

Studies show increasing microplastics in our waterways

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“Even in places that are seemingly pristine are impacted,” he said. “Valley Creek at Valley Forge had untouched snow around the banks, and we still found microplastics there.”

Elick noticed in a paper that was released several years ago that microplastics have been found in everything from the bottled water we purchase to the tea bags we use to flavor that water – and increasingly in human feces and other sources that go directly to the wastewater treatment facilities that don’t have efficient microplastic filters.

“A few years ago, one of the treatment plant’s workers talked about some of those microplastics even falling out of suspension early as finer threads made it through processing and into brick material that used to be given to farmers to spread on their fields as fertilizer,” she said. “That hasn’t been done more recently, but it shows how quickly it can be spread all over. The scariest thing is that it’s in our precipitation, in the environment, in glacial ice and our groundwater.”

Unknown ripple effects

“The new report from PennEnvironment about the prevalence of microplastics is very concerning,” said Dr. Jon Niles, of Susquehanna University’s Freshwater Research Institute. “There is still much information that we don’t know about the impact of microplastics on our freshwater ecosystems and the aquatic species that inhabit these waters.”

Niles has his own ties to microplastic research in area waterways – last June the Middle Susquehanna Riverkeeper Association shared out information about a study Niles and his students completed, testing the contents of 206 smallmouth bass stomachs collected over a three-year span from 2017 to 2019. Each year, the concentration of microplastics in the samples increased until all samples collected in 2019 contained some combination of microplastic materials.

“The diet analysis of smallmouth bass shows a large variety of prey items from several trophic levels suggesting that there are many pathways for the accumulation of microplastics,” said Niles at the time.

How that directly impacts health is still being determined.

“These filaments are very tiny, so maybe fish suck them into and through their gills. They are so tiny, it is more likely that mollusks and mussels on the bottom of the



Photo provided

Faran Savitz collects a water sample, one of more than 300 from across the state that were included in a recent study showing microplastic proliferation.

river and oysters in the Chesapeake Bay are filtering them out and incorporating them into their own biomass,” said Elick. “Then you start to think about the raccoons that eat the mussels, and then whatever eats the raccoon. It can climb through the food chain quickly.”

As Savitz continues to study the microplastic pandemic and receives feedback on his recent study, he finds himself most drawn to the unknowns of that potential ripple effect.

“We don’t realize the danger this poses to wildlife within our waterways, but also to humans,” he said. “Plastics contain all sorts of chemicals and can act as sponges for other contaminants that can directly impact our health. We are consuming this in our water, in our food, in the air and we’re consuming it in high quantities.”

One pandemic impacting another

The coronavirus pandemic has only increased the spread of microplastics as masks containing synthetic fibers and stay-at-home restrictions led to an increased reliance on plastic-based takeout packaging and utensils according to a study by Susquehanna University student Samantha Chillis under the supervision of professor Dan Ressler.

“We had samples from 2019 before everything closed down and took more in 2020 during the shutdown,” said Ressler.

Chillis collected the samples from a study

in East Buffalo Township near Lewisburg along sections of restoration on Limestone Run, known locally as Bull Run.

“For a majority of Bull Run, I looked at pools and eddies,” said Chillis. “For the pool sites at both upper and lower Bull Run, we saw an increase (of microplastic particles) in them.”

In the lower Bull Run segment, Chillis was finding five to six pieces of microplastics per each 30-gram sample of sediment from those pools in 2019 collections vs. eight in 2020. In the upper Bull Run section, the amounts doubled from four (in 2019) to eight to 10 microplastics (in each 30-gram sample) from 2020. For context, 30 grams is about two tablespoons of sediment material tested in each sample.

Those microplastic particles included flakes “from plastic bags or anything else that can break off into smaller pieces that aren’t hard or thick plastic,” harder 3-D particles “ranging from little white pieces that may have broken off from plastic silverware or little microbeads” and microfibers “from clothing and even little wiry remnants that almost looked like they were from a frayed rope,” said Chillis.

“When you look at a study like ours, we don’t have million-dollar-funded research projects with state-of-the-art equipment, but even with the simple tools we have, we found

microplastics a lot more broadly spread than originally expected,” said Ressler. “The fact that we can turn over a rock in any part of our region and find microplastics is notable. It would be easy to just say that this is a Bethlehem or Philadelphia problem, but then you realize just how much of an issue it is right here in our region.”

Converting facts into action

“It is critical that we better identify how microplastics might be entering our ecosystem as they can come from a variety of sources, including stormwater runoff, wastewater treatment effluent and even from the wind,” said Niles. “We need to work to reduce the amount entering our waterways.”

Ressler agreed.

“There is a lot of plastic from all corners of consumer life, from plastic bags and shipping materials to the plastic utensils we use for eating – they all break down and wind up where we never expected them,” he said. “Even these masks that have become a part of our lives over the past year, they contain a lot of plastic fibers and you see them laying in street gutters that lead to our creeks.”

“For me,” added Chillis, “just thinking about what you are doing day to day can help. If you enjoy takeout regularly, consider a reusable straw or silverware. Take time to recycle your plastic instead of it winding up in a landfill.”

Unfortunately, it can be hard to avoid plastic, Elick admitted.

“So much of our clothing nowadays include synthetic fibers. It seems odds to be wearing plastic like we are, in many ways. In my house, we have lots of blankets – even the interior of my camper is made of plastic filaments,” she said. “But we can make a difference if we change the areas we can and avoid purchasing plastic-based items where possible.”

Savitz suggested taking those actions to the next level for any real impact on the problem.

“Using re-useable bags at the grocery store and recycling helps, but it can feel like a Band-Aid on the scope of what we’re dealing with concerning plastic pollution,” he said. “Beyond mindfully tackling your own waste, it is important to make our voices heard. Call elected officials and tell them that you care about plastic pollution.”

“Plastic is really everyone’s problem, and clearly the system we are using now to deal with it isn’t working when you realize just how much of it is out there.”

Making changes at the source among the realistic next steps

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“The fact that we can turn over a rock in any part of our region and find microplastics is notable. It would be easy to just say that this is a Bethlehem or Philadelphia problem, but then you realize just how much of an issue it is right here in our region,” said Susquehanna University professor Dan Ressler in our microplastics report. “There is a lot of plastic from all corners of consumer life, from plastic bags and shipping materials to the plastic utensils we use for eating – they all break down and wind up where we never expected them.”

The proliferation goes beyond the environment and into our bodies. Microplastics were found in every human tissue studied by graduate students at Arizona State University. In December 2020, microplastic particles were found in the placentas of unborn babies for the first time.

Perhaps more daunting than the staggering evidence of microplastics littered throughout our river-based resources (and ourselves) is the task of how to realistically make changes.

Plastics recycling, using reusable bags when grocery shopping, avoiding plastic straws and utensils in favor of those that can be washed and used again – these all help, but the magnitude of the problem suggests the need for bigger response.

One common theme among each of the studies we shared – including my impromptu experiment from the banks of the Penns Creek – is the drastic increase in plastic microfibers in our waterways. These



The Middle Susquehanna Riverkeeper Association serves the 11,000 square-mile middle Susquehanna watershed with the goal of protecting and promoting our river-based resources. Contact us at midsusriver@gmail.com or 570.768.6300. Learn more at www.MiddleSusquehannaRiverkeeper.org

are tiny, mostly impossible-to-see synthetic threads that mostly come from our clothing via wash cycles that discharge high amounts of fibers into our water table.

In a new study by the Ocean Wise conservation group and Canada’s Department of Fisheries and Oceans, researchers sampled seawater from across the Arctic and found synthetic fibers made up around 92 percent of microplastic pollution. Of this, around 73 percent was found to be polyester, resembling the dimensions and chemical identities of synthetic textiles – particularly clothing.

As Susquehanna University professor Jennifer Elick’s 2019 class found via stud-

ies on a Selinsgrove laundromat wash cycle and nearby wastewater treatment facility, the synthetic fiber situation isn’t just an arctic seawater problem. It is a major issue right here in the Susquehanna Valley.

Shockingly, one study from a few years ago suggests that a typical load of laundry can release as many as 700,000 microscopic plastic fibers into the environment. Changing the type of clothing you wear and wash can help improve this statistic, but the Middle Susquehanna Riverkeeper Association would like to take this process one step further.

Washing machine manufacturers need to make it a priority to add effective micro-

fiber filters to their products – filters that not only strain out these microplastics but do it in a way that is not cost-prohibitive in the sale price of the washer and that makes maintaining the filter manageable for everyday family use.

The Middle Susquehanna Riverkeeper Association will be contacting these manufacturers and legislators to find a realistic solution for this specific microplastic source. Until then, there are a few products on the market that households can utilize.

One is the Microplastics LUV-R, which has been backed by the Pennsylvania Master Watershed Steward Program. It has an 87 percent initial efficiency capture of micro plastic fibers and 100 percent rating at saturation of filter. The unit costs around \$150, can be hooked up via your washer’s outtake plumbing and requires cleaning every two to three loads of laundry.

Another is the Cora Ball, an item you put in your washer to collect microfibers. It isn’t as effective as the previous product, but is a fraction of the price and much easier to use.

Ultimately, the microplastic issue is here to stay, and something that will only improve if we all work together for realistic change.

As PennEnvironment microplastics researcher Faran Savitz shared in our recent microplastics report: “Plastic is really everyone’s problem, and clearly the system we are using now to deal with it isn’t working when you realize just how much of it is out there.”