use less plastic. But it's cool that even while we work to reduce plastic, some companies are turning trash into Stuff we actually like. Drink it, drop it in the bin, take it to a recycling factory, chop it up, weave it, wear it, wash it, wear it again,

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[1] This website has all you've ever wanted to know about what polyester is! The short version: plastic fabric made from fossil fuels. http://www.whatispolyester.com/

[2] As of now, 60% of all clothing on earth is made from polyester. http://www.greenpeace.org/international/Global/international/briefings/toxics/2016/Fact-Sheet-Timeout-for-fast-fashion.pdf

[3] This article demonstrates the carbon footprint of various textiles. Polyester is the highest by a factor of almost 2 to 1 over the next most carbon intensive fabric, cotton. http://www.greenpeace.org/international/Global/international/briefings/toxics/2016/Fact-Sheet-Timeout-for-fast-fashion.pdf

[4] These figures from Textile World give you an idea of how fast the polyester market is growing compared to all other textiles. http://www.textileworld.com/textile-world/fiber-world/2015/02/man-made-fibers-continue-to-grow/

[5] This report shows the growth in demand for "fast fashion," inexpensive clothing that moves from "the runway" to the rack quickly. Demand for polyester grew 17% in 2016, driven in part by the "fast fashion" industry. http://www.greenpeace.org/international/Global/international/briefings/toxics/2016/Fact-Sheet-Timeout-for-fast-fashion.pdf

[6] Plastic bottle to clothing recycling is not new, but this article talks about the benefits and dangers of claiming that bottle to clothing is a net environmental gain. http://www.earthisland.org/journal/index.php/elist/eListRead/recycled_plastic_clothing_solution_or_threat/

[7] In the U.S. we throw away 22 billion plastic bottles a year – that's 60 million a day! http://www.container-recycling.org/index.php/issues/.../275-down-the-drain

wash it again. Seems like a great solution, right? But darn, when we look closer… there are some real problems with this.[8]

The big problem is that some people might be encouraged to use more disposable plastic if they think it's being recycled safely.[9] But there's also a little problem – a micro problem – that's adding up to one big mess. Every time we wash synthetic fabrics – whether they're made from recycled bottles or brand new materials – super tiny pieces of plastic called microfibers[10] wash off and flow down the drain... up to hundreds of thousands each wash.[11] [12] The older our clothes get, the worse the problem can become.[13] Yikes! These fibers are so tiny, water treatment plants don't catch them all,[14] so they wind up in rivers, lakes and even the ocean.[15] [16] [17]

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[8] This Earth Island Institute piece gives a great overview of the issue. For sure, there are energy and water savings from reusing plastic bottles to make clothes. That's good. But this isn't what the circular economy is supposed to look like. The basics of circular economy thinking 101 is that "technical nutrients," or Stuff that is not easily broken down by nature, should not escape into the environment – calling into question why many brands are continuing to tout the practice as being sustainable. In this case, the technical nutrient leaking into the world are the plastic microfibers themselves. http://www.earthisland.org/journal/index.php/elist/eListRead/recycled_plastic_clothing_solution_or_threat/

[9] This study looked at people's consumption behavior when recycling was an option and when it was not. What it found is that if recycling is offered, people consume more. Our founder, Annie, often says, "recycling is the opiate of the masses" She's being a little hyperbolic of course, and of course, she supports recycling, but what she's getting at is that just because you can recycle doesn't mean you shouldn't refuse, reduce, or reuse first. Check out the study: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2056047

[10] A microfiber is a particle of plastic (from synthetic clothing) that is released into washing machine effluent by agitation in a washing machine cycle. It's similar to dryer lint, except that washing machine effluent isn't caught before draining.

[11] This is an older study and it shows up to 1,900 per wash: http://pubs.acs.org/doi/abs/10.1021/es201811s

[12] This study shows that a single jacket can shed between 8,500 to 250,000 fibers per wash: http://brenmicroplastics.weebly.com/uploads/5/1/7/0/51702815/bren-patagonia_final_report.pdf

[13] This study shows that older jackets shed more than newer jackets, which is a bummer since we really like durable clothing. http://brenmicroplastics.weebly.com/uploads/5/1/7/0/51702815/bren-patagonia_final_report.pdf

[14] Waste water treatment captures a lot of the microplastics in sludge, but that sludge is often land applied as fertilizer. Wastewater treatment plants weren't designed to capture microplastics. https://news.agu.org/press-release/wastewater-treatment-plants-significant-source-of-microplastics-in-rivers-new-research-finds/

[15] This study shows 7 million microplastic particles, including fibers, enter San Francisco Bay every day. http://www.sfei.org/sites/default/files/biblio_files/RMP%20Sutton%20FactSht%20Microplastics%20081116web.pdf

[16] This study shows that 85% of plastic particles on beaches are fibers! http://pubs.acs.org/doi/abs/10.1021/es201811s

[17] This article is a good reading about scientists working in the microplastics field. It also mentions that 50% of microplastics found in Lake Michigan are fibers! http://www.chicagotribune.com/news/local/breaking/chi-great-lakes-plastic-fibers-scientists-20150109-story.html

When they reach the ocean they act like sponges, sucking up other pollutants around them. They're like little toxic bombs full of motor oil, pesticides, and industrial chemicals[18] [19] that end up in the bellies of fish and eventually in the bellies of us.[20] [21] It's gross. It's already estimated there are 1.4 million trillion in our oceans.[22] [23] That's like 200 million microfibers for every person on the planet!

These are some serious downsides to what looked like a good solution.[24] Time for these creative companies to go back to the drawing board.[25] Because while we can wash our clothes less, or avoid buying synthetic clothing, we can't solve the problem without them. And if we want these companies to make it a top priority, they need to hear from you. Let's

[18] This study looks at different types of plastics absorbing different amounts of toxins in San Diego Bay. http://pubs.acs.org/doi/abs/10.1021/es0010498

[19] This is a study of polypropylene plastic pellets that's pretty freaky. Plastic pellets can be a million times more toxic than the surrounding water! http://pubs.acs.org/doi/abs/10.1021/es0010498

[20] It's important to note that we're not entirely sure what the effects to humans are of eating plastic-polluted fish, but we're taking a precautionary stance. We do know that in lab experiments where fish were fed toxics-laden plastics that those chemicals did migrate to the fish tissue and caused liver damage (pre-cancerous lesions) and hormonal issues that affect gender in the fish. No matter what, it's gross that so many animals are eating plastic. http://www.nature.com/articles/srep03263

[21] This study showed that 25% of the fish bought in a market in the US had fibers in them! Yikes! http://www.nature.com/articles/srep14340

[22] This is a number that George Leonard, Chief Scientist for The Ocean Conservancy, extrapolated from a peer reviewed paper attempting to determine how many fibers are in the ocean. He presented this number to the Outdoor Industry Association Microfibers Subgroup (a group of outdoor brands working on microfiber issues), which was extrapolated from this study on fiber distribution in sediment. http://rsos.royalsocietypublishing.org/content/1/4/140317

[23] We can also look at the problem by the total mass of microfibers being released into the ocean, rather than number of individual particles. A study published by the International Union for Conservation of Nature and Natural Resources estimates that 0.6 - 1.7 million tons of microfibers are released into the ocean every year! http://storyofstuff.org/wp-content/uploads/2017/02/IUCN-report-Primary-microplastics-in-the-oceans.pdf

[24] No doubt we love the idea of a circular economy. It's a great idea to reuse and remake the Stuff in our lives. But a truly circular economy means that bad Stuff isn't escaping into the environment in the process. Turning bottles into fibers, or recycling original polyester clothes is a great idea, but when something doesn't work, it's time to go back to the drawing board. Learn more about circular economy principles here: https://www.ellenmacarthurfoundation.org/circular-economy

[25] Some companies are investigating how to make synthetic clothing shed fewer fibers, as well as what role washing machine filtration plays in the solution to the problem.

find a real solution[26] to make our clothes safe for the environment, safe for the ocean, and safe for us.

[26] We think a real solution has to start upstream, at the creation of the clothing we wear. Filtering in washing machines is technically difficult, and without tough laws it would be difficult if not impossible to enforce; revamping sewage treatment to capture all fibers would be immensely costly. We advocate for solutions that stop microfibers from entering the environment on the front end, at the design stage.