What do we do about plastics?

April 23 2018, by Steve Cohen

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It's accumulating in the oceans, lakes and rivers; its microbeads are now embedded in our biology; it is disgusting and dangerous and doesn't biodegrade. It's our old friend, plastics. Last week, several New York City Council representatives proposed banning plastic bottles from vendors in our parks. New York State's Assembly has already overturned the city's effort to charge a fee for plastic bags. We've all seen the islands of "floatables" collecting in the oceans. Plastic bags hang from trees and now appear on our political agenda.

The Oceanic Society and NRDC provide some simple steps all of us can take to reduce plastics, but somehow these solutions don't quite measure up to the magnitude of the problem. In a global economy with more and more e-commerce, the things we buy are increasingly packed in plastic and made of plastic. The World Economic Forum's approach is more systemic and seems to attack the root causes of plastic pollution, but much of it is politically infeasible. Their "eight steps to solve the ocean's plastic problem" include:

1. Reduce plastic dependency
2. Increase producer responsibility
3. Increase fees and taxes on polluting plastics
4. Increased waste management where the problem is greatest
5. Implementation of the zero vision for ocean plastic
6. Increased mapping, surveillance and research
7. Stop the flow of plastic waste into the sea
8. Increased funds for clean-up

These ideas are sound, but plastic pollution remains the ultimate "tragedy of the commons." The waterways are generally invisible common or collective resources and the management of our waste stream is highly decentralized. While some localities do a good job of managing waste, others do not have the resources or interest to do much at all.

The fundamental issue of plastic waste must be connected to the overall problem of solid waste, or what most people call garbage. Waste production in the U.S. per capita peaked around the year 2000, but growing population means the volume of waste continues to grow. The volume of waste in rapidly developing nations like India and China is exploding. More waste in the west and in Japan is recycled or treated in some way and less is ending up dumped in landfills. Waste-to-energy plants have become more common, as have anaerobic digesters that use food waste to produce fertilizer and natural gas. Plastics are either

recycled, burned or dumped, but when they are dumped they persist in the environment. Unlike many other forms of waste they do not biodegrade very quickly.

There is one ultimate technological fix to the plastic waste problem: We could develop a plastic that is strong enough to perform the functions required, but capable of breaking down after exposure to common natural processes. I have no idea if that is possible, but perhaps coupled with the steps outlined by the Oceanic Society, NRDC and WEF, we could address this issue. The lifestyle choices of convenience are unlikely to go away, but perhaps we could make a plastic that would be less persistent. Short of that, the most practical element of the solutions proposed is to include a charge for the social cost of plastic convenience in the price of the good. A bottle or bag surcharge or a tax on e-commerce packaging could pay for many of the items proposed in the World Economic Forum's list of solutions. This doesn't require that people give up using plastic, but instead pay the price of keeping it out of our ecosystems. While such a tax might be politically feasible in some places, the United States federal government in 2018 is not one of those places.

Behavior change based on growing understanding of environmental impact is also worth continued exploration. Behavior change based on our preference for convenience is how we ended up with plastic beverage containers. When I was a kid growing up in Brooklyn, my Great Uncle Joe had a job as a "Soda Man." He drove a truck delivering cases of bottled soda and seltzer to our home and picked up the empties. Our milk was delivered in glass bottles to a box on our stoop by the Milk Man. We also returned those bottles. Delivery and pick-up was quite convenient, but these services were knocked out of business by lower-cost, one-way beverage distribution, and the growth of two-income earning households. Someone had to be home to accept the deliveries–the same problem now faced by e-commerce.

Over time we see changes in consumption patterns and culture. The value of protecting the planet from discarded plastic is more widely accepted than it used to be, and could become even more common in the future. It is not unusual to see a student carrying a backpack with a reusable beverage container affixed to the pack. For the past decade, at Columbia Earth Institute events we've provided New York City tap water to participants served in reusable glass containers. Building awareness of the problems of plastic waste is essential to building the value and cultural change that will result in new consumption patterns. It may also result in the public policies needed to include the full cost of plastic bottle convenience in the price of the bottle.

The modern economy is built on one-way production, transport and consumption. Changing consumption patterns can help reduce waste generation and enhance waste management, but in the long run we need to develop a circular economy based on renewable resources. The energy and materials the economy requires must be renewable. The collection of waste will need to be connected to a waste processing system that reuses all resources. Materials will be sorted and reprocessed for re-use. We are many decades away from the technology needed for such an economy, but in the long run that is the solution to plastic and other forms of unmanaged waste.

The economics of raw materials makes mining and dumping materials cheaper than "mining" materials from the waste stream. But the environmental damage of most mining is not included in the price of raw materials, providing a hidden subsidy to raw materials mining. Still, the economics of recycling will advance with technology, and the price of finite un-mined materials will go up as demand increases and supply diminishes. The long term future for the circular economy holds promise.

Which still leaves the problem of the short term and the exponential

increase in plastic waste we may see in the coming decades. In the short run, the Oceanic Society and NRDC are on the correct path. We need to build understanding of the problem of persistent plastics. We need local policies to encourage better waste management, more recycling and less use of plastics in the first place.

Plastics are a symptom of the type of economy we've built. It will take a paradigm shift to build a more sustainable economy. We are at the start of that process, and my hope is that the planet and its people will be able to reduce waste in the old throw-away economy while we build a new renewable one.

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