

• 28 November 2022

Plastic pollution: Three problems that a global treaty could solve

Specialists discuss strategies that could help stop plastics contaminating the environment.

• [Tosin Thompson](#)



Credit: Ben Curtis/AP/Shutterstock

Plastic is one of the fastest growing materials and production is on course to double, to more than one billion tonnes a year, by 2050. With that, will come more pollution. This week, delegates from more than 150

countries are expected to meet in Uruguay to begin negotiations for a historic global agreement to end plastic pollution.

In March, the United Nations Environment Assembly made a [landmark decision to create a legally binding treaty](#) that considers the lifecycle of plastics, from production through to innovative packaging, products and business models.

The treaty is expected to be finalized by the end of 2024. Between now and then, negotiators will have the daunting task of devising and agreeing to rules and strategies for controlling plastic pollution. *Nature* explores three key issues and how the treaty could tackle them.

Pollution

Plastic accounts for 85% of all marine litter. The UN Environment Programme (UNEP) predicts that the amount of plastic in the ocean will nearly triple by 2040, adding 23 million to 37 million tonnes more waste every year.

“The vast majority of mismanaged plastic waste that originates on land eventually ends up in rivers and is churned out into oceans,” says Steve Fletcher, who studies ocean policy and economy at the University of

Portsmouth, UK, and works with UNEP on plastic issues.

The cost of plastic pollution to society — including environmental clean-up and ecosystem degradation — exceeds US\$100 billion a year, according to the philanthropic Munderoo Foundation in Perth, Australia. “The cost of inaction against plastic waste far exceeds the cost of addressing plastics”, says Linda Godfrey, a principal scientist at the Council for Scientific and Industrial Research in Pretoria, South Africa.

Godfrey says that treaty negotiators will have to deal with competing opinions about how to resolve pollution: non-governmental organizations and lobbyists often want to ban single-use plastics and find safer alternatives; the plastics industry says that pollution can be solved through improved waste collection; and the waste-management and recycling industries push for more recycling. “There is no silver-bullet solution,” she says. Godfrey hopes that the treaty will include all of these measures, with varying degrees from country to country. Banning the movement of plastic waste from high-income countries to lower-income countries will also reduce pollution, she says.

Godfrey also wants the treaty to specify that producers pay for the collection, sorting and recycling of the plastic

packaging and products they make. This would divert more plastic from landfill and shift the financial burden of waste management away from local governments, which are typically funded by taxes. If companies making and using plastic can't afford to do this, then, "should this product be on the market, and should it be in plastic?", she asks.

To reduce the amount of plastic ending up in the ocean, the treaty must include a deadline by which countries aim to reduce the amount of plastic they use, says Atsuhiko Isobe, an oceanographer at Kyushu University in Fukuoka, Japan.

Recycling

Currently only 9% of plastic waste is recycled, in part because plastic waste has little value. Scientists say that if it was worth something, more plastic would be reused, less would end up in the environment and there would be also less need for new plastics, a concept called the circular economy.

To jump-start a circular economy for plastic, Australian mining billionaire and philanthropist Andrew Forrest thinks that countries should agree, as part of the treaty, to place a surcharge on the creation of polymers, the building blocks of plastics. This money could be used to fund recycling.



Plastic waste makes up 85% of marine debris. Credit: Salvatore Laporta/KONTROLAB/LightRocket via Getty

Retailers that sell plastic products should also be obliged to buy back plastic waste and find ways to reuse it, says Forrest, who chairs the Minderoo Foundation, which runs an initiative to accelerate the creation of a circular economy. This cost for retailers would probably be passed on to consumers, but Forrest thinks that consumers would be willing to pay more for products if they knew this would reduce the amount of plastics in the environment. Such an approach would also help end the production of plastics that cannot be reused or recycled, because there would be no one to buy them back.

Forrest wants the treaty to establish such a system in the next five years, with countries introducing regulations that penalize companies that pollute plastic into the environment. “Major manufacturers and distributors of plastic have all admitted to me that they give consumers no choice but to consume plastic which cannot be recycled,” says Forrest. “With penalty-backed regulation, you will see companies change their habits immediately.”

But Godfrey wonders whether a circular economy is desirable, particularly because little is known about the health risks posed by plastics that have been recycled several times. “As we drive greater plastic circularity, we need to ensure we’re not increasing the risk to human or to ecosystem health,” she says.

Social and health implications

All over the world, but mainly in Asia, plastic waste is burnt. This reduces the volume of waste and prevents it from becoming breeding grounds for bacteria, viruses and mosquitos. But the burning is a major contributor to air pollution, says Cressida Bowyer, a biologist at the University of Portsmouth, who works on creative approaches to address plastic pollution.

Around 4.2 million people died as a result of outdoor air pollution in 2016, with 91% of those deaths in low- and

middle-income countries. In low-income parts of Nairobi and Sylhet, a city in Bangladesh, plastic is part of the landscape and presents a substantial health hazard. “It’s physically embedded into the soil,” making it extremely difficult, if not impossible, to collect back, Bowyer says. She wants the treaty to consider alternatives to plastic.

Studies have found that microplastics are inhaled¹ and consumed through food and water². Smaller-sized plastics, called nanoplastics, have also been shown to cause damage and inflammation in human skin and lung cells. Plastics also contain additives — such as bisphenol A, phthalates and polychlorinated biphenyls — that are linked to endocrine disruption and reproductive abnormalities^{3,4}.

“We’re just beginning to take the lid off that the Pandora’s box to find out how much plastic — and its associated chemicals — are in us,” says neuroscientist Sarah Dunlop, director of plastics and human health at the Minderoo Foundation.

Dunlop says that the treaty should consider asking countries to ban or phase out chemicals in plastic that are known to harm human health. “The treaty needs to include protecting human health through chemical regulation as well as other measures,” she says.

doi: <https://doi.org/10.1038/d41586-022-03835-w>

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