

Dangerous Plastics Are a Threat to Us and Future Generations

Why a legally binding treaty cannot be postponed

By [Meena Miriam Yust](#)

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Every day people make decisions about what to eat, sometimes opting for colorful fruits and veggies, sometimes finding the smell of bacon irresistible. At the end of the day people are controlling their own health. What is remarkable though, is the possibility that something one swallows today could have a lasting effect on future offspring—children, grandchildren, great grandchildren. New research is finding a generational impact of certain chemicals. This time it's not the bacon we're worried about—but plastics and the toxins within them.

[Twenty years ago](#), researchers at Washington State University discovered accidentally that the now-infamous bisphenol A (BPA) was leaching out of plastic cages, harming the mice within. The contamination caused abnormalities in mice eggs and fertility. Numerous subsequent studies found BPA exposure affects adult fertility and health across species, including monkeys, fish, and humans. Known to decrease sperm count in rats and to cause breast cancer in women, [BPA was banned](#) in 2012 by the FDA from being used in baby bottles and sippy cups. Yet BPA is still used in many products, including epoxy resins used to coat canned foods. A [2004 study](#) of 2,517 people found that 93% had detectable quantities of BPA's by-product in their urine.

Since the toxic effects of BPA came to light, several replacement bisphenols were quickly brought to market by chemical companies and are now in widespread use. Twenty years after the BPA toxicity discovery, by remarkable chance, the same Washington State University lab recently noticed again that something was amiss with their mice. This time the mice were housed in cages comprised of replacement bisphenols, largely believed to be safer than BPA. The researchers subsequently performed controlled studies with several of the replacement bisphenols including BPS, a widely used replacement.

Results demonstrated that the new bisphenols behaved similarly to BPA, causing health problems including detrimental effects on fertility in both males and females, reported in [Cell Biology in September 2018](#). [Scientist Sarah Hunt](#) explained, "This paper reports a strange déjà vu experience in our laboratory." What the lab discovered once with BPA, it was seeing again with the replacements. Perhaps most troubling were the long-lasting effects of the toxins. Even if all bisphenols could be magically eliminated today, the toxic effects would still last about three generations through the germline of people already exposed. This means bisphenols ingested today could affect the fertility of one's great grandchildren.

The bisphenol case demonstrates that FDA bans do not necessarily solve the root problem. Chemical companies tend to roll out similar chemicals to those that have been banned,

because this is the easiest way to bring something to market quickly. But more testing is needed before chemicals are released into the environment. Long term problems such as generational infertility and cancer risk often cannot easily be examined in clinical trials, and environmental effects are not rigorously analyzed prior to release.

The Washington State University study also proved that damaged and heated plastics are particularly deadly, as the damaged cages leached more toxins. This should serve as a warning for those who microwave food in plastic containers for their families. And it should remind us that discarded plastic bottles degrading in oceans and rivers are releasing toxins that cause irreversible infertility.

The current estimate of plastics in our oceans is approximately [150 million metric tons](#). By 2050, the amount is expected to 'outweigh the fish,' according to [Jim Leape](#), co-director of the Stanford Center for Ocean Solutions. A [recent study](#) has determined microplastics (small plastic particles) are present in every river and lake in Britain. And they have been found in tap water, everywhere from the Environmental Protection Agency in Washington, DC to the Trump Grill in New York. A [study](#) of 159 drinking water samples on five continents found that 83% of those samples were contaminated. Plastics are everywhere, from the highest mountains to the deepest parts of the ocean and Arctic. Nanoplastics less than 50 nanometers long have even been [found in plankton](#), which is ingested by fish that humans eat.

Scientists are finding that plastics are disrupting marine mammals' ability to reproduce. Many forms of plastic including polychlorinated biphenyls (PCBs) and Bisphenol A are endocrine disruptors, meaning they affect the hormonal systems of animals. An orca of adult age called Lulu, [researchers recently found](#), was barren as if she was a juvenile. Analysis revealed very high levels of PCBs in her lipid tissues. One orca pod off the coast of Scotland has not produced a calf in 25 years. Despite bans on PCBs 30 years ago, toxins remain in orca mothers' milk, and are passed from mother to baby. A recent [study](#) published in the journal Science predicts that half the world's population of orcas will be extinct in just a few decades due to PCB poisoning. Researchers have also found that despite the PCB ban in Europe, levels of PCBs have not decreased, indicated that they may be leaching out of landfills. Hormone disruptors have also been found to [impair male frogs' fertility](#), and to cause tadpoles to more frequently develop ovaries rather than testicles, thus skewing the proportion of males to females. Similar problems have been found in fish. Reproductive risks associated with endocrine disrupting chemicals span species.

Bisphenol A is known to decrease sperm count and to cause cancer in many species. Its counterpart [replacement plastics](#) (BPS, BPF, BPAF, BPZ, BPP, BHPF... to name just a few), researchers have recently discovered, are no better. Whether these pollutants have already affected humans is anyone's guess, but it would be wise to view statistics during the time period since plastics became popular, starting in the 1960s, and to see if there is a significant trend over time.

It appears there is. Notably, a [2017 study](#) found that sperm counts per milliliter declined by more than 50% from 1973 to 2011, with total sperm counts down almost 60%. [Two other recent studies](#) have demonstrated that over the past few decades in the U.S. and Europe, both sperm count and motility have decreased.

The United Nations Environment Assembly (UNEA) [recently debated](#) a proposed legally

binding treaty to address plastic pollution. One objective of the proposed treaty was to phase out single use plastics by 2025. Norway also suggested a global agreement for handling ocean plastic pollution. Sadly, the U.S. was the largest voice against the proposed treaty and the proposed global waste disposal plan.

Eventually a non-legally-binding agreement was reached in which the U.S. watered down the language to “significantly reduce” plastics by 2030, eleven years from now. [One UN delegate described](#) the Trump representatives as “trying to remove all targets and timelines.”

Meanwhile, the U.S. has been exporting large quantities of plastics overseas for years, historically mostly to China. In the previous year, 70% was exported to China and Hong Kong. But in 2018, [China banned imports](#) of plastic waste. Since the ban the U.S. has looked to poorer nations for its overseas garbage dump. Unearthed, Greenpeace’s research group, has found that in the first six months of 2018, almost [half of U.S. plastic waste](#) was sent to developing countries: Thailand, Malaysia, and Vietnam. U.S. plastic waste exports to Thailand went up by nearly 2,000% this year.

Most developing nations do not have sufficient recycling infrastructure to properly handle plastic waste. On [Earth Day 2018](#), the top producers of mismanaged ocean plastic waste were ranked by tons of waste. The top five after China were Indonesia, the Philippines, Vietnam, Sri Lanka, and Thailand. In some cases as in parts of the Philippines, recycling is done [laboriously by hand](#), picking bottles out of large dumps. As this is very difficult and time consuming, large quantities find their way into oceans and rivers. Sadly and not surprisingly, the Pasig River in the Philippines transports approximately [72,000 tons of plastic downstream](#), and has been declared “biologically dead” since 1990. Instead of helping these countries to develop recycling infrastructure, we are sending them more toxic waste.

We might think we are kicking the can down the road by sending plastics overseas but they will wash right back up on the Hawaiian and California coast. Beachgoers might witness solid litter washing ashore, or unearthed from the stomachs of dead whales. Or they might not notice the pollution — instead unknowingly consuming microplastics in their next Ahi Tuna sandwich. On the East Coast, one might encounter them in a [glass of water at the Trump Grill](#) in New York. There is only one world sink after all. Tossing poison to the other end of the tub only works for so long – it will inevitably, over time, mix and wash back to your side of the water. And when one of us is diagnosed with cancer, do we really know the cause?

It is instructive to remember the orca Lulu, a mammal like us, who no longer produces eggs. And to remember that if sperm counts continue to decline at the present rate, they will soon reach levels where it becomes difficult to have children. By then, the world’s water supply may be irreversibly contaminated and an enforceable treaty will be too late.

Postponing a legally binding treaty may put us on the path of our fellow mammals the orcas, half of which already face [inevitable extinction](#) worldwide. And we can not forget the tragedy of the orca Tahlequah, who last summer [carried her dead calf](#) for a record 17 days and 1,000 miles in mourning.

Eleven years may be too late.

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[Meena Miriam Yust](#) is an attorney based in Chicago, Illinois. Educated at Vassar College and Case Western Reserve University School of Law, she published a draft Migratory Insect Treaty with commentary in the Case Western Reserve Journal of International Law.

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Articles by: **[Meena Miriam Yust](#)**

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