



A water sample collected off the coast of Hawaii demonstrates the ubiquity of microplastic in our oceans. (Photo by David Liitschwager)

Solving the Plastics Problem:

Exploring the causes and leading policy solutions to global plastic contamination

By Derek Schwabe

In his 2015 article in the National Academy of Sciences' journal, *Proceedings of the National Academy of Sciences of the United States of America*, Boris Worm compares the urgency of the world's plastic problem to one of the earliest major U.S. environmental movements, sparked by Rachel Carson's seminal 1962 book, *Silent Spring*. Worm traces several key stages of the movement's development, including awareness, organized advocacy, and sustained public outcry, which ultimately led to swift and effective policy action.

While the environmental destruction of the pesticide DDT unveiled by Carson was horrific, the stages of public response recounted by Worm offer an encouraging account of the

Key Messages

- **Our soil, oceans, air, and bodies are being contaminated by plastic waste at alarming rates**, as the amount of such waste—be it nano, micro, or macro—in our world grows exponentially
- **A distortion of market incentives means more plastic is being produced than ever**, while less plastic waste is responsibly disposed of.
- **The problem of plastic proliferation is global**, and thus cannot be fully solved without coordinated action between governments.
- **Government action is needed to ensure plastic producers pay the true social and environmental costs.** Taxes on producers, quotas, targeted bans, and other tools can achieve this.

power of research, journalism, and organized advocacy to exact decisive environmental policy reforms, at least from an accountable government. Yet for those hoping to use the same playbook to solve the modern proliferation of plastic waste, the lessons of the *Silent Spring* generation may stop there.

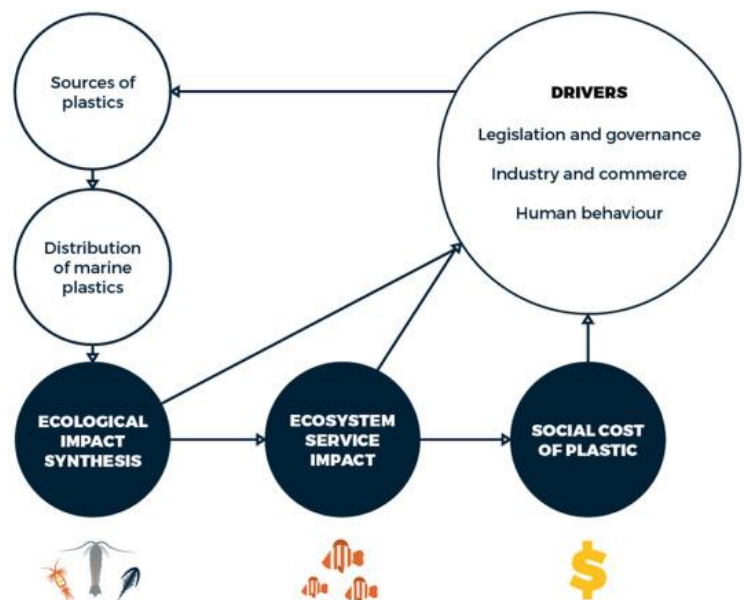
Unlike the DDT problem, plastic waste is hardly confined within national borders. A byproduct of a globalized economy, it contaminates every major region of our world—and the oceans that separate them. Like too many of our global problems, its worst effects fall on those least to blame, as mountains of plastic trash are dumped by rich, wasteful countries like the United States on countries too poor to refuse them. The result is the literal flooding of their communities and local ecosystems with plastic.

An Introduction to our Global Plastic Problem

At current rates, more than 1.3 billion tons of plastic waste—a truly unfathomable number—are expected to be released into the world's oceans and onto its land by 2040¹. The rise of online shopping and subsequent growth of shipping services worldwide has only added to the global production of single use plastics. Most aggregate plastic packaging, such as the air pillows standard to Amazon packages, is single use, making it the largest source of pollution from household waste.²

Most recently, the Covid-19 pandemic has served to accelerate plastic production and waste disposal, as it disrupted global waste management systems and regulations and caused significant cuts in plastic prices. The incredible rise in demand for personal protective equipment, which is largely made from plastic components also contributed.³

Figure 1: Three Leading Impacts of Plastic Waste on Marine Life



A growing body of research points to the presence of not just visible plastic waste such as bottles, grocery bags, and cutlery, known as macro plastics, but of micro, and nano-plastics too; small and even microscopic particles that contaminate our soil, oceans, and air. Increasingly, these particles are ending up in our food and water supplies, causing health effects not yet fully understood. They're also finding their way into the bodies of birds and marine life, in some cases causing health problems and even death.

The production and subsequent dumping of plastic into our communities and natural environments are a significant contributor to climate change, too, on track to account for 20 percent of all oil consumption by 2050.⁴ Lastly, and perhaps most important for policymakers, the estimated annual economic impacts of the global plastic waste problem alone amount to \$2.5 trillion.⁵ Figure 1 explains how the ecological and ecosystem service impacts translate into social costs. \$2.5 trillion is roughly the same cost of President Biden's sweeping U.S. infrastructure investment plan known as Build Back Better.⁶

Understanding Key Factors

If the environmental, social, and financial costs of plastic waste are so astronomical, why isn't the world racing to respond in the same way that the United States so swiftly acted to ban DDT in response to *Silent Spring*? The answer to that question is no-doubt bound up in a host of geographical, political, and economic factors. Indeed, many countries *are* rapidly moving toward action, though not yet on sufficient scale to meet the problem. Still others have taken little to no action at all. Arguably the the economic factors of the disposable plastic waste problem are fundamental. Let's explore them:

Plastic is unmatched as a multipurpose

material: Few would dispute the myriad benefits of plastic. It's cheap to produce, lightweight, strong, durable, waterproof, can come in virtually any shape or color, and can last a very, very long time. While some efforts have been made to uncover cost-competitive, sustainable plastic alternatives, notable among them bioplastics (plastics derived from plants), few have proven inexpensive and scalable enough to challenge plastic's economic dominance.

Current market incentives induce continued

production: Operating in largely unregulated markets (at least on the environmental front), plastic producers run a simple calculus, weighing the exceedingly low costs of raw materials, labor, and production against the revenue they can collect from the sale of plastic products. As long as the revenue exceeds those low costs, they keep producing. For most plastic producers, the environmental and social costs that their products will inflict upon the world never enter into their calculus. With no cheaper sustainable alternatives available, plastic producers have little incentive to stop making more plastic.

Market incentives favor dumping over

recycling: In 2018, China dropped an economic bombshell into the global plastic recycling market when it implemented a policy that halted plastic waste imports from mostly Western countries like the United States. Prior to 2018, China had processed about half of U.S. plastic recycling products. The plastic recycling business model always worked on a razor thin profit margin in China, built upon a reliable stream of dirt-cheap labor. Yet even China's plastic recycling operation was only able to actually recycle about 70% of the plastic it imported. The remaining 30%, contaminated by mixing with other trash, ended up in their own landfills.⁷

As China's income and labor standards rose and as it started to account for the social and environmental costs of its plastic recycling industry, it eventually concluded that accepting the world's trash was no longer worth it. Since 2018 other countries have enacted similar policies, sending wealthy countries scrambling to find other places poor enough to take their plastic waste. While some—mostly in Africa—are filling that void for now, it's likely only a matter of time before they too close their doors. As long as rich countries continue to take advantage of cheap labor and lax regulations in poor ones, incentives will continue resulting in the dumping of plastic waste over recycling.

Policy has been slow to correct this market imbalance and account for the full social costs of plastic waste.

The substantial influence of the oil industry over policymakers in both rich and poor countries is no doubt part of the reason why. Consumer hesitancy about plastic bans and taxes also contributes to the less-than-urgent policy response.

Recommendations for Policymakers: A Three-pronged Plan

Solving the plastic problem demands nothing short of decisive action from policymakers. As is the case for most leading environmental challenges, market-driven solutions cannot respond quickly enough since, as mentioned above, the market fundamentals offer insufficient incentives for plastic producers to stop producing nor for plastic waste dumpers to stop dumping. While action in countries that consume the most plastic, like China and the United States, can make a substantial contribution, ultimately all major governments of the world will need to coordinate to enact similar laws and global agreements that eliminate the market incentives that keep the plastic waste system in place. Global economic organizations like the World Trade Organization, led by the wealthy countries, can play this coordinating role.

With that in mind, the following are the three major policy steps that individual countries should take to start reversing the global crisis of plastic waste:

Policy Goal 1: Make producing disposable plastics more expensive

The first step to easing overproduction of disposable plastics is to use policy instruments to raise the price of producing them to match the total cost that they exact on society—not merely their low-production costs. Policymakers can achieve this through taxes and standards that pass the costs of environmental and social externalities onto plastic producers. It is important to target these policies at producers rather than consumers, firstly because producers are most directly at fault, and secondly because taxes

on consumers are broadly unpopular and thus have a lower chance of being enacted. A successful example of such a policy is Germany's Green Dot system, which forces manufacturers to account for the costs of collection and recycling of their disposable products by marking them with a green dot.⁸

The use of targeted bans of plastic products—effectively raising the cost of production to the cost of breaking the law—have also proven effective in appropriate political contexts. A vital consideration with taxes, bans, standards and other such policies is state capacity to enforce. However, examples from lower-income countries like India and Kenya prove that such policies can be successfully implemented in countries of all incomes.

Policy Goal 2: Make it cheaper to recycle high-quality plastic

The global plastic recycling market is projected to grow by \$14.74 billion by 2024,⁹ which signals that the market demand for disposable plastics will remain viable for years to come. For this reason, policymakers at all levels of government must invest in more efficient collection and sorting technology. Several cities across Europe and the United States are already making such investments, with San Francisco leading the way. The city of San Francisco already recycles 90% of its waste, with the goal of reaching 100% by 2030.¹⁰

Another policy tool for making recycling cheaper is to invest in domestic markets for goods made from recycled plastics by requiring products to be made with a specified percentage of recycled materials. Such policies rapidly grow markets for recycled goods, incentivizing investments in more efficient and inexpensive technology.

Policy Goal 3: Make sustainable plastic alternatives cheaper

Since no plastic can be endlessly recycled, ultimately all plastic products will still end up in the same place: incinerated or in our land and oceans. This means that long-term, humanity will need incentives to move away from plastics entirely and toward affordable alternatives that don't carry environmental and social costs. Many such alternatives are being developed, though investments remain insufficient. Governments can change that by investing more heavily in research, development, and scaling of plastic alternatives.

Policymakers can also make sustainable plastic alternatives cheaper by rewarding companies that use them. Subsidies and tax breaks for

companies that produce goods using sustainable materials are possible policy tools for achieving this.

Conclusion

Plastic is a modern miracle material. Yet like so many other beneficial human technologies, it's one whose full costs too society have never been fully understood or taken into consideration. Accounting for the sprawling environmental degradation and human suffering caused by the proliferation of plastic waste must ultimately be the chief end of any policy interventions that seek to solve it. Through the three policy goals and specific recommendations outlined in this brief, we hope to chart a viable path toward achieving that end.

Endnotes

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