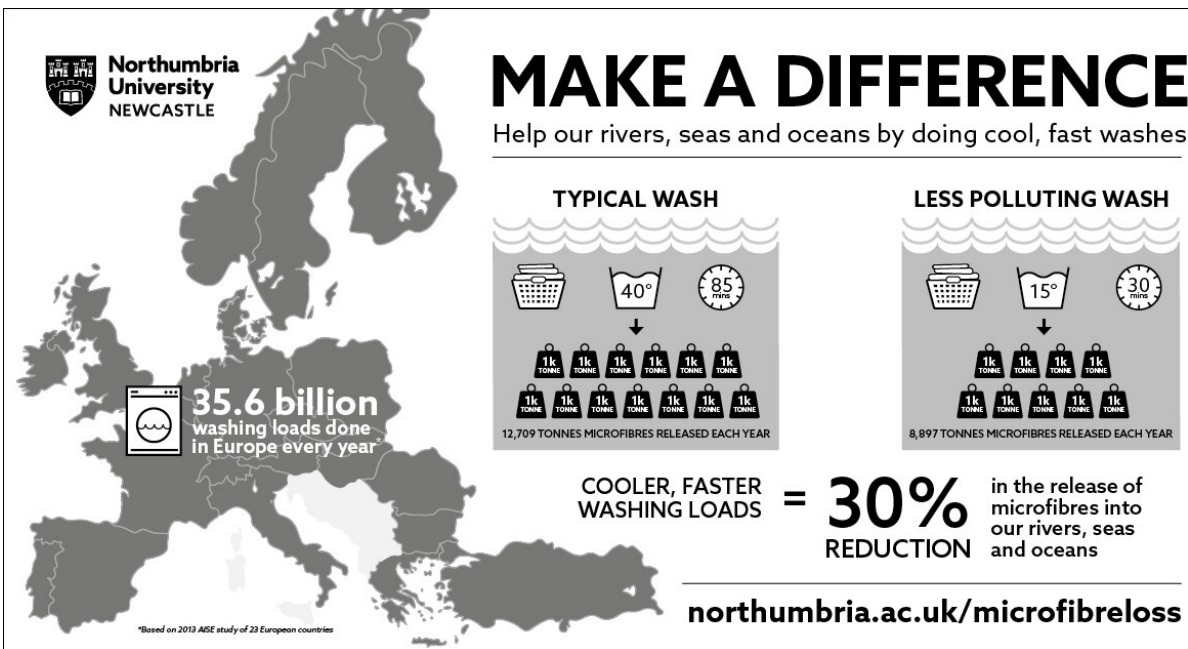


Thousands of tons of ocean pollution can be saved by changing washing habits

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Infographic of volume of microfibres. Credit: Northumbria University

A new study has revealed that almost 13,000 tonnes of microfibres, equivalent to two rubbish trucks every day, are being released into European marine environments every year—but this could be reduced by as much as 30% if we made a small change to our laundry habits.

The findings have been published by the scientific journal *PLOS ONE* today, ahead of World Oceans Day on Monday 8 June.

Every time you wash your clothes, thousands of tiny microfibrils from the fabric are released into rivers, the sea and the ocean, causing marine pollution. Scientists have speculated for some time that these microfibrils may cause more harm than microbeads, which were banned from UK and US consumer products in recent years.

Researchers from Northumbria University worked in partnership with Procter & Gamble, makers of Ariel, Tide, Downy and Lenor on the first major forensic study into the environmental impact of microfibrils from real soiled household laundry.

Their forensic analysis revealed an average of 114 mg of microfibrils were released per kilogram of fabric in each wash load during a standard washing cycle.

Given that a 2013 AISE report suggested 35.6 billion wash loads are completed in 23 European countries each year, the researchers suggest a massive 12,709 tonnes of microfibrils are being released from washing machines into rivers, the sea and the ocean each year in Europe alone. This is the equivalent of two rubbish trucks worth of waste ending up in marine environments each day.

However, the researchers achieved a 30% reduction in the amount of microfibrils released when they performed a 30-minute 15 C wash cycle, in comparison to a standard 85-minute 40 C cycle, based on typical domestic laundering.

If households changed to cooler, faster washes, they would potentially save 3,813 tonnes of microfibrils being released into marine ecosystems in Europe.

The researchers found even more significant differences when they compared different microfibril release from different types of North

American washing machines.

Households in North America and Canada have historically used high volume traditional top loading washing machines with an average 64 litre wash water volume. The market is gradually moving to high-efficiency machines which use up to 50% less water and energy per load.

As a consequence, these high-efficiency machines released less microfibres than traditional top-loading machines, with notable examples including a 70% reduction in microfibres from polyester fleece fabrics and a 37% reduction from polyester T-shirts.

Other key findings emerging from the study include:

- Larger wash loads led to a decrease in the release of microfibres, due to a lower ratio of water to fabric. As such, the research team advises consumers fill—but do not overfill—their washing machines. A correctly filled washing machine should be around three-quarters full.
- New clothes release more microfibres than older clothes. Microfibre release was more prominent in new clothes during the first eight washes.
- Fabric softeners were found to have no direct impact on microfibre release when tested in both European and North American washing conditions.

A novel aspect of the study was the involvement of forensics expertise from Dr. Kelly Sheridan, an expert in forensic textile fibres who has worked on several high-profile murder cases. Her guidance ensured the research could be conducted without cross-contamination of fibres from other sources.

The team applied test methods used in forensic science, such as

spectroscopic and microscopy techniques, to examine the structure and composition of the microfibrils released from the clothing. This enabled the fibres to be weighed and characterised to determine the ratios of manmade to natural fibres being released from wash loads.

The researchers found that 96% of the fibres released were natural, coming from cotton, wool and viscose, with synthetic fibres, such as nylon, polyester and acrylic accounting for just 4%.

A positive point to note is that the natural fibres from plant and animal sources biodegrade much more rapidly than synthetic fibres. A previous study has identified that cotton fibres degraded by 76% after almost eight months in wastewater, compared to just 4% deterioration in polyester fibres. This means that natural fibres will continue to degrade over time, whereas petroleum-based microfibrils plateaued and can be expected to remain in aquatic environments for a much longer period.

John R. Dean, Professor of Analytical and Environmental Sciences at Northumbria University, who led the study, said: "This is the first major study to examine real household wash loads and the reality of fibre release. We were surprised not only by the sheer quantity of fibres coming from these domestic wash loads, but also to see that the composition of microfibrils coming out of the washing machine does not match the composition of clothing going into the machine, due to the way fabrics are constructed.

"Finding an ultimate solution to the pollution of marine ecosystems by microfibrils released during laundering will likely require significant interventions in both textiles manufacturing processes and washing machine appliance design."

Dr. Neil Lant, Research Fellow at Procter & Gamble, said: "This study has proven that consumer choices in the way they do their laundry can

have a significant and immediate impact on microfibre pollution. These won't eliminate the issue but could achieve a meaningful short-term reduction while other solutions such as washing machine filters and low-shedding clothing are developed and commercialised."

The researchers say that the study provides evidence for appliance manufacturers to introduce filtering systems into the design of machines and develop approaches to reduce water consumption in laundry. Procter & Gamble laundry products, such as Ariel Pods, are suited to low temperatures and the company intends to use this evidence to bring further innovations to enable consumers to wash with low temperatures without compromising on performance.

They also hope it will encourage textile manufacturers to help by conducting filtered pre-washing to remove the most labile fibres which can easily break down and displace.

The study is a further example of the work undertaken at Northumbria University which led to it being ranked 6th in the UK and 27th globally for sustainability last month.

More information: The paper, Microfiber Release from Real Soiled Consumer Laundry and Impact of Fabric Care Products and Washing Conditions is available through *PLOS ONE*. DOI: 10.1371/journal.pone.0233332

Provided by Northumbria University

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