

# Plastic, Plastic Everywhere

Why **micro**plastics are a **mega** problem



**Sherri Mason**, professor of chemistry and the sustainability coordinator at the Behrend College at Penn State Erie, is a leading researcher in

freshwater plastic pollution. Her work highlights the environmental and potential public health threats posed by microplastics. Mason spoke with *Nutrition Action's* Caitlin Dow.

## PLASTIC PLANET

**Q: It's hard to imagine a life without plastic.**

**A:** It is, but we've only been able to mass produce plastics since World War II. So we've only had them for public use for about 70 years.

**Q: How much plastic do we make?**

**A:** Worldwide, we produce over 300 million metric tons each year. If things don't change, the industry will nearly quadruple that amount by 2050.

**Q: Why is that a problem?**

**A:** First, plastics are made from fossil fuels, so producing them creates greenhouse gases that contribute to the climate crisis. And plastic doesn't biodegrade. That means it doesn't break down into its basic components, which get reincorporated back into the soil.

Plastic can break into smaller and smaller pieces, but it retains the same chemical structure. And most plastic ends up as waste in landfills or it pollutes natural environments like the ocean.

**Q: What is a microplastic?**

**A:** It's any piece of plastic that's smaller

**W**e can't always see them, but tiny particles of plastic are everywhere. Microplastics have been found in the most remote parts of the globe ...and in humans. Scientists are still uncovering the impact of microplastic pollution on our—and the planet's—health. Here's what you need to know.

than 5 millimeters, which is about the length of a grain of rice. Many microplastics are far smaller than that, and are far too small to see with the naked eye.

**Q: Where do they come from?**

**A:** They can come from larger pieces of plastic that have broken apart. But some, like microbeads—which were used as exfoliators in body washes and toothpastes before they were banned for that use by the FDA—are manufactured. Microbeads are still in personal care products in some other countries, though.

**Q: Do microplastics also come from clothes?**

**A:** They do. Synthetic fabrics like polyester, nylon, and spandex are all types of plastic. I'm draped in plastic right now. Sixty percent of clothing fabrics are synthetics, rather than natural fibers like cotton, wool, linen, or hemp.

And we all know from cleaning out the lint trap in our dryers that pieces of our clothes break off. It happens in the washing machine as well. The fibers from synthetic clothing are a type of microplastic. They break off in the wash and go down the drain.

**Q: Where do they end up?**

**A:** About 95 percent of microplastics are filtered out at wastewater treatment plants. That sounds great, but the 5 percent that make it through add

up. Our study of 17 wastewater treatment plants in the U.S. showed that each facility was releasing, on average, more than 4 million microplastic particles into our waterways every day. And we have about 15,000 plants.

**Q: So microplastics contaminate the oceans?**

**A:** Yes. One study estimated that there are roughly 5 trillion pieces of microplastics floating in the world's oceans.

But they're also in the air. Researchers have even found microplastics in snow samples from the Arctic. Every place we've looked, we've found microplastics.

**Q: Do plastics harm marine animals?**

**A:** Yes. Most of the focus has been on larger plastics. You've probably seen the pictures of sea turtles with straws up



Plastic waste is harming marine life from the bottom to the top of the food chain.

their noses. And there have been reports of beached whales with stomachs full of plastic debris like plastic bags, cups, netting, and so on.

**Q: How about microplastics?**

**A:** We're still learning, but we know that animals are ingesting microplastics, and there's evidence that they impair the reproduction, growth, mobility, and feeding patterns of small marine animals.

It starts with plankton at the very base of the food chain. The plankton ingest microplastics, which sometimes kills them, and then the animals that rely upon them have less food. If the plankton don't die before they're eaten, their microplastics end up inside whatever eats them. So the plastics might accumulate as you go up the food chain.

## SIDE OF PLASTIC?

**Q: Are microplastics in food?**

**A:** Yes. Seafood was one of the first foods they were found in. I've had people say, "Well, I don't eat seafood. I just eat chicken, so I'm fine." We haven't looked for microplastics in chicken. But I can assure you that if they're in seafood, they're in chicken, because they're in our air, water, and soil.

**Q: What about other foods?**

**A:** There are all sorts of foods that we haven't analyzed yet. But we've found microplastics in water, beer, and sea salt. And a recent study showed that they can make their way into vegetables through the roots.

**Q: How do microplastics get into soil?**

**A:** Wastewater treatment plants retain everything that gets filtered out. It's called sewage sludge. About half of that sludge gets treated and applied to agricultural land, because it's very nutrient-rich.

Microplastics from the sludge can then percolate through the soil and end up in fruits, vegetables, and grains. Or they might end up as runoff that flows into a river and doesn't go through a wastewater treatment plant. So applying the sewage sludge to agricultural land may delay

the plastics from entering the waterways, but they eventually move into our food.

**Q: And they're in our drinking water?**

**A:** Yes. We studied tap water from 14 different countries, including the U.S. In each liter of water, on average, there were about 5½ pieces of microplastic.

Some people were like, "Oh my gosh, I'll just drink bottled water." But in another study, we found twice as much microplastic in bottled water as in tap water. You should assume that anything that's wrapped in plastic is going to contain microplastic. A recent study concluded that the number one thing



We produce more plastic than we know what to do with, and we can't recycle our way out of the problem.

people can do to reduce their ingestion of plastic is to not drink bottled water.

**Q: How much plastic do we consume?**

**A:** One recent study estimated that some people may be consuming up to five grams' worth of plastic a week. That's the amount of plastic in a credit card.

**Q: Do microplastics harm our health?**

**A:** It appears that we can absorb some plastics, depending on their size and chemistry. For example, one study found microplastics in four of six women who had just given birth. But we don't know yet if that harms us.

Also, there are a lot of chemicals in plastics like BPA and phthalates. Many are hormone disruptors that have been linked to fertility problems, obesity, type 2 diabetes, and some cancers.

We still have much to learn, but we know that plastics and microplastics can adversely affect marine life, even if we don't know everything yet. So we need to take a precautionary approach.

## CUTTING THE PLASTIC CORD

**Q: Do we need to stop using plastic?**

**A:** No. Plastics serve a lot of necessary purposes, and we can't eliminate them. I'm not anti-plastic; I'm anti-unnecessary-plastic, like single-use plastics. We need to rethink our relationship with plastic.

**Q: So reduce, reuse, recycle?**

**A:** Yes. And they're in that order for a reason. Reducing is most important. And reusing what we have gets the most life out of a single item.

**Q: And recycle?**

**A:** Yes. But in the U.S., we only recycle 9 percent of our plastics. Some plastics can't be recycled. And most are complex blends of different plastics and additives that can't be teased apart, which makes them difficult or impossible to recycle.

Also, recycling plastic is more expensive than making new plastic. So even if plastic can be recycled, it often isn't.

Corporations have put the responsibility on consumers to recycle ourselves out of this problem. But that won't work.

**Q: What else can we do?**

**A:** In some cases, we can change the types of materials that we buy and use. Consumers have a bigger impact than we give ourselves credit for. If we demand materials other than plastic, the industry will respond. In other cases, the industry could move to a bioplastic, something that can biodegrade.

But if we're going to fix this problem, we need to hold corporations accountable. Once they are responsible for their packaging after consumers have disposed of it, there will be less plastic, plastic will be more durable, and systems will be put in place to collect it.

And this isn't just about us. We have to demand change and reduce our use of plastics now, for the future for our kids and grandkids. Our focus should not simply be on avoiding certain foods. It's about changing the system so plastics are not in the foods to begin with.

# BREAKING up with PLASTIC

The best way to avoid microplastics—and to curb our contribution to microplastic pollution—is to use less plastic.

“You don’t need to get rid of all your plastic and buy new things,” says Penn State’s Sherri Mason. “But as things break or you lose them, try to replace them with reusable items made out of more sustainable materials like glass or stainless steel.”

And curbing plastic doesn’t have to mean spending money. Wash out and reuse food jars. And repurpose tote bags into grocery or produce bags (or sew your own!).

Here are some other tips to get you started.

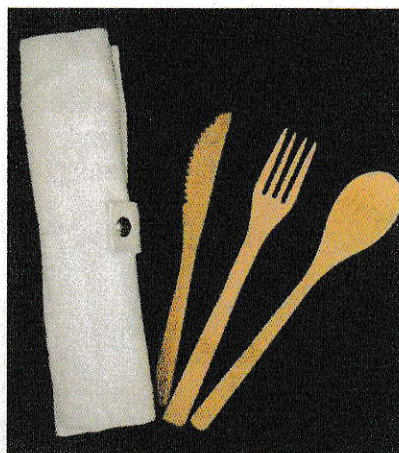
## SMART STORAGE

- Store food in glass jars or storage containers.
- If you buy food in plastic containers, reuse them. (Use glass for liquids or hot food.)
- Beeswax wraps can replace plastic wrap or bags.



## SAY GOODBYE TO SINGLE-USE

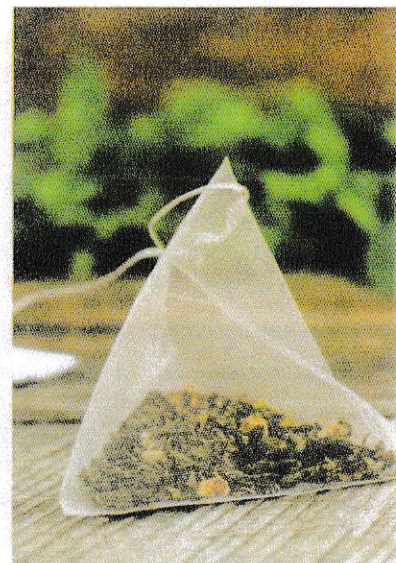
- Ditch the bottled water. Keep a refillable bottle on hand.
- Say no to plastic straws and utensils in takeout orders. Keep your own set of utensils with you.
- Bring your own containers for restaurant leftovers.



## PLASTIC-FREE STEEPING

When researchers steeped plastic tea bags (like the one pictured) in hot water for five minutes, each cup ended up with 11.6 billion microplastic particles.

- Teavana says that its store-bought tea bags are made out of plastic.
- Celestial Seasonings, Tazo, and Lipton say that their tea bags are mostly paper with some plastic added.
- Yogi, Numi, Traditional Medicinals, and Stash say that their tea bags are made without plastic.
- Try a metal infuser for loose-leaf tea.



## REVAMP YOUR GROCERY RUN

- Consider reusable grocery and produce bags. Many are made of polyester or other synthetic fabrics, so look for bags made from natural fibers like cotton or hemp.
- When you can, buy in bulk and look for food that’s sold in glass or metal instead of plastic.



## CONSCIOUS CLOTHING

One study estimated that a 13-pound laundry load of polyester clothing releases nearly 500,000 microfibers.

- When replacing clothing, consider secondhand first. Aim for natural fibers, if you can.
- Wash your clothes less often. (Bonus: they’ll last longer!)

■ In two studies, Environmental Enhancements’ MicroPlastics LUV-R Filter (which attaches to home washing machines) prevented roughly 75 to 80 percent of polyester microfibers from heading down the drain. (You toss the trapped particles into your trash bin.)