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Want a solution to plastic pollution? Scientists urge UN to require global reporting

Plastic is a wonder material that has molded itself to fit a wide variety of applications. But it comes with a host of drawbacks that aren't fully considered. That's why the United Nations has convened to hammer out a treaty to address plastic pollution.

As negotiations continue, scientists in the United States and China joined forces to urge the delegates to introduce a mandatory measurement and reporting component, similar to protocols for other internationally regulated pollutants. The [details](#) appear in the journal *Science*, and will inform a workshop in Geneva, Switzerland on September 16 and 17.

Recognizing the scope of the problem

In March 2022, the UN Environmental Assembly convened a committee to begin negotiating a treaty to end plastic pollution. This process offers an opportunity to establish standards for measuring and reporting plastic production, use, disposal and pollution. Scientists at UC Santa Barbara and Tsinghua University in Beijing, China collaborated to highlight this fact.

“The biggest worry would be that the first version of the Global Plastics Treaty has no reporting requirements,” said co-author [Roland Geyer](#), professor of industrial ecology at UCSB’s Bren School of Environmental Science & Management.

Geyer’s co-authors echoed this sentiment. “As the negotiations progressed, we became increasingly concerned that data and reporting were not receiving the attention we felt they deserved,” said lead author Quanyin Tan, an assistant professor at the School of Environment, Tsinghua University. “That concern became an important motivation for this paper.”

The reporting program the authors lay out would entail measuring the kinds of plastics produced, how they're traded and how they're recycled or disposed of. This, in turn, requires countries to standardize labeling and establish measurement practices and repositories.

“We’re not describing something new,” said UCSB professor [Douglas McCauley](#), “but we realize it’s a bold idea to ask all countries in the world to report detailed data on plastics from cradle to grave.”

Bold, but not radical. Society has already developed international protocols for a variety of other products, chemicals, materials and consumer goods:

- The Montreal Protocol regulates ozone-depleting substances
- The Basel Protocol handles hazardous wastes
- The Stockholm Convention deals with persistent organic pollutants
- The Minamata Convention manages mercury compounds
- The Paris Agreement covers greenhouse gas emissions

These treaties have tackled some of the world's most pernicious environmental problems. And their successes have hinged on collecting data on the problem and tracking change. “We now need to break ground on a system for plastics,” said McCauley, professor of ecology, evolution, and marine biology.

“Because you can't manage what you don't measure,” added Geyer. “Regulations like the Clean Water Act, Clean Air Act and Resource Conservation and Recovery Act are powerful because they involve measuring things and then coming up with regulation based on what you measure.”

Standardizing how we label, measure and report on plastics will also enable us to track the impact of any solutions we devise. And the authors emphasize that these conventions do need to support real actions to address the problem.

The authors also view measurement and reporting as attainable goals. “Even if the parties can't agree how much plastic humanity should produce every year, then maybe they can at least agree that it would be good to know how much is produced, what chemicals are used, how it's traded, how much waste is generated and where the waste ends up,” Geyer said.

A material of the modern age

Far from decrying the evils of plastics, Geyer and McCauley view them in terms of tradeoffs. “Plastic is a critically important material for doing all kinds of things,” McCauley said. “But we're applying this wonder material where it's not the right fit.” It is used to produce products like single-use containers, packaging materials and utensils. A plastic fork used for 5 minutes could last over 500 years in a landfill. “That is a critical design flaw.”

Throughout human history waste management was often an afterthought. Most things humans produced could be disposed of into the environment: Stone, brick and glass are inert; paper and wood biodegrade; most metals will rust away. “But plastics just don't do that,” said Geyer. “Synthetic polymers are the first manmade materials that nature categorically cannot re-assimilate.”

As a result, plastic is now pervasive. “It's everywhere, and too much finds its way into the environment and into organisms, including ourselves,” Geyer said. “The public is concerned, rightfully so.”

We know plastic pollution is harmful, the risks it poses to human health have become increasingly apparent, and yet plastic production grows every year. In 2024, McCauley, Geyer and other colleagues [estimated](#) that plastic use would continue to grow by 37% by 2050. There are strong incentives for this trajectory, McCauley explained, since plastic is often plan-b for petrochemical companies, especially as the world moves beyond fossil fuels.

The team hopes this paper reinvigorates conversations around data gathering and reporting. But beyond encouraging this discussion, they hope the framework

provides a practical reference for countries as they develop or improve these systems, Tan explained.

As a follow-up to the paper, UCSB and the World Economic Forum will co-host a workshop September 16–17 in Geneva, bringing together scientists, policy makers, industry representatives and implementation experts in a neutral setting. The event will provide a space to explore different approaches to reporting and identify practical trade-offs. It will also offer an opportunity to discuss how to ensure scientifically robust reporting is also practical, feasible and implementable across countries with different capacities.

The workshop will enable experts to contribute their technical perspectives to the broader dialogue on treaty implementation. A summary will be available to stakeholders ahead of the next Intergovernmental Negotiating Committee meeting on plastic pollution in March 2027.

Modern society needs plastic for many applications, but it also needs to recognize the material's drawbacks and mitigate them. "And in order to understand it, we need to set up this new global reporting program," McCauley said.

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