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N.C. Bar Association Sustainability Essay Contest

29 May 2020

Plastic Empire: Local Solutions for a Global Scourge

Since the 1950s, plastic has altered the way we live in ways most of us barely notice. It can be found in a surprising number of items that populate our lives such as consumer packaging, electronics, clothing, toys, and even chewing gum. The variety of uses for it is unfathomable, spurred on by its versatility, durability, and low production cost. Indeed, plastic makes everything easier and more convenient by encouraging the disposable consumer culture that we have all grown accustomed to. Yet, what we are sacrificing in return is the health of our planet and its inhabitants. The good news is that consumers are starting to care, and municipalities are eager to relieve their overflowing landfills. This provides a timely opportunity for North Carolina to position itself in the forefront of tackling the crisis by forging a path away from dependence on plastic, and to serve as a paragon of responsibility to humanity and the earth.

Rise of an Empire

As a byproduct of extracting and refining fossil fuels, a staggering 8.3 billion metric tons of plastic have been produced since its invention (Geyer et al.), and most of it ends up in landfills or as litter. Because it decomposes very slowly, the majority of it will be with us for hundreds of

years. Scientists estimate that by the year 2050, our oceans will contain more plastic than fish (World Economic Forum, et al.17), and over 12 billion metric tons of it will reside in landfills. Plastic manufacturing, particularly that which is designated for single-use, has increased by 8% each year (Geyer et al.). With an estimated \$130 billion dollars being invested into new or expanded U.S. plastic production facilities (Moore et al. 2), there are no signs of slowing down. Globally, consumers are using up to a trillion disposable plastic bags each year (Larsen & Venkova), and a million disposable plastic bottles every minute (Laville & Taylor). As the shocking discovery of the swirling plastic vortex in the Pacific Ocean illustrates, it has become ubiquitous in our economy, and a most pervasive and persistent pollutant to our environment.

Scourge of the Earth

There is no escape from the harrowing images depicting washed up whales with stomachs full of plastic, birds with their beaks bound in 6-pack rings, and turtles with straws embedded in their noses. Still, beyond these glaring examples are a multitude of more insidious threats to our critical ecosystems, wildlife, and human health.

Microplastics, tiny plastic particles resulting from the breakdown of larger plastic objects, are now being recognized as a global hazard on a massive scale (Hale et al.). Simply opening a disposable plastic bottle releases thousands of them (Li), and synthetic textiles such as nylon and polyester shed off a profusion of them with every wash (Almroth, et al.). Tires are one of the biggest polluters of microplastics, abrading around 1.8 million tons each year in the U.S. alone (Whitaker). Traveling on ocean and wind currents, they have been discovered deep down on sea basins (Gibbens) and high up on mountaintops (Carrington), with the polar regions bearing some of the greatest loads (Hislop). Due to their small size, they can be ingested or inhaled, with the

tiniest particles able to pass into the bloodstream (Leahy). They bioaccumulate up the food chain and are being detected within living organisms all around the world. Alarmingly, humans eat, drink and breathe in more than 125,000 particles each year (Cox, et al.).

Plastics, including microplastics, both attract and leach harmful chemicals that potently build up over time, and are taken in by fish, wildlife, and humans (Gallo, et al.). Bisphenols like BPA, the primary building blocks of plastic, have been linked to many serious adverse health effects (Vandenberg, et al.). Because it is found in most water bottles and food packaging, virtually everyone on the planet harbors BPA in their body (Mitro, et al.). Adding insult to injury, plastic is notoriously spongy, able to readily bind with other harmful chemicals such as PCBs and inorganic compounds like heavy metals (Gallo, et al.), associated with profound health implications, including death, at relatively low doses (Sullivan, et al.).

Converting fossil fuels into plastic requires several stages of production that pollute the air with a great number of toxic emissions, namely persistent organic pollutants (POPs). With a capacity for getting swept up by wind currents, environmental contamination by POPs is extensive ("Persistent"). After production, plastic can easily off-gas the structurally enhancing additives it contains, such as phthalates, poisoning the air we breathe and the products we consume (Fortuna, et al.). Phthalates are known endocrine disruptors associated with a deluge of health problems (Elter, et al.). Later, the majority of plastic ends up in landfills, where it generates powerful greenhouse gases and leaches many detrimental chemical contaminants into the groundwater as it breaks down (Azoulay 62-63). Furthermore, approximately 12% of plastic waste is incinerated, which releases POPs, heavy metals, and other hazardous chemicals into the atmosphere that comes to rest on vegetation and in waterways, eventually being consumed by

animals and humans. These extremely harmful and potentially lethal pollutants can wreak havoc on biological functions (Azoulay 44-45).

Pillars of the Problem

In the United States, less than 10% of all plastic is recycled (*Advancing*) and of that, a third is exported (Albeck-ripka). Making little economic or environmental sense, our nation has shipped close to 3 million containers full of 15 million tons of our plastic waste around the world over the last 10 years. In addition to contributing to climate change with enormous amounts of freight carbon emissions, we are unloading in countries that are not able to manage it all, thus creating more plastic pollution (Dell). Ostensibly an easy way to recycle while avoiding local costs and dilemmas, in actuality, many municipalities in North Carolina are paying other countries to take their plastic waste and have no control over what is done with it (Harrison). Beginning in 2018, some of the largest markets, including China, began heavily regulating and limiting U.S. plastic exports, essentially bringing it to a halt (O'Neill). Having become dependent on offshoring our garbage, this has led to a crisis as the United States tries to deal with the exacerbation of an already mountainous plastic waste problem.

Plastic recycling programs are exorbitantly expensive, with estimates in North Carolina upward of \$70 a ton, compared to \$33 a ton to dispose in a landfill (Harrison). Compounding the cost is contamination by food waste and consumer confusion over what is recyclable, with a wide variety of plastics that can't be recycled (Szaky). Machines do some of the separating, but the majority of it is labor-intensive (Harrison). For recycling to work, municipal programs must have buyers for the bulk scrap to recoup the costs of curbside collection and processing. In truth, there is not a big market for plastic. Unlike aluminum and glass, plastic significantly degrades

each time it is recycled, and can only be made into lower quality products once or twice (Holmes). Additionally, recycling plastic necessitates a complicated manufacturing process that is more expensive than producing it from new materials (Lee), thereby decreasing demand. Because of this, the market for recyclable plastic is collapsing nationwide, forcing many local governments to scale back or suspend their recycling programs (Harrison).

In the midst of this growing ecological disaster, many governments have taken steps to limit single-use plastic and reduce the burden on landfills. Most of the action taken is centered around bans and levies on individual disposable items. However, these strategies have proven to be largely ineffective due to a lack of enforcement, and have also given rise to the use of other items outside of the bans that further the negative impact on the environment (Giacovelli, et al. 65). North Carolina enacted a state law in 2009 banning the disposal of plastic bottles in landfills. While there was an uptick in recycling at first, the ban was never enforced, and more than a billion plastic bottles are still going to landfills every year (Stradling).

Externalizing the costs their products incur by shifting the onus of responsibility onto the public, plastic manufacturers have effectively obscured the source of the problem, leaving governments and consumers burdened with something they have no control over. Recycling, bans, and levies will never clean up the mess that continues to mount. Ultimately, producers must be held accountable for allowing the pollution of plastic.

Reign of Sustainability

North Carolina, like the rest of the world, is facing an enormous challenge that demands fundamentally rethinking our approach to plastic. It is critical that immediate and radical measures are taken to rescue our environment, our health, and our economy. With a greater

awareness of environmental issues, North Carolina's leaders can expect robust public support as they implement an aggressive campaign devoted to this escalating ecological emergency.

Continually remediating the symptoms of the plastic crisis is not economically viable, and we must develop the framework for a systemic transition towards sustainability. This will require a scalable, multi-pronged approach, with the objective of eliminating plastic altogether and replacing it with fully biodegradable or cleanly recyclable alternatives.

Part of doing business in North Carolina must include environmental protection, and strong policy actions should be taken that will lead to plastic no longer being produced, sold, or used within the state. Firm deadlines, disclosure agreements, and special attention paid to the composition of plastic alternatives to be utilized is imperative. Additionally, laws that extend a producer's responsibility for the waste their products become will encourage innovation and provide relief to our waste collection and recycling infrastructures.

Our waste management systems need to put an end to all waste exports and evolve into more efficient entities. This is accomplished by focusing solely on items that can be sterilized and reused, and on materials that can be recycled an unlimited number of times without degradation. Making it simpler for citizens to participate by developing a phone application with clear guidelines could go a long way in reducing contamination. In addition, reinstating container deposit programs, that once boasted up to a 97% return rate ("Bottle"), would likely boost compliance. These transformations, along with the creation of a market that is fueled by producers, could generate profits and a clean economy.

In every community, a network of stakeholders should be assembled, including policy makers, representatives from key organizations, and ordinary citizens. Motivated only by the

desire for ecological justice, this group would be responsible for spearheading initiatives as we progress into plastic-free societies. Some of their functions might include conducting research, helping local businesses with the transition, enabling grassroots solutions, recruiting volunteers, organizing clean-up efforts, fundraising, and engaging the public. Additionally, ideas, knowledge, and best practices could be shared with other communities across North Carolina.

At the state level, grants and interest-free loans aimed at incentivizing businesses to reduce their plastic footprint, and public-private investment opportunities to encourage and fund innovation could be established. Central to the objective would be seeking out new solutions that have the power to shift paradigms. Of particular importance is replacing plastic with renewable resources that are native to North Carolina and provide benefits to the environment as they break down. Finally, awarding businesses and communities with badges of honor, tax breaks, and other incentives for meeting plastic-free targets would be a positive way to foster a sense of pride, and unite governments and citizens behind the shared pursuit of a sustainable future.

From the cradle to the grave, plastic is a problem of increasingly complex dimensions. As it has stealthily infiltrated our lives, the devastation it has caused is unconscionable. Bold, unyielding resolve for the preservation of our planet is urgently needed, and North Carolina has an opportunity to set an example for the nation by trailblazing the way towards a plastic-free society. Although a challenging and arduous endeavor, it promises a sustainable way of life that we can pass along to future generations.

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