



With every washing cycle
microfibres are released
into the environment.

MICRIFIBRES

FAST FASHION, FATAL FIBRES

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We all have seen shocking pictures of sea birds that have been killed by the quantity of plastic debris in their guts. No less than 84 plastic items were recovered by scientists in the body of a fulmar, setting a sad record. These days it's rare for scientists to find a sea bird free from plastic caps, cigarette lighters or tooth brushes¹.

A lesser known, but identical drama is also taking place in the microscopic world of plankton organisms. Fish larvae, arrow worms and tiny crustaceans ingest vast amounts of small plastic particles called microplastics². And hardly anyone suspects that a considerable share of these microplastics comes from our wardrobes. Cheap, short-life clothing also known as "fast fashion", is a massive contributor to ocean plastic pollution.

Microplastic particles are typically relics of larger plastic items, broken down over time into smaller pieces.³ It has only recently become known that synthetic textiles are also a considerable source of microplastics, because they shed fibres every time they are washed. A single fleece jacket can release up to one million fibres during a wash cycle; a pair of nylon socks as much as 136.000 fibres. According to a study financed by the European Union, washing machines in Europe alone flush 30.000 tonnes of synthetic fibres into waste water every year.⁴

Depending on the technology, some microfibrils can be filtered by wastewater treatment plants;⁵ nevertheless, thousands of tonnes end up in the oceans every year. Because polyester, acrylic and nylon fibres are not biodegradable, at best they are only slowly degraded into even smaller particles. In any case, they remain and accumulate in the marine environment.

Not very tasty: if you barbecue fish expect to have tiny plastic fibres in your meal

It is no surprise that plastic fibres are already ubiquitous in the world's oceans. They are distributed around the planet by ocean currents and as a result, researchers have found them in the Arctic,⁶ on remote beaches⁷ and even in the deep sea.⁸ The delicious fish on your barbecue will probably have plastic fibres in its guts⁹. When we eat shellfish, crab or any seafood normally consumed whole, we also ingest microplastics; a dozen oysters can contain one hundred plastic particles.¹⁰

This microplastic contamination is not only unsavoury; plastic particles may also be unhealthy, particularly as toxic chemicals tend to cling to them. We still do not know enough about the health risks associated with microplastics, but very small particles could possibly enter body tissue and cause inflammation.¹¹

The wider consequences for the marine environment may be far worse. Plankton organisms such as fish and shellfish larvae, various crustaceans, as well as worms, crabs and other animals living on the sea floor, could be severely affected by ingested microplastics.¹² These tiny creatures are the foundation of the ocean's food chain and sustain many larger animals, from the common mussel to the blue whale. Economically important fish such as herring and mackerel also depend on plankton as their food source. If zooplankton does not thrive, larger ocean dwellers will starve.

Scientists have only begun to study the effects of plastic contamination on plankton, but the first results are disturbing. For example, freshwater amphipods that ingested microplastic particles grew slower and had less offspring compared to normal specimens. Microfibres seemed to be especially harmful as the animals needed a long time to defecate them.¹³

Also, shore crabs that were fed polypropylene fibres ate considerably less and grew slower than normal, even though their food contained only one percent plastic fibres¹⁴. This quantity does not seem unrealistic given the findings that some estuaries already contain more microplastic particles than plankton organisms.

With the rise of throwaway fashion the use of polyester has exploded

It seems obvious that microplastics are threatening the ocean's food web. They could be the final blow to our already overfished and polluted oceans. The apocalyptic scenario that Rachel Carson once described for terrestrial life in her famous 1962 book „Silent Spring“ could now become reality under water.

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There is little chance that the slow choking of ocean life can be stopped. With the rise of „fast fashion“ and textile chains such as H&M or Primark, the global consumption of synthetic fibres has literally exploded: from 2000 to 2016, the use of polyester by the global garment industry increased from 8.3 to 21.3 million tonnes annually. At the same time the world's total garment production has roughly doubled, in 2014 it crossed the threshold of 100 billion items. The share of synthetic fibres, mainly polyester, has risen from under 50 to more than 60 percent.¹⁵

There seems to be no end to the polyester success story: the overall apparel consumption is projected to rise by 63 percent by 2030, at which point the world's population will consume staggering 102 million tons of clothing, equivalent to 500 billion T-shirts.¹⁶ This avalanche of textiles will consist of almost 70 percent polyester.¹⁷

Actually, without these cheap synthetic fibres the current „fast fashion“-phenomenon would not have been possible. In today's cheap fashion stores it's hard to find a T-shirt or a pair of trousers that consists of pure cotton. After all, natural fibres are more expensive than the output of the petrochemical industry.

So, choose a cotton shirt instead? Or viscose?

Should we therefore avoid synthetic clothing and choose cotton garments instead? A boycott of synthetic fibres would not be a solution; it would just shift the ecological impact. In order to achieve the highest possible yields, about three quarters of current global cotton cultivation is irrigated, in part heavily. Entire areas can dry up, particularly in water scarce regions. A well-known victim of cotton farming is the Aral Sea in central Asia, once the world's fourth largest lake, which has been reduced to a tenth of its former size.¹⁸ To make it worse, cotton farmers use large quantities of pesticides, and most cotton planted today is genetically modified.

Organic cotton is a very good alternative and comes with a much better eco-balance. But currently it only accounts for 0.4 percent¹⁹ of global cotton consumption. During recent years, its share has actually dropped.²⁰ Satisfying the world's current greed for fashion with organic cotton is unrealistic.

Another widely used fibre is viscose. Though it is made of wood, a renewable material, conventional methods of production require vast amounts of energy and chemicals. Only recently activists have exposed that large fashion chains such as H&M and Zara use viscose produced in Asian factories which cause massive pollution.²¹ In the end, wood is a limited resource, too. Natural forests are under pressure worldwide, and timber plantations are not much more sustainable than cotton fields.

There has been much research into developing textile fibres from alternative materials such as algae²², banana peels²³ and even milk²⁴. It certainly makes sense to use waste or production residues like milk that are not suitable for human consumption. But, as an example, half of Germany's four million dairy cows²⁵ would be needed to meet just one percent of the world's clothing demand using fibres made from milk.²⁶ It's easy to imagine the ecological impact of keeping and feeding so many extra cows – apart from all the suffering of animals. The development of alternative fibres certainly deserves recognition, but these products will never make a discernible impact on the global textile market.



Functional clothing and sportswear is often washed after one single wear.

At the moment well-known fashion chains are advocating recycling as the silver bullet to solve the industry's resource dilemma.²⁷ But this also turns out to be an illusion. Of course, it is perfectly possible to tear up cotton garments and to mix the regained fibre with virgin material to make new fabrics. But in real life, dyes, applications, zippers and last but not least fibre blends make this kind of recycling difficult, and the fibre quality is drastically reduced. On the other hand, the chemical recycling of synthetic fibres could in theoretically deliver a high-quality product, but the processes are complex and rather expensive and there are considerable technical problems still to be solved²⁸. It is no wonder that the share of recycled fibres in today's new clothing is close to zero²⁹ and it cannot be expected to rise significantly any time soon.

The only exception currently is the recycling of used PET bottles into polyester fibres, which has become quite a common practice. And surely not much can be said against the well publicised campaigns of clothing brands who collect plastic bottles from exotic beaches and turn this waste into fleeces. However, it would be much better for the environment if those plastic bottles were collected and refilled, especially in developing countries, and prevented from entering the sea. And we must not forget that recycled polyester garments also shed microfibres.³⁰

It is time to realize that there is simply no way to satisfy our current demand for fashion in a sustainable way. Therefore, the quantities and the share of synthetic fibres used by the industry will continue to rise and the oceans will have to swallow more and more microplastics.

Confronted with this dilemma, politicians are hoping for a technical solution. The EU is considering the mandatory installation of filters in new washing machines, that would be fine enough to capture microfibres.³¹ But it is not clear if this technology will even be available in the near future; appliance manufacturers are keeping suspiciously quiet on this issue.³² Another option is changing textile manufacturing processes, for example, switching to ultrasound cutting of fabrics. But steps like these can only reduce fibre shedding to a certain degree, they will not prevent it.³³

Fine-meshed washing bags that have been developed by a small German company are also no real solution. So far, their efficiency has not been conclusively proven.³⁴ Furthermore, they require quite a lot of time and attention from their users, and even the inventors concede that the „Guppyfriend“ bags can only be a first step towards solving the fibre problem.³⁵

In any case, it would take many years for new technology to penetrate the market. Meanwhile, day after day, year after year, the flood of microplastics into our oceans continues to surge.

Throwaway mentality: Fashion is too cheap to appreciate and value

In the end there can only be one way out: we must consume less textiles. These „fast fashion“ clothes designed for a short life, are an aberration of the consumer society. It is time to change our habits. We must return to a more common sense approach to clothing, which used to be the norm, when clothing was valued, maintained and – yes, really! – repaired when a button got lost.³⁶ Currently almost half of the Germans state that they have never fixed a garment themselves or given it to a tailor for repair.³⁷

Our current understanding of fashion brings to mind the „The Emperor’s New Clothes“ fairytale: we want to express our individuality by wearing brand new, stylish outfits, but run around in cheap, ill-fitting junk. The quality of today’s clothing is so low that it threatens secondhand markets because the cheap items are just not fit for resale.³⁸

Real fashion is more than fancy packaging that we use for a short while and then throw away like a yoghurt cup or cardboard box. Real fashion is versatile: instead of buying a new garment we can use accessories to create a new look. It is high-quality: if we are finally fed up with one piece, we can pass it on to a friend or swap it.³⁹ And it is timeless, so it keeps looking good for many years. Then the question of which fibre is used for fashion is not so crucial.

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